U.S. DEPARTMENT OF ENERGY
STRATEGIC PETROLEUM RESERVE
PROJECT MANAGEMENT OFFICE
NEW ORLEANS, LOUISIANA

Site Environmental Report
for
Calendar Year 1995

Department of Energy
Strategic Petroleum Reserve Project Management Office
900 Commerce Road East
New Orleans, Louisiana 70123

June 18, 1996

Distribution:

SITE ENVIRONMENTAL REPORT FOR 1995 - STRATEGIC PETROLEUM RESERVE

Enclosed for your information is a copy of the Site Environmental Report for Calendar Year 1995 for the U.S. Department of Energy's Strategic Petroleum Reserve. This report is prepared and published annually for distribution to local, state, and federal government agencies, the Congress, the public, and the news media. The report was prepared for the Department of Energy by DynMcDermott Petroleum Operations Company.

To the best of my knowledge, this report accurately summarizes and discusses the results of the 1995 environmental monitoring program.

If you have any questions or desire additional information, please contact Dr. Brent Smith of the Project Management Office Environmental, Safety and Health Division at (504) 734-4970.

Sincerely,

William C. Gibson, Jr.
Project Manager

Enclosure

STRATEGIC PETROLEUM RESERVE

SITE

ENVIRONMENTAL REPORT

FOR

CALENDAR YEAR 1995

Document No. ASE5400.49 Rev. AO

Prepared for the Department of Energy
Strategic Petroleum Reserve Project Management Office
under Contract No. DE-AC96-93PO18000

DYNMCDERMOTT PETROLEUM OPERATIONS COMPANY
850 South Clearview Parkway
New Orleans, Louisiana 70123

May 31, 1996

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ABBREVIATIONS AND ACRONYMS

ac	acre
adj	adjacent
ADM	action description memorandum
AFFF	aqueous film forming foam
AO	administrative order
ARCO	Atlantic Richfield Company
As	arsenic
AST	aboveground storage tanks
ASTM	American Standard Testing Methods
avg	average
bbl	barrel(s) (1 bbl = 42 gallons)
BC	Bayou Choctaw
BDL	below detectable limit
BH	Big Hill
bldg	building
bls	below land surface
BM	Bryan Mound
BMP	best management practices
BOD_5	five day biochemical oxygen demand
CAA	Clean Air Act
CAP	corrective action plan
°C	degrees Celsius
CEQ	Council for Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act

ABBREVIATIONS AND ACRONYMS (continued)

CESQG	conditionally exempt small quantity generator
CFR	Code of Federal Regulations
Ci	curies
cm	centimeter
CO	carbon monoxide
COD	chemical oxygen demand
COE	United States Army Corps of Engineers
CV	coefficient of variation
CWA	Clean Water Act
CX	categorical exclusion
CY	calendar year
DM	DynMcDermott Petroleum Operations Company, Inc.
DMR	discharge monitoring report
DO	dissolved oxygen
DOE	United States Department of Energy
DOT	United States Department of Energy
DPRP	Discharge Prevention and Response Plan
EA	environmental assessment
EIQ	emissions inventory questionnaire
EIS	environmental impact statement
EO	executive order
EPA	United States Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
ERT	emergency response team

ABBREVIATIONS AND ACRONYMS (continued)

ERO	emergency response organization
ESA	Endangered Species Act
ES&H	Environmental Safety & Health
F&WS	United States Fish and Wildlife Service
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FONSI	finding of no significant impact
FRP	Facility Response Plan
ft	feet
GALCOE	U.S. Army Corps of Engineers, Galveston Division
GLO	General Land Office
ha	hectare
HAP	hazardous air pollutant
H_g	mercury
HPP	high pressure pump pad
HQ	headquarters
HW	hazardous waste
ICW	Intracoastal Waterway
in	inch
km	kilometers
LA	Louisiana
lab	laboratory
LAC	Louisiana Administrative Code
lbs	pounds
LDEQ	Louisiana Department of Environmental Quality

ABBREVIATIONS AND ACRONYMS (continued)

LPE	laboratory performance evaluation
LWDPS	Louisiana Water Discharge Permit System
LDNR	Louisiana Department of Natural Resources
LDOTD	Louisiana Department of Transportation and Development
LDWF	Louisiana Department of Wildlife and Fisheries
m^3	cubic meters
m/sec	meters per second
maint	maintenance
max	maximum
MBI	methylenebis
mCi	millicuries
mg/l	milligrams per liter
mi	miles
M&O	management & operations contractor
mmb	million barrels
NAAQS	National Ambient Air Quality Standards
NE	northeast
NEPA	National Environmental Policy Act
NFRAP	No Further Remedial Action Plan
NHPA	National Historic Preservation Act
NORM	naturally occurring radioactive material
NO_x	nitrogen oxide
NOV	notice of violation
NPDES	National Pollutant Discharge Elimination System

ABBREVIATIONS AND ACRONYMS (continued)

NPL	National Priority List (CERCLA)
NRC	National Response Center
NSR	new source review
NV	not a valid or statistically meaningful number
NW	northwest
NWP	nationwide permit
O&G	oil and grease
OPA	Oil Pollution Act
Ops	operations
OVA	organic vapor analyzer
PCB	polychlorinated biphenyl
pH	negative logarithm of the hydrogen ion concentration (acidic to basic on a scale of 0 to 14, 7 is neutral)
PM_{10}	particulate matter (larger than 10 microns)
PMO	Project Management Office
PPA	Pollution Prevention Act of 1990
ppt	parts per thousand
PREP	Preparedness for Response Exercise Program
PSD	prevention of significant deterioration
QA	quality assurance
QC	quality control
RCRA	Resource Conservation and Recovery Act
RCT	Railroad Commission of Texas
RPX	recovery pump exercise
ROW	right-of-way

ABBREVIATIONS AND ACRONYMS (continued)

RWIS	raw water intake structure
SAL	salinity
SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act
Se	selenium
SE	southeast
SIP	state implementation plan
SJ	St. James Terminal
SOC	security operations center
SO_2	sulfur dioxide
SOW	statement of work
SPCC	Spill Prevention Control and Countermeasures Plan
SPR	Strategic Petroleum Reserve
SQG	small quantity generator
STP	sewage treatment plant
S.U.	standard units
SW	southwest
TDH	Texas Department of Health
TDH&PT	Texas Department of Highways and Public Transportation
TDS	total dissolved solids
TNRCC	Texas Natural Resource Conservation Commission
TOC	total organic carbon
TPDES	Texas Pollution Discharge Elimination System
TPQ	threshold planning quantity

ABBREVIATIONS AND ACRONYMS (continued)

tpy	tons per year
TSCA	Toxic Substance Control Act
TSS	total suspended solids
TWC	Texas Water Commission
TX	Texas
UIC	underground injection control
UST	underground storage tank
USCG	United States Coast Guard
VOC	volatile organic compound
WH	West Hackberry
WI	Weeks Island
yd	yard

EXECUTIVE SUMMARY

The purpose of this Site Environmental Report (SER) is to characterize site environmental management performance, confirm compliance with environmental standards and requirements, and highlight significant programs and efforts. The SER, provided annually in accordance with Department of Energy (DOE) Order 5400.1, serves the public by summarizing monitoring data collected to assess how the Strategic Petroleum Reserve (SPR) impacts the environment. This report (SER) provides a balanced synopsis of non-radiological monitoring and regulatory compliance data and affirms that the SPR has been operating within acceptable regulatory limits.

Included in this report is a description of each site's environment, an overview of the SPR environmental program, and a recapitulation of special environmental activities and events associated with each SPR site during 1995. Two of these highlights include decommissioning of the Weeks Island facility, involving the disposition of 11.6 million m^3 (73 million barrels) of crude oil inventory, as well as the degasification of over 4.5 million m^3 (30 million barrels) of crude oil inventory at the Bryan Mound and West Hackberry facilities. The decision to decommission the Weeks Island facility is a result of diminishing mine integrity from ground water intrusion. Transfer of Weeks Island oil began in November, 1995 with 2.0 million m^3 (12.5 million barrels) transferred by December 31, 1995. Degasifying the crude oil is a major pollution prevention initiative because it will reduce potentially harmful emissions that would occur during oil movements by three or more orders of magnitude. Spills to the environment, another major topic, indicates a positive trend. There were only two reportable oil and three reportable brine spills during 1995, down from a total of 10 reportable spills in 1994. Total volume of oil spilled in 1995 was 56.3 m^3 (354 barrels), and the total volume of brine spilled was 131.1 m^3 (825 barrels). The longer term trend for oil and brine spills has declined substantially from 27 in 1990 down to five in 1995. All of the spills were reported to appropriate agencies and immediately cleaned up, with no long term impacts observed.

All of the SPR sites were inspected or visited on 13 occasions by outside regulatory agencies (Louisiana Department of Environmental Quality, Railroad Commission of Texas, U. S. Army Corps of Engineers, Texas Natural Resource Conservation Commission, and the Jefferson Parish Environmental Department) during 1995. No unresolved or substantial concerns resulted from these visits. Eleven minor noncompliances were self reported under state and federal discharge permits for all SPR sites during 1995, and one Notice of Violation (NOV) was received for an improper waste manifest at Weeks Island. The SPR continues to address ground water contamination from the brine pond and buried piping at West Hackberry with positive results. Also, the SPR has removed its underground storage tanks (USTs) and replaced them with aboveground storage tanks. Administrative closure of UST removals was in process at three SPR sites and completed at the fourth site at the end of 1995.

The SPR sites generally operate as either Conditionally Exempt Small Quantity Generators (CESQG) in Texas, or Small Quantity Generators (SQG) in Louisiana (the smallest level generator in each state). The SPR sites do not treat, store, or dispose of hazardous wastes. Superfund Amendments and Reauthorization Act (SARA) Title III Tier Two reports are prepared and submitted to agencies every year detailing the kinds and amounts of hazardous substances on SPR facilities.

Two National Environmental Policy Act (NEPA) review actions in 1995 required Environmental Assessments (EAs) with accompanying Findings of No Significant Impact (FONSIs). The FONSI for the Weeks Island Decommissioning was issued on 12/01/95, and the one for the leasing of the St. James Terminal was issued on 01/26/95.

National Pollutant Discharge Elimination System (NPDES) permit renewal applications were found administratively complete by the Environmental Protection Agency (EPA) in 1995 allowing applicable sites to continue to operate. A renewed NPDES permit was issued for Bryan Mound in 1995, with applications for the other sites still pending. Further, each SPR site operates in accordance with a Pollution Prevention Plan prepared in

accordance with the storm water general permits. The SPR met its drill and exercise requirements for 1995 under the Oil Pollution Act of 1990 through the National Preparedness for Response Exercise Program (PREP).

Internal self-assessments at the SPR sites during 1995 identified a total of 23 Category II findings (Administrative) and eight Category III findings (Best Management Practice). No findings indicated environmental degradation occurring.

The SER also characterizes environmental management performance and programs pertinent to the SPR. The active permits and the results of the environmental monitoring program (i.e., air, surface water, ground water, and water discharges) are discussed within each section by site. The quality assurance program is presented which includes results from laboratory and field audits and studies performed internally and by regulatory agencies.

The following page contains a Questionnaire/Reader Comment Form which may be utilized to submit questions or comments to the originator for response.

QUESTIONNAIRE/READER COMMENT FORM

The 1996 Strategic Environmental Report, slated for publication in 1997, will be updated with new and pertinent user comments.

Please submit your questions/comments on a photocopy of this page and forward it to the following address:

DynMcDermott Petroleum Operations Company
Environmental Department, EF-83
850 South Clearview Parkway
New Orleans, LA 70123

A copy of your comments will be sent to the originator for response.

Date: _____

Name of Submitter: _____

Street or P.O. Box: _____

City/State/Zip code: _____

Organization (if applicable): _____

Comments:

_____

_____

_____

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_____

(Attach other sheets as needed)
(for originator's use)

Subject Matter Expert (SME): _____ Date: _____

SME's Response: _____

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_____

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1. INTRODUCTION

The purpose of this Site Environmental Report (SER) is to present summary environmental data so as to characterize site environmental management performance, confirm compliance with environmental standards and requirements, and highlight significant programs and efforts.

The creation of the Strategic Petroleum Reserve (SPR) was mandated by Congress in Title I, Part B, of the Energy Policy and Conservation Act (P.L. 94-163), of December 22, 1975. The SPR provides the United States with sufficient petroleum reserves to mitigate the effects of an oil supply interruption.

The SPR consists of five active Gulf Coast underground salt dome oil storage facilities (three in Louisiana and two in Texas), a marine terminal facility (in Louisiana), and an administrative facility (in Louisiana). The SPR employed approximately 1,300 government and contractor personnel at these facilities during 1995. Figure 1-1 is a regional map showing the relative location of SPR facilities.

Three of the five storage sites, Bayou Choctaw, Bryan Mound, and West Hackberry, were acquired with existing solution-mined caverns and subsequent additional solution mining. The fourth site, Weeks Island, is a room and pillar salt mine, previously created by mechanical underground mining techniques and converted by the SPR to storage. The fifth storage site, Big Hill, was created entirely by solution mining. Weeks Island is undergoing decommissioning, and the St. James Terminal is being proposed for commercialization either by sale or lease.

The pipeline terminals currently used by the SPR are the ARCO Terminal (Texas City, Texas), the Phillips Docks and Jones Creek Tank Farm (Freeport, Texas), the Sunoco Pipeline Terminal (Nederland, Texas), the Capline and LOCAP Pipeline Terminal from LOOP (St. James, Louisiana), the Texas 22 to Lake Charles refineries, and the SPR St.

James Terminal. The sites are also capable of distributing crude oil via tank ships. Descriptions of the individual sites with photographs (Figures 1-2 through 1-8), follow. Section 5, Figures 5-1 through 5-7, provide the site-specific configurations.

Each site's crude oil storage capacity and 1995 year-end inventory is illustrated in Table 1-1.

Table 1-1. Site Storage Capacities/Inventories

Site	Capacity	Inventory (Dec 31, 1995)
BC	11.4 million m^3 (72 mmb)	9.3 million m^3 (58.8 mmb)
BH	25.6 million m^3 (160 mmb)	7.8 million m^3 (48.8 mmb)
BM	35.9 million m^3 (226 mmb)	34.6 million m^3 (217.8 mmb)
SJ	0.3 million m^3 (2 mmb)	103,864 m^3 (653,305 bbl)
WH	34.8 million m^3 (219 mmb)	32.4 million m^3 (203.8 mmb)
WI	11.6 million m^3 (73 mmb)	9.5 million m^3 (59.6 mmb)

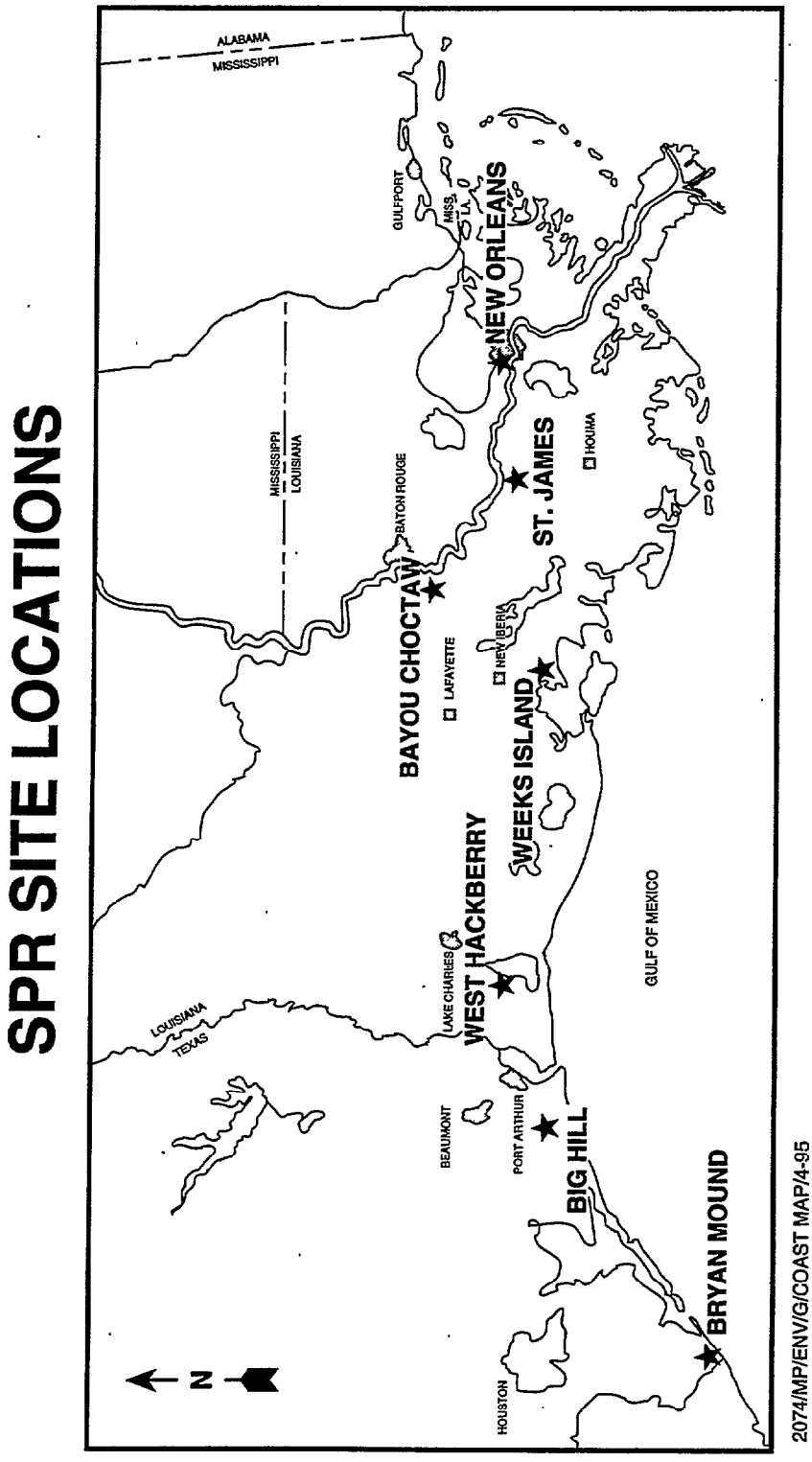

Figure 1-1. SPR Site Locations

1.1 BAYOU CHOCTAW

The Bayou Choctaw (BC) site is located on the west side of the Mississippi River, 19.3 km (12 mi.) southwest of Baton Rouge in Iberville Parish, Louisiana (Figure 1-2). The site consists of a primary operational area and a brine disposal area occupying approximately 69 and 81 hectares (ha) (168 and 200 acres (ac)) respectively. The area surrounding the site is rural with a number of people living in small settlements along the nearby highways. The nearest communities are Addis to the northeast and Plaquemine to the southeast. Baton Rouge, the Louisiana State Capital and the major source of housing and services for the site, is within easy commuting distance.

The habitat surrounding the site is a freshwater swamp. Elevation ranges from approximately 1.5 to 3.0 m (five to ten ft) above sea level. Although there are no clear topographic expressions in the area, major surface subsidence has occurred creating substantial areas of bottomland hardwoods and swamp with interconnecting waterways. The site proper is normally dry and protected from spring flooding by the site's flood control levees and pumps. The collapse of a solution-mined cavern in 1954 resulted in the formation of a 4.9 ha (12 ac) lake, Cavern Lake, on the north side of the site.

Bottomland hardwood forest and deciduous swamps are predominant at the Bayou Choctaw site. The vegetation at the site includes bald cypress, sweetgum, water tupelo (characteristic of lowland areas), bulltongue, and spikerushes. Water oak is also present but not abundant. The deciduous swamp is the most widespread habitat type found at the site. It provides resources for a large

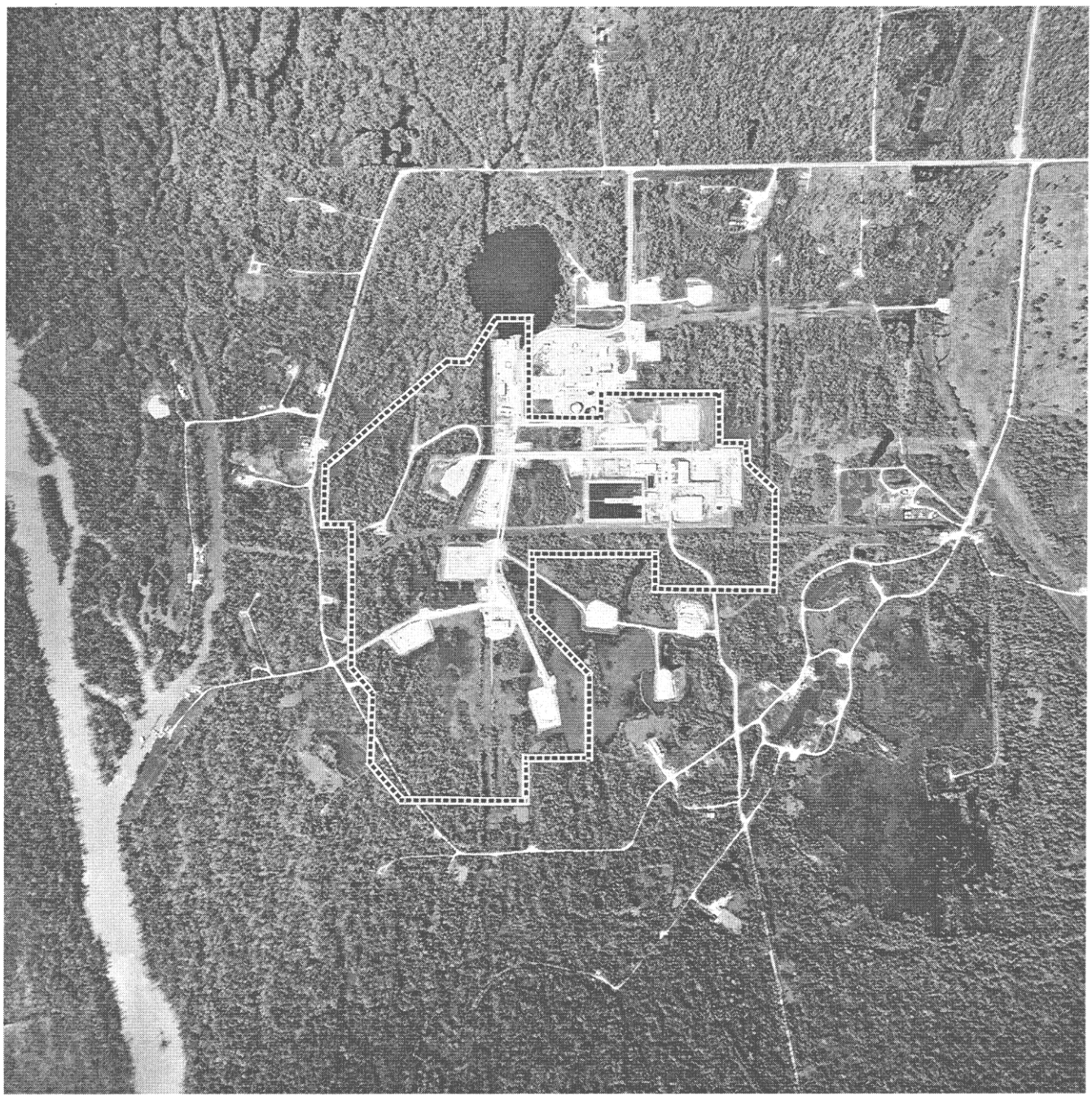

Figure 1-2. Bayou Choctaw SPR Site

number of wildlife. Bird species common at Bayou Choctaw are heron, ibis, egret, woodpecker, wood duck, thrush, American anhinga, and American woodcock. Raptors are commonly observed perching in the area. The southern bald eagle, an endangered species, has one nest within one mile of the Bayou Choctaw - St. James crude oil pipeline, and a second has been identified within the regional area of the site. Other endangered species of raptors may occasionally appear near the Bayou Choctaw facility or along its pipeline right-of-ways. Inhabitants of the bottomland forest and swamp include opossum, squirrel, nutria, mink, river otter, raccoon, swamp rabbit, white-tailed deer, and snakes. The American alligator, classified as "threatened by similarity of appearance," is frequently found in and adjacent to the site.

The site is located near the intersection of several major bayous and waterways. The Intracoastal Waterway (Port Allen Canal) passes in a north-south direction one km (0.6 mi) west of the site. The Intracoastal Waterway extends to the north and then turns eastward through the Port Allen Locks to enter the Mississippi River at Baton Rouge. In the area of the site, the Intracoastal Waterway is part of Choctaw Bayou, a natural waterway. Smaller canals and bayous, such as Bayou Bourbeaux, the North-South Canal, and the East-West Canal, enter the site area and continue to Bull Bay and the Intracoastal Waterway.

The Bayou Choctaw site will be used to store 11.4 million m^3 (72 mmb) of crude oil. The 1995 year-end inventory is 9.3 million m^3 (58.8 mmb). Currently, there are six solution-mined caverns at this storage site. An existing cavern, Number 18, was expanded by solution mining to

enhance the overall storage capacity of the Bayou Choctaw SPR site. Raw water is provided from Cavern Lake. Brine is transported via pipeline to 12 brine disposal wells located approximately 3 km (2 mi) south of the site. There is a 91 cm (36 in) crude oil pipeline 58 km (36 mi) long that connects the site to the St. James Terminal.

1.2 BIG HILL

The Big Hill (BH) site is located in Jefferson County, Texas, approximately 109 km (68 mi) east of Houston, 37 km (23 mi) southwest of Port Arthur, and 14 km (9 mi) north of the Gulf of Mexico. Only small unincorporated communities are located near the site. The rural area around the site (Figure 1-3) is used primarily for rice farming, cattle grazing, and oil and gas production. The permanent work force is supplied in small part from the local area, with the remainder moving into the area or commuting from Beaumont or Port Arthur. The site is situated on approximately 111 ha (275 ac) of land on the Big Hill salt dome. Surface elevations reach 10 m (35 ft) above sea level, the highest elevations in the region. The agricultural and pasture land uses around Big Hill are typical of the region.

Approximately one km (0.6 mi) south of the dome is the northern boundary of fresh to intermediate marsh which grades into brackish and saline marsh toward the Gulf of Mexico. The nearby waterways include Spindletop Ditch, approximately five km (three mi) south of the site, which connects to the Intracoastal Waterway located three km (two mi) further south and oriented in a northeast to southwest direction. Freshwater impoundments are located south of the site. Numerous sloughs, bayous, and lakes,

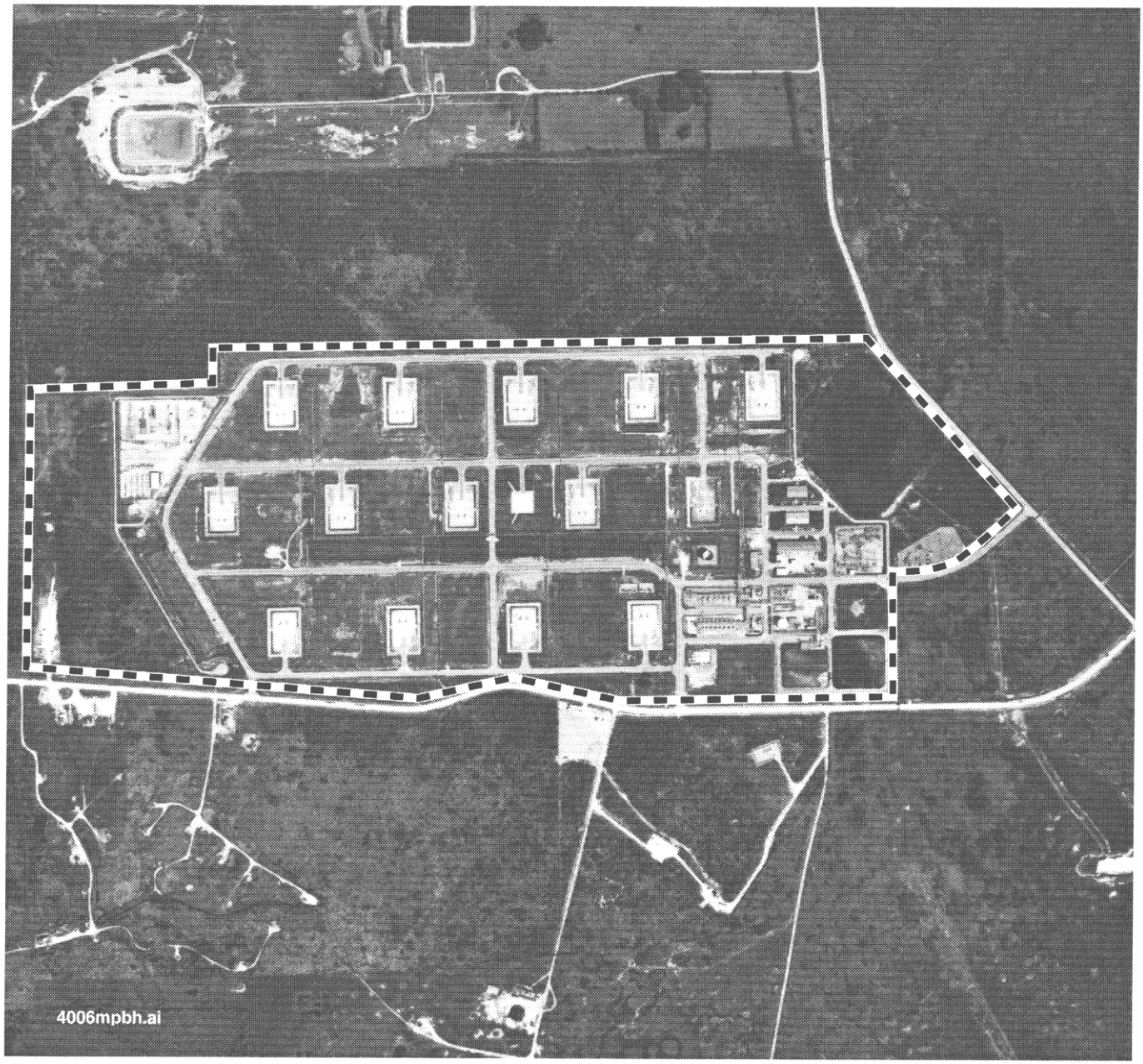

Figure 1-3. Big Hill SPR Site

including Willow Slough Marsh, Salt Bayou, Star Lake, and Clam Lake, connect with the Intracoastal Waterway. Natural ridges (cheniers) paralleling the coastline isolate the marsh from the Gulf of Mexico. Existing habitats in the vicinity of the site are related to agricultural use. There are petroleum-related industrial operations on and off the salt dome which have altered land use.

There are two ponds present on the eastern edge of the dome, one of which is located on the northeast corner of the site and the other just north of the site. The upland habitat, which comprises the majority of the site, consists of many tall grasses such as bluestem, indiangrass, switchgrass, and prairie wildgrass. A few 150 year old live oak trees are present on the site. Identified bird concentrations and rookeries are about eight km (five mi) south and west of the site.

No rare, threatened or endangered species habitat is identified in the vicinity of the Big Hill site on the Texas Natural Resource Conservation Commission (TNRCC), formerly Texas Water Commission, Coastal Regional Spill Response Map. The paddlefish, a state regulated species, has been identified in Taylor Bayou in the vicinity of the oil pipeline crossing. Fauna typical in the area include coyote, pocket gopher, rabbit, raccoon, rodents, snakes, turtle, and numerous upland game birds and passerines. The nearby ponds and marsh south of the site provide excellent habitat for the American alligator. The McFaddin National Wildlife Refuge located south of the site provides important habitat for over-wintering waterfowl.

The Big Hill site capacity is 25.6 million m^3 (160 mmb) of crude oil in 14 caverns, but the present inventory is 7.8 million m^3 (48.8 mmb). Appurtenant facilities include a raw water intake structure 8.4 km (5.2 mi) away on the Intracoastal Waterway with a 107 cm (48 in) pipeline extending to the site, a 107 cm (48 in) brine disposal pipeline extending 15.1 km (9.4 mi) onshore and 7.6 km (4.7 mi) offshore in the Gulf of Mexico, and a 39.3 km (24.4 mi) 91 cm (36 in) pipeline for transporting crude oil between the site and the Sunoco Terminal in Nederland, Texas. The brine pipeline has a series of brine diffuser nozzles which disperse and mix brine with receiving sea water.

1.3 BRYAN MOUND

The Bryan Mound (BM) site is located in Brazoria County, about 105 km (65 mi) due south of Houston, Texas, and five km (3 mi) south of Freeport, Texas, on the east bank of the Brazos River Diversion Channel, near the Gulf of Mexico. The area is highly industrialized, and includes several petrochemical related facilities. Approximately 50 percent of the area's population work in the local area, although many commute to work from outside the immediate vicinity.

The site occupies 202.3 ha (500 ac) in the southwest apex of a triangle formed by the Brazos River Diversion Channel, the old Brazos River, and the Intracoastal Waterway. A U.S. Army Corps of Engineers silt gate controls the flow of water between the Intracoastal Waterway and the Diversion Channel. A levee parallels the Diversion Channel in a southern direction from Freeport until due west of the site. The levee then turns east, bisecting the site.

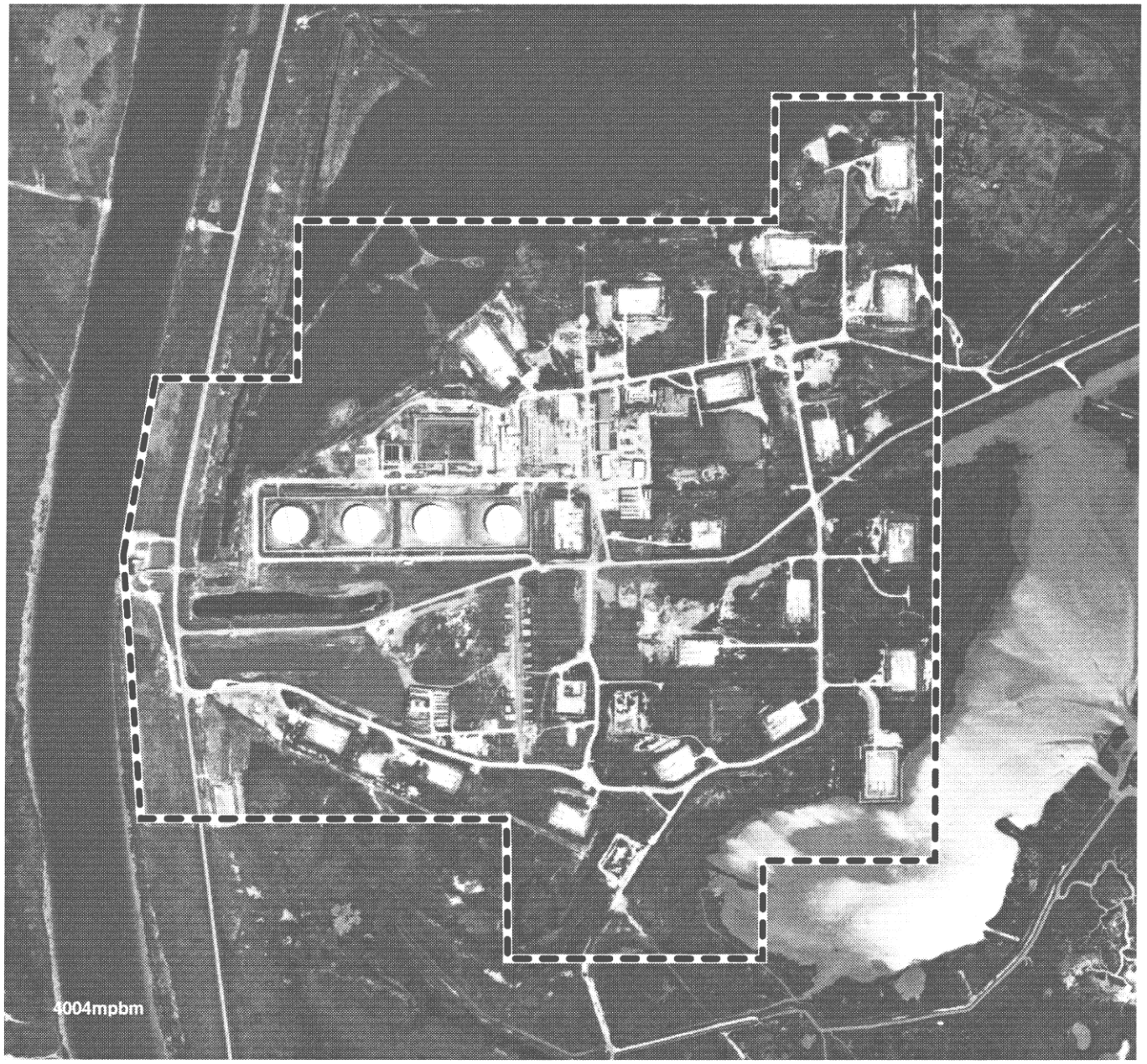

Figure 1-4. Bryan Mound SPR Site

Figure 1-4 shows the major water bodies near the site, Blue Lake to the north, and Mud Lake to the southeast. These water bodies generally define the mounded aspect of the Bryan Mound dome, which creates a surface expression in the terrain by rising approximately five meters (15 ft) above the surrounding wetlands. Although Blue Lake is within the protective triangle formed by the levee system, with excess rainwater drained off by two large pump stations operated by the city of Freeport, there is some drainage through culverts southward into the Intracoastal Waterway. Mud Lake, on the other hand, is connected by a slough to the Intracoastal Waterway.

The marsh and prairie areas surrounding Bryan Mound are typical of those found throughout this region of the Texas Gulf Coast. Brackish marshland dominates the low-lying portions of the site in all but the northern area, where the coastal prairie ecosystem extends along the levee paralleling the Brazos River Diversion Channel. The coastal prairie is covered with medium to very tall grasses which form a moderate to dense cover for wildlife. These grasses also occur in unmowed "natural" site areas. Those areas periodically inundated by tidal waters are dominated by cordgrass.

A diverse range of habitats is created by water bodies surrounding Bryan Mound. Marshes and tidal pools, such as Mud Lake and Bryan Lake, which connect with the Gulf of Mexico by way of the Intracoastal Waterway or the Brazos River, are ideal habitats for a variety of birds, aquatic life, and mammals. Migratory waterfowl, common egret, snowy egret, great blue heron, killdeer, least tern, and black-necked stilt (the latter two are Texas state-protected species), as well as nutria, raccoon, skunk, rattlesnake, turtles, and frogs can be found on

and in the area surrounding Bryan Mound. No federally endangered or threatened species are found on the site; however, brown pelican, piping plover, and peregrine falcon inhabit nearby areas. Whooping cranes have been recorded occurring just across the Brazos River Diversion Channel to the southwest of the site.

Shrimp, crab, trout, flounder, and redfish are abundant in Mud Lake during various seasons of the year. Black drum, mullet, gar, and blue crab are found in Blue Lake.

Bryan Mound has a total storage capacity of 35.9 million m^3 (226 mmb) of crude oil in 20 solution-mined caverns. The 1995 year-end inventory is 34.6 million m^3 (217.8 mmb). Appurtenant facilities include a 91 cm (36 in) old brine disposal pipeline extending 22.4 km (13.9 mi) offshore into the Gulf of Mexico and 4.5 km (2.8 mi) onshore, a 61 cm (24 in) new brine disposal pipeline extending 6.6 km (3.5 nautical mi) offshore into the Gulf of Mexico and 4.5 km (2.8 mi) onshore, a raw water intake structure adjacent to the site on the Brazos River Diversion Channel, two 76 cm (30 in) crude oil pipelines connecting the site to the Jones Creek Tank Farm 4.8 km (3 mi) northwest of the site, the Phillips docks 6.4 km (4 mi) northeast of the site, and the 102 cm (40 in) 73.6 km (46 mi) crude oil pipeline from the site to the ARCO refinery in Texas City. Construction on the new brine disposal pipeline was completed in September 1995. The old brine disposal pipeline was abandoned in place at that time after the diffusers were removed.

1.4 ST. JAMES TERMINAL

The St. James Terminal (SJ) consists of six aboveground storage tanks with a total capacity of 0.3 million m^3

Figure 1-5. St. James SPR Terminal

(2 mmb) and two tanker docks, as seen in Figure 1-5. The 1995 year-end inventory is 103,864 m^3 (653,305 bbl). The tank farm area occupies 42.5 ha (105 ac) and the docks occupy 19.4 ha (48 ac). The terminal has separate crude oil pipelines connecting it with Weeks Island and Bayou Choctaw. The site is located on the right descending (west) bank of the Mississippi River, with the two docks central to a point about 158.2 river miles above the Head of Passes. This location is approximately halfway between New Orleans and Baton Rouge, Louisiana, and 3.1 km (1.9 mi) north of the town of St. James, on Louisiana Highway 18.

The area around the site is rural with a number of people living in small settlements along Highway 18, the major thoroughfare in the area. Although some of the work force may commute from New Orleans or Baton Rouge, the majority of the workers are from the local labor pool. The terminal is bounded by the Texas and Pacific Railroad to the west, commercial facilities to the north and south, and the Mississippi River levee on the east between Louisiana Highway 18 and the river. The area adjacent to the Mississippi River at the St. James docks (the batture) is a freshwater wetland that is inundated during high water periods. Much of the land area surrounding the terminal is used for pasture and sugar cane cultivation.

Per the Threatened and Endangered Species of Louisiana, Parish List (January 25, 1993), it is possible that the following two species could be present near the site or the Mississippi River: the pallid sturgeon (endangered) and the Arctic peregrine falcon (threatened). No federally endangered or threatened species are found on the site; however, a southern bald eagle (endangered)

was previously reported flying along the Mississippi River near the docks. Frogs, snakes, turtles, rabbit, raccoon, armadillo, muskrat, opossum, nutria, squirrel, egret, ibis, and heron can be found on the site and in the surrounding areas.

During 1995 DOE prepared an Environmental Assessment for leasing SJ to private industry as a commercial terminal. Although there was some general interest in this action, no specific private entity has yet committed to leasing or purchasing the SJ Terminal from the DOE.

1.5 WEEKS ISLAND

The Weeks Island (WI) site is located in Iberia Parish, Louisiana, about 22 km (14 mi) south of New Iberia. The surrounding area is sparsely populated. New Iberia, the closest major urban center, supplies the greater part of the labor force. The major employment sectors within the parish are mineral production, manufacturing, construction, and agriculture.

The aboveground facility, shown in Figure 1-7, occupies approximately three ha (seven ac). The dome borders Vermilion Bay, which opens to the Gulf of Mexico. The Weeks Island salt mine, developed in the early 1900s by room-and-pillar mining, operated continuously until 1981, at which time operations were moved to another part of the same dome. The land surface over the salt dome forms an "island" caused by domal upthrusting and includes the highest elevation, 52 m (171 ft) above sea level, in southern Louisiana. The area surrounding the island is a combination of marsh, bayous, manmade canals (including the Intracoastal Waterway), and bays contiguous with the Gulf of Mexico. The Weeks Island site consists of a

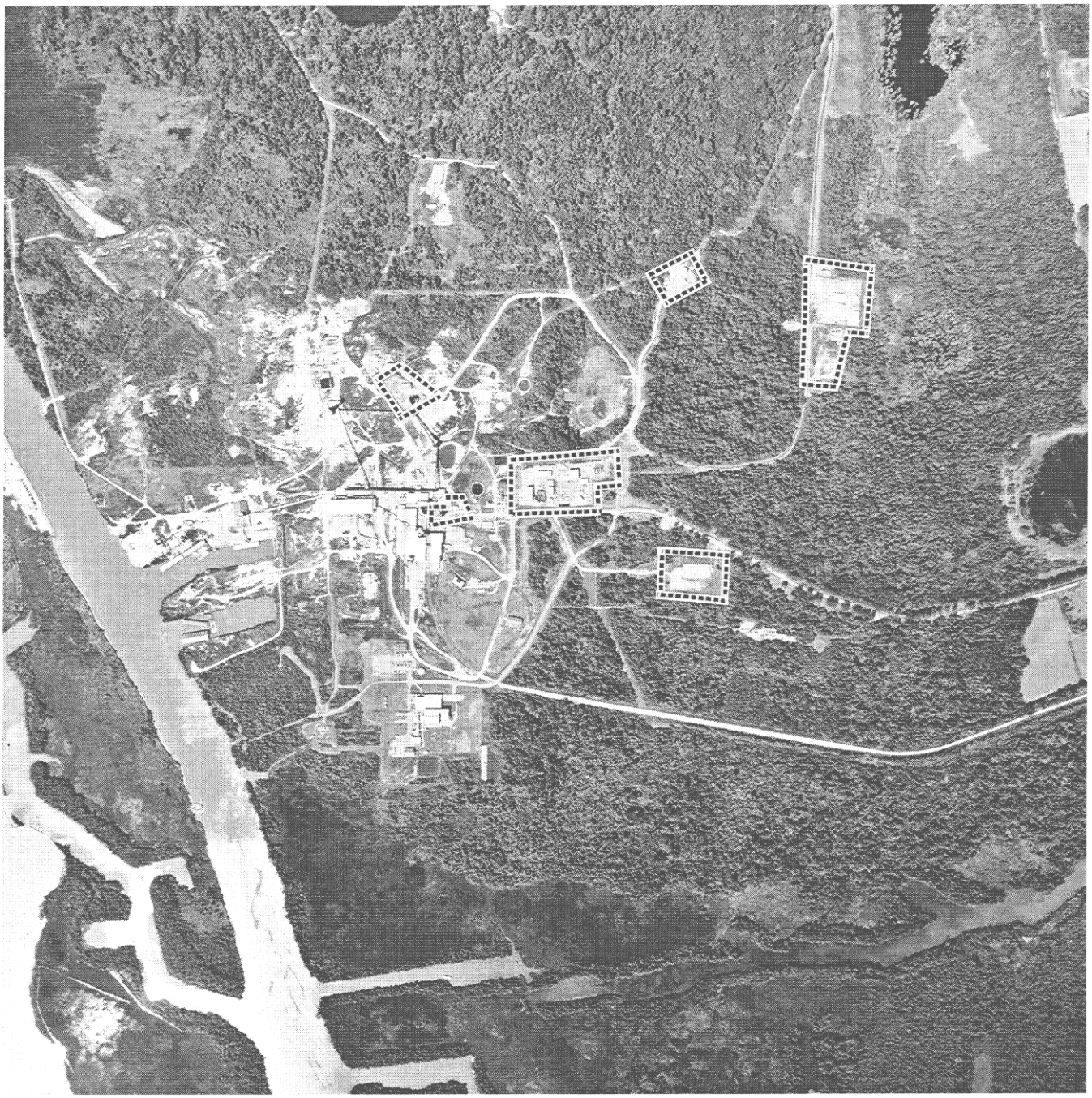

Figure 1-6. Weeks Island SPR Site

large mechanically excavated salt mine with 11.6 million m^3 (73 mmb) of crude oil storage capacity. The 1995 year-end inventory is 9.5 million m^3 (59.6 mmb). In addition to normal site facilities, there is a 91 cm (36 in) diameter, 108 km (67 mi) long crude oil pipeline connecting the site to the St. James Terminal.

The vegetation communities on Weeks Island are diverse. Lowland hardwood species proliferate in the very fertile loam soil common at the higher elevations. The predominant tree species are oak, magnolia, and hickory which extend down to the surrounding marsh. Pecan trees are also present. Gull, tern, heron, and egret are common in the marsh area.

Mink, nutria, river otter, and raccoon are the most common inhabitants of the intermediate marshes. Other mammals found at Weeks Island are opossum, bat, squirrel, swamp rabbit, bobcat, white-tailed deer, and coyote. Weeks Island is the home of one of the densest breeding populations of the Louisiana black bear, which has been listed as a threatened species by the U.S. Fish and Wildlife Service under authority of the Endangered Species Act. The endangered red wolf has been sighted in Vermilion Parish about 48.2 km (30 mi) west.

Weeks Island and the surrounding wetlands are also frequented by a variety of endangered or threatened avian species, including the brown pelican, bald eagle, peregrine falcon, the piping plover, and least tern. The wetlands to the southwest of Weeks Island are a breeding area for least terns. The American alligator occurs in the marshes adjacent to the site.

The water bodies surrounding Weeks Island provide a vast estuarine nursery ground for an array of commercially and recreationally important finfish and shellfish.

DOE Headquarters announced on December 15, 1994, that the Weeks Island site will be decommissioned. Weeks Island began drawing down oil stocks in November 1995 and transferring them to Big Hill and Bayou Choctaw. Although the oil should, for the most part, be removed in 1996, the de-commissioning process is expected to take in excess of three years to complete.

1.6 WEST HACKBERRY

The West Hackberry (WH) site is located in Cameron Parish 29 km (18 mi) southwest of Lake Charles, Louisiana, and 26 km (16 mi) north of the Gulf of Mexico. Cameron Parish is the largest and least populous parish in Louisiana. The local economy consists of fishing, shrimping, rice farming, and petroleum production. The work force at the site is derived from local residents of the Hackberry community, the towns of Sulphur and Lake Charles, Calcasieu Parish, and from recent arrivals to the area.

The site is situated on 229 ha (565 ac) of land on top of the West Hackberry salt dome (Figure 1-8). The dome is covered by a distinct mounded overburden on its western portion, with elevations up to 6.5 m (21 ft), the highest elevation in Cameron Parish. The majority of the dome is approximately 1.5 m (five ft) above sea level. Two brine disposal well pads occupying approximately 2.5 ha (six ac) are located three km (1.9 mi) south of the site. Waterways near the site include Calcasieu Lake and the Calcasieu Ship Channel approximately five km (three mi)

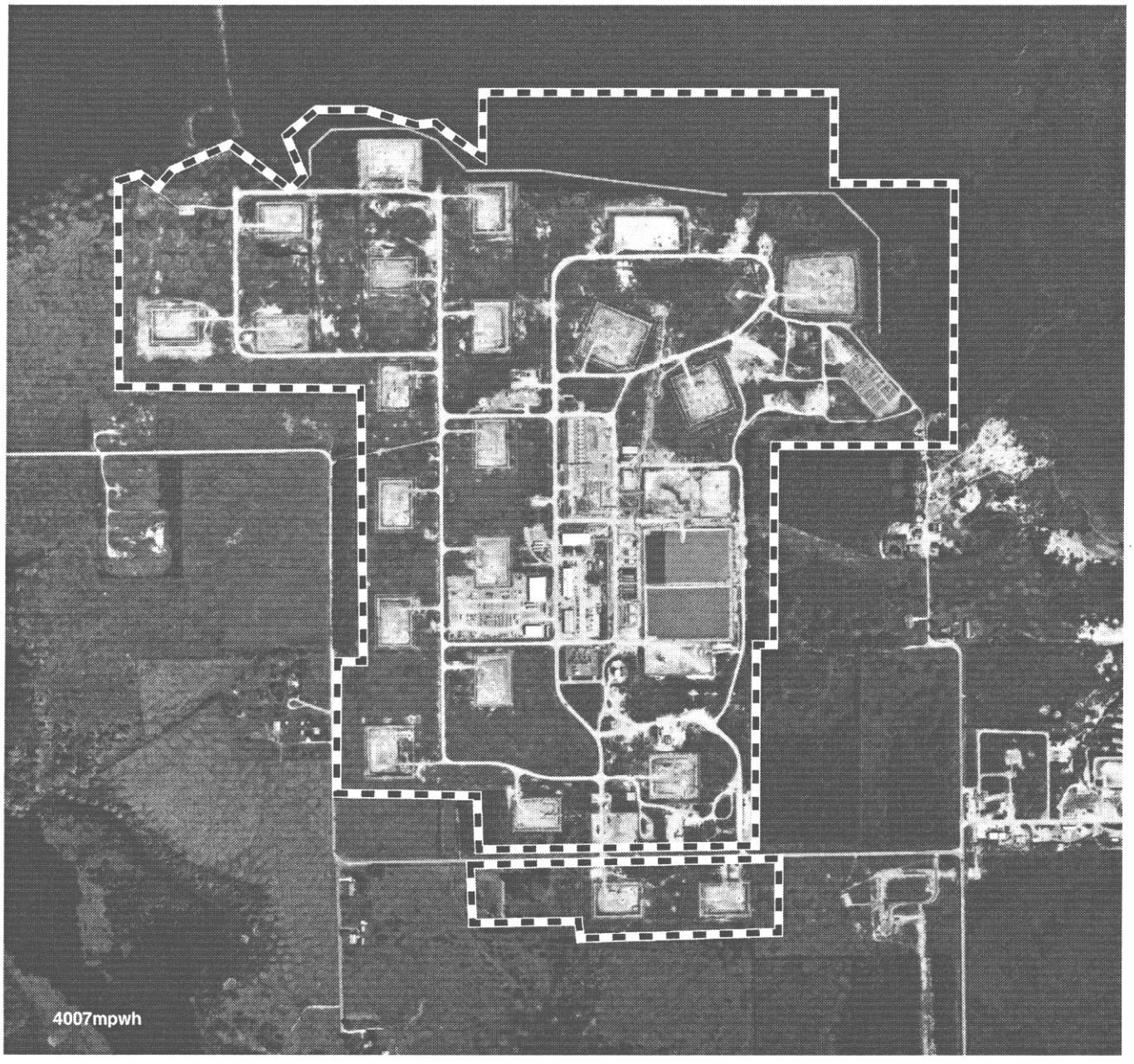

Figure 1-7. West Hackberry SPR Site

to the east, and the Intracoastal Waterway approximately six km (four mi) north of the site. Black Lake, a brackish water lake, borders the dome on the northern and western sides. Numerous canals and natural waterways, including Black Lake Bayou, connect Black Lake to Alkali Ditch and then to the Intracoastal Waterway on the eastern side of the site. Black Lake Bayou, referred to locally as Kelso Bayou, continues wandering in a generally easterly direction from Black Lake, eventually connecting with the Calcasieu Ship Channel northeast of the town of Hackberry.

The western part of Cameron Parish consists of marshland with natural ridges extending in a generally east-west direction. These ridges, or cheniers, are stranded former beach lines which affect water flow through the marshes. The cheniers typically support grasses and trees. In many areas, lakes, bayous, and canals are concentrated so that the marsh may not seem to be a land mass, but rather a large region of small islands.

Marshland closest to the coast generally has the highest salinity levels and lowest species diversity. Vegetation found on the site and in the surrounding area of the West Hackberry facility is dominated by Chinese tallow, willow, various oak species, and numerous species of marsh and upland grasses. The marsh lands surrounding West Hackberry and its appurtenant facilities provides excellent habitat for a variety of wetland species. This area is predominantly brackish marsh with areas of submerged vegetation. Many wading birds, waterfowl, shore birds, seabirds, and diving birds frequent the area, in many cases breeding and nesting here. The American alligator is extremely common, breeding and nesting in this area. A variety of other reptiles, fish,

shellfish, and mammals also frequent this area, in many cases breeding and reproducing. Oyster reefs occur in Calcasieu Lake with large concentrations in West Cove near the brine disposal pipeline. Sport and commercial fishing takes place throughout this area for a variety of species, including fresh water and marine fish and shellfish.

Several species that are protected by the U.S. Fish and Wildlife Service under authority of the Endangered Species Act occur in the West Hackberry area. These include the southern bald eagle, Arctic peregrine falcon, and brown pelican. These species also inhabit the lands through which the SPR pipelines pass.

Also inhabiting the area surrounding the West Hackberry site are snakes, egret, heron, migratory waterfowl, red-tailed hawk, red fox, raccoon, nutria, opossum, rabbit, and white-tailed deer. Aquatic inhabitants of Black Lake include crab, shrimp, drum, croaker, spot, sheepshead, mullet, gar, redfish, and catfish. No endangered or threatened species other than the alligator (threatened by similarity of appearance) have been identified on the site.

The West Hackberry site will store 34.8 million m^3 (219 mmb) of crude oil in 22 solution-mined caverns. The 1995 year-end inventory is 32.4 million m^3 (203.8 mmb). Brine is currently transported and disposed by injection into eight active brine disposal wells. The 91 cm (36 in), 42 km (26 mi) brine pipeline that goes to an area 11 km (seven mi) south of Holly Beach, Louisiana, in the Gulf of Mexico is currently out of service. Raw water is brought to the site via pipeline from the Intracoastal Waterway and crude oil is transported between the site

and the Sunoco Terminal in Nederland, Texas, via a 107 cm (42 in), 66 km (42 mi) crude oil pipeline.

1.7 NEW ORLEANS HEADQUARTERS

The main office for SPR operations is housed in three adjacent office buildings in Harahan, a suburb of New Orleans, Louisiana. Unlike the crude oil reserve sites, activities conducted at the New Orleans office complex are predominantly administrative with some warehouse capacity to augment project-wide storage. Office space is rented, not owned by the Department of Energy.

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2. COMPLIANCE SUMMARY

General

The Strategic Petroleum Reserve (SPR) operates in conformance with standards established by federal and state statutes and regulations; Executive Orders; and Department of Energy (DOE) orders and directives. A list of federal, state, and many of the DOE standards that, in varying degrees, affect the SPR is Appendix A. The SPR has been managed and operated by DynMcDermott Petroleum Operations Company while under contract to DOE since April 1, 1993. Compliance status in this year's report reflects compliance activities conducted by DOE personnel and DynMcDermott Petroleum Operations Company.

Regulatory

The principal regulatory agencies responsible for enforcing environmental regulations at SPR facilities are the Environmental Protection Agency (EPA) Region VI, the U.S. Army Corps of Engineers (COE), the Louisiana Department of Environmental Quality (LDEQ), the Louisiana Department of Natural Resources (LDNR), the Railroad Commission of Texas (RCT), and the Texas Natural Resource Conservation Commission (TNRCC). These agencies issue permits, review compliance reports, inspect facilities and operations, and oversee compliance with regulations.

DOE Orders/Directives

The SPR follows and operates in conformance with numerous DOE Orders applicable to its operation. Some of the major orders include General Environmental Protection (5400.1); National Environmental Policy Act (NEPA) Compliance Program (451.1); and Environment, Safety, and Health (ES&H) Program for Department of Energy Operations (5480.1B). The orders establish some of the policies of the SPR-PMO.

In 1995, the SPR prepared the FY `97 Environmental, Safety, and Health Management Plan including environmental budgetary needs for core, compliance, and improvement activities over the next seven

years. A total of 15 Environmental Activity Data Sheets (ADSs) were prepared: seven for core activities, six for compliance activities, and two for improvements. One of the core ADSs is for DOE management, and the remaining ADSs are for contractor activities.

2.1 COMPLIANCE STATUS (JAN. 1, 1995 THROUGH DEC. 31, 1995)

Eleven minor noncompliances with state and federal discharge permits for all SPR sites during 1995 were submitted to regulatory agencies under the permit self-reporting provisions. These are discussed further in Section 2.3. One Notice of Violation was received for an improper waste manifest at Weeks Island. Much of the SPR's compliance program deals with meeting regulations under the Clean Water Act. The SPR sites have a total of 102 wastewater and storm water discharge monitoring stations. The SPR is also required to meet many requirements under the Clean Air Act and the Safe Drinking Water Act. Site waste management activities are conducted in accordance with the Resource Conservation and Recovery Act (RCRA). The SPR sites do not routinely generate large quantities, over 1 metric ton (2,200 lbs), of hazardous waste and therefore typically operate as either Conditionally Exempt Small Quantity Generators (CESQG) in Texas, or Small Quantity Generators (SQG) in Louisiana (the smallest level generator in each state). The SPR sites do not treat, store, or dispose of hazardous wastes, and therefore are not RCRA permitted facilities. Each site is identified by an EPA generator number that is used to track the manifesting of hazardous waste for off-site treatment or disposal. None of the SPR sites are identified on the National Priority Listing (NPL) under CERCLA. Polychlorinated biphenyl (PCB) contaminated oils and friable asbestos wastes were not generated at SPR sites in 1995.

The following sections highlight primary compliance activities at the six SPR sites by environmental statute.

Clean Water Act (CWA)

The SPR sites comply with the CWA through permitting with the National Pollution Discharge Elimination System (NPDES) program and following the Spill Prevention, Control and Countermeasures (SPCC) program, both of which are regulated by EPA.

Region VI EPA issued a revised NPDES permit which incorporated the new brine disposal line at the Bryan Mound site. The remaining five expired NPDES permits also received renewal applications in late 1993 and were found administratively complete by EPA in 1994, allowing those sites to continue to operate under their existing permits until the new permits are issued. Region VI EPA has not yet acted on these renewal applications giving priority to other non-SPR facilities within the region. An interim Administrative Order (AO) issued to facilitate use of the new Bryan Mound diffuser prior to renewal of the old permit, expired in September 1995 on issuance of the revised Bryan Mound NPDES permit.

The LDEQ has been unable to process the St. James permit due to revised priorities; however, a 1996 processing date is anticipated. Delays in this action may be due to efforts by LDEQ to obtain primacy from EPA for the state discharge program. The SPR obtained a Louisiana-wide permit for discharge of hydrostatic test water from LDEQ, saving filing fees and increasing flexibility in support of site construction and maintenance activities.

Each SPR site has an SPCC plan that addresses prevention and containment of oil spills. During 1995, DM revised

SPCC plans for the Bryan Mound and New Orleans sites. Revision of SPCC plans for the remaining sites should be completed in 1996. The Louisiana consolidated hazardous substance on-site provisions were included. All of the SPR spill plans are current in accordance with 40CFR112.

Pollution Prevention Act of 1990 (PPA)

Each SPR site operates in accordance with a Pollution Prevention Plan prepared in accordance with the EPA storm water general permits. This multimedia document consolidates the EPA requirement with the more general DOE required Pollution Prevention Plan, the related Waste Minimization and Solid Waste Management Plans, and the Best Management Practices (BMP) Plan required by the LWDPS water discharge permits.

Clean Air Act (CAA)

The six SPR facilities comply with the applicable provisions of the CAA and State Implementation Plans (SIP). All of the SPR facilities are located in attainment areas for all National Ambient Air Quality Standards (NAAQS) pollutants with the exception of ozone. St. James (reclassified from transition area in 1995), Weeks Island, and West Hackberry are located in attainment areas for ozone; therefore, they are regulated by the Prevention of Significant Deterioration (PSD) permitting program. Big Hill, Bryan Mound, and Bayou Choctaw are located in nonattainment areas for ozone; therefore, the New Source Review (NSR) permitting program applies. None of the SPR facilities are considered to be major sources during normal operations under PSD, NSR, and Title III hazardous air pollutant regulations. All of the facilities operate in accordance with the provisions of the applicable state air permits.

A West Hackberry air permit modification (addition or deletion of facilities) was submitted to Louisiana Department of Environmental Quality in June 1995 and is awaiting approval.

A permit amendment (change to operating conditions or emissions) application for the Bryan Mound facility was submitted to Texas National Resource Conservation Commission (TNRCC) in 1994 to reflect operational changes to the site. The permit was approved in 1995.

In response to a Texas Natural Resource Conservation Commission requirement related to ozone reduction, the Bryan Mound facility also participated in an employee trip reduction program throughout 1995 by using a compressed four day work week.

During 1995, DOE began reducing potential emissions from gassy oil by degasing stored crude oil. Degasing plants, designed to remove the methane and ethane from selected crude oil inventories, were installed, and began operations at Bryan Mound and West Hackberry. Degasing operations will continue at Bryan Mound for a total of three years. The West Hackberry plant moves to Bayou Choctaw (three months of operation) and Big Hill (nine months of operation) in 1996. Since these degasing plants will emit regulated pollutants (VOC, NO_X, SO_2, and HAPs) during their operational periods, additional air permits are being obtained prior to constructing and operating these plants at each site. The degasing units for Bryan Mound and Big Hill are being handled under TNRCC Standard Permits for processes that reduce emissions. The degasing unit for West Hackberry and Bayou Choctaw is being handled under an LDEQ Mobile Permit.

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)

The SPR has not needed to conduct response activities pursuant to this act. DOE Order 5480.14 required all DOE-owned sites to evaluate compliance with CERCLA. DOE Phase I and II reports (similar to CERCLA's Preliminary Assessment and Site Investigation process) were completed in 1986 and 1987, respectively. The reports assessed each site for the potential presence of inactive hazardous waste sites, and recommended no further action under CERCLA. The DOE Phase I and II reports were submitted to EPA Region VI, and all SPR sites are considered as No Further Remedial Action Plan (NFRAP) sites to reflect the findings in the reports.

Superfund Amendments and Reauthorization Act (SARA)

SARA Title III Tier Two reports, also known as Emergency Planning and Community Right-to-Know Act (EPCRA) Section 312 reports, were prepared and distributed as required by March 1st to state and local emergency planning committees and local fire departments. It has been jointly determined by DOE and EPA that the SPR is not required to submit Toxic Release Inventories (TRI) under Section 313 of EPCRA.

Safe Drinking Water Act (SDWA)

The SPR oil storage caverns and brine disposal wells are regulated by the SDWA. The EPA has given primacy under the SDWA to both Louisiana and Texas UIC programs, which regulate underground hydrocarbon storage, related brine disposal, and oil field wastes. The SPR operates 21 salt water disposal wells in Louisiana. In Texas, brine pipelines which extend into the Gulf of Mexico are used for brine disposal, as well as ancillary commercial

disposal wells. The 1995 Annual Report Form OR-1 was completed and submitted on schedule to the Louisiana Department of Natural Resources.

A letter report detailing in-place closure of three anhydrite storage pits permitted for the West Hackberry site was filed with LDNR on January 10, 1995.

Brine pond ground water studies at West Hackberry and Bryan Mound indicate that ground water contamination from leaking brine ponds or buried piping has occurred at varying levels at both sites. The West Hackberry facility negotiated a corrective action plan (CAP) for a leaking brine pond with LDNR in February 1992. The CAP requires ground water recovery pumping, ground water monitoring, and submission of quarterly monitoring reports. In 1993, LDNR issued a requirement to continue to monitor the wells for 30 years after closure of the permanent anhydrite disposal pits. This annual requirement is being met by the quarterly monitoring requirement for the brine pond CAP.

Monitoring in 1995 indicates that the brine contaminated plume remains localized around and east of the pond system with no indications of any off-site migration. Affected ground waters at both sites are naturally brackish and not suited for domestic or agricultural use. This use limitation is a significant factor in determining whether additional action will be needed in the future. A hydraulic evaluation and engineering inspection of the Bryan Mound brine pond was conducted in late December 1995 in accordance with pond permit provisions. The resulting report will be completed and submitted to the RCT in 1996.

A baseline ground water survey is being conducted in two phases at all sites. Phase I was completed in 1993 and consisted of a non-intrusive survey of site soils using electrical conductivity and soil gas sensing as indicators of potential brine and oil contamination. The Phase II contamination verification survey is scheduled for completion in 1996.

Resource Conservation and Recovery Act (RCRA)

Enforcement responsibility for the hazardous waste program is delegated to both Louisiana and Texas. Non-hazardous SPR wastes associated with underground hydrocarbon storage activities continue to be considered under the corresponding state programs for managing drilling fluids, produced waters, and other wastes associated with the exploration, development, production or storage of crude oil or natural gas. Other non-hazardous wastes generated at SPR facilities are managed in accordance with state solid waste programs. Hazardous wastes are managed in strict compliance with the delegate state hazardous waste programs. The appropriate waste management strategy is based on the results of waste stream characteristics.

In 1995, the SPR manifested hazardous waste from the Big Hill, Bryan Mound, St. James, West Hackberry, and Weeks Island SPR sites for off-site incineration. The wastes consisted primarily of spent paint solvent, solvent contaminated oils, and laboratory wastes. The SPR submitted notification forms of regulated waste activity to the EPA for all SPR sites. In 1995, accumulated monthly waste volumes exceeded the SQG generator monthly limits twice at Bryan Mound. West Hackberry operated as a large quantity generator (LQG) during 1995.

The SPR had underground storage tanks (USTs) that were used for the storage of diesel and unleaded gasoline. In 1995, two UST systems (gasoline and diesel fuel) were removed at Bayou Choctaw and St. James Terminal. One diesel UST was removed at Big Hill, and two (gasoline and diesel) USTs were properly closed and abandoned in place at Big Hill. The USTs were replaced with aboveground tank vault systems, providing integral secondary containment without creating an additional storm water retention outfall. Closure was conducted in accordance with Louisiana and Texas UST programs. Indications of fuel release (free product, hydrocarbon odor, and stained soil) were found at Big Hill and St. James. The State of Texas determined Big Hill does not warrant remediation. Soil at St. James was excavated and remediated on-site, in coordination with LDEQ.

Toxic Substances Control Act Construction (TSCA)

Friable asbestos construction materials were not found at SPR sites in 1995. The small amount of nonfriable asbestos (less than 1,000 lbs) in use on the SPR is disposed locally as it is taken out of service, in accordance with applicable solid waste regulations. No liquid-filled electrical equipment or hydraulic equipment used on the SPR has been identified as PCB equipment or PCB contaminated under TSCA.

National Environmental Policy Act (NEPA)

One hundred and sixty projects were submitted for NEPA review action in 1995. One hundred and fifty-eight of these NEPA reviews resulted in categorical exclusions that did not require further action. The remaining two required Environmental Assessments (EAs) with accompanying Findings of No Significant Impact (FONSIs). The FONSI for the Weeks Island Decommissioning was issued

on 12/01/95, and the one for the leasing of the St. James Terminal was issued on 01/26/95.

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

All pesticides and herbicides were used in accordance with manufacturers' recommendations. Restricted use pesticides were applied only by licensed commercial applicators.

The SPR encompasses 748 hectares (1,849 acres) and uses approximately 5,400 kgs (12,000 lbs) of pesticides and herbicides to control weeds, insects, and rodents on the sites annually.

Endangered Species Act (ESA)

The Weeks Island site, along with neighboring facilities, continued to work with the U. S. Fish and Wildlife Service (F&WS), Louisiana Department of Wildlife and Fisheries (LDWF), and the Louisiana Nature Conservancy to prevent harm to the resident Louisiana black bear and to ensure worker safety.

The brine line beach construction area near Bryan Mound was monitored for the presence of the piping plover, an endangered species. Construction in the area was completed with no observed impact to this species.

In a continuing effort to minimize disruption and provide suitable habitat and food supply to the existing wildlife and migratory birds in the Bryan Mound area, mowing of open fields during spring was limited to areas immediately along existing roads. This practice allowed for spring wildflower growth and seed development, and

provided nesting areas for Black Ducks and other federally protected birds which nest near Bryan Mound.

National Historic Preservation Act (NHPA)

No site activities performed in 1995 required coordination with State Historical Preservation Offices. No places on or eligible to the National Register of Historic Places are located on or adjacent to SPR sites.

Oil Pollution Act (OPA) of 1990

In 1995, the Facility Response Plans (FRPs) for all sites were reviewed and approved by EPA.

The SPR implemented a drill and exercise program in accordance with the National Preparedness for Response Exercise Program (PREP) during 1995. PREP specifies a comprehensive drill and exercise program, evaluation procedures, and performance based training.

An additional program enhancement included the establishment of a unified incident command system for management of emergency responses. This concept uses an organizational framework consistent with that used by state and federal agencies during response operations. Standardization of this unified command concept facilitates seamless management among SPR and regulatory personnel during response operations.

Executive Orders (EO)

During 1995, the M&O contractor prepared wetlands delineation maps for each SPR site in support of compliance with Executive Order 11988, "Floodplain Management," and Executive Order 11990, "Protection of Wetlands."

In accordance with all applicable pollution control standards, the SPR complies with E.O. 12088, "Federal Compliance with Pollution Control Standards," by implementing the SPR Pollution Prevention Plan. The plan includes goals for hazardous and nonhazardous waste reduction and for recycling.

A major pollution prevention initiative in 1995 was the installation of oil coolers and the start of degasing SPR stored oil at Bryan Mound and West Hackberry, with similar future action scheduled for Bayou Choctaw and Big Hill. At Bryan Mound alone, this initiative, when coupled with cooling during drawdown, will reduce volatile organic compound (VOC) emissions from 16,242 metric tons (17,900 tons) to less than 23 metric tons (25 tons), hydrogen sulfide emissions from 352 metric tons (388 tons) to less than nine metric tons (10 tons), and hazardous air pollutants (HAP) from 133 metric tons (147 tons) to less than nine metric tons (10 tons) at SPR and commercial terminals during drawdown. The degasing process essentially retains all of the original crude oil components while primarily using stripped methane and ethane to fuel the degas plant, minimizing generation of waste byproducts. See Section 2.2 for additional details.

Executive Order 12873, "Federal Acquisition, Recycling, and Waste Prevention," requires federal facilities to establish affirmative procurement programs for certain products containing recovered materials. The SPR purchases recycled paper, the only listed product that is purchased in significant quantities, approximately 68,039 kgs (150,000 lbs) per year.

2.2 MAJOR ENVIRONMENTAL ISSUES AND ACTIONS

Gassy Oil

The SPR confirmed in 1993 that the crude oil stored at Bayou Choctaw, Big Hill, Bryan Mound, and West Hackberry presented environmental problems during oil movements greater than 500,000 barrels per year. One of the problems was volatile organic compounds (VOC) emissions at storage tanks and docking facilities at both SPR and private terminals. Methane gas (non-regulated) that migrated from the salt dome into stored crude oil, strips and releases to the atmosphere regulated pollutants (VOC) in the oil when pressure on the oil is reduced. The best option was to blend crude oil that had methane gas removed from it with other untreated oil during drawdown in order to minimize the impact to air quality. SPR procured, installed, and began operating equipment to separate and collect the gas. Operations were started at Bryan Mound and West Hackberry in 1995. Due to the amount of gas in the oil at Bryan Mound, operations will continue for about two more years. Operations were completed at West Hackberry in 1995, and equipment from that site will be moved to Bayou Choctaw and then Big Hill, in turn, to process crude oil at those sites. Site air quality permits are required for the above mentioned operations.

The second problem encountered during large oil movements is elevated crude oil vapor pressures exceeding regulatory limits for storage in tanks caused by relative storage temperatures greater than 38°C (100°F) in the caverns. During 1995, the SPR installed heat exchangers to cool the oil sufficiently when removed from the caverns so that the vapor pressures are within regulatory limits.

In response to Section 5-501 of E. O. 12856, "Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements," all SPR sites were listed in the Potential Facilities Listing prepared by DOE on 04/13/94 for potentially meeting reporting requirements under EPCRA Sections 304 and 311-312 requirements. Reporting under Section 313 (Form R) does not apply to the SPR. The SPR Pollution Prevention Plan has been implemented since 1993. The SPR has also developed and implemented site-specific emergency response plans. See Section 5, Tables 5-20 through 5-27 for a summary of 1995 SARA reporting.

During 1995 the social economic condition outlook for Iberia Parish, Louisiana, Executive Order 12898, "Environmental Justice" was addressed in preparation of the Environmental Assessment for decommissioning the Weeks Island SPR facility. The socioeconomic impact of decommissioning was determined to be not regionally substantial. Approximately 100 full-time jobs would be lost at an economic loss of one percent for Iberia Parish and 0.15 percent for the regional economy.

DOE Orders/Directives

Phase I of the expanded baseline ground water surveillance field work, required by DOE Order 5400.1, was conducted in 1993 at all SPR sites. Phase II will begin in 1996 and will include installation of ground water monitoring wells to verify potential contamination where indicated by the Phase I conductivity and soil gas survey. It will be performed as necessary in accordance with the ground water protection management program plan.

The Weeks Island Sinkholes

In 1992 a surface sinkhole was discovered over the southern edge of the Weeks Island crude oil storage area. By late 1993 the size of the sinkhole had begun to increase measurably, and an increase in brine inflow into the mine was detected. A major diagnostic effort was completed to identify the cause of the sinkhole and to develop possible mitigative options. The diagnostics were successful in locating a significant leached zone or crevasse in the salt below the sinkhole and measuring downward flow of partially saturated brine and sediments well below the top of salt. Simultaneously, the brine inflow into the fill hole sump of the crude oil storage chamber was significantly increasing with the volume of fill material added to the sinkhole. Saturated brine is being introduced into the sinkhole chimney at about 21 meters (70 ft) below the top of salt at a rate slightly higher than the inflow into the mine. This mitigative action appears to have significantly slowed the growth of the pathway and subsequently the rate of inflow into the mine. Further ground water control efforts, i.e., ground freezing, are being pursued to further control water inflow into the mine. A ground freeze plug has been established under the sink hole and above the crevasse to isolate this feature from the surrounding aquifer.

A second sinkhole was identified in 1995. It was filled with sand and monitored for activity. This sinkhole is currently inactive.

On December 15, 1994, DOE HQ announced the decision to decommission Weeks Island. The plan to draw down and decommission Weeks Island commenced in 1995 with removal of oil beginning in late 1995. Oil removal will continue through 1996 with skimming operations to remove residual

oil following. The mine will be refilled with saturated brine upon removal of recoverable oil.

Tiger Team Assessments/Environmental Audits

The DOE Tiger Team visited the SPR during 1992, assessing all environmental programs in accordance with established protocol. In their final report, 84 findings (72 compliance findings and 12 best management practice findings) were identified in environmental media. A Corrective Action Plan (CAP) was prepared for each finding and approved by headquarters.

In June 1994, the SPR evaluated the existing Tiger Team findings and corrective action plans (CAPs) and consolidated some of the corrective actions to more efficiently correct the findings. Of the 84 original environmental findings, 16 were closed prior to the rebaselining effort. As a result of the rebaselining effort, another 30 were closed and the other 38 were combined into 16 open CAPs. This was accomplished by combining similar open CAPs for the purpose of increasing the efficiency and cost effectiveness in closing them.

As of December 1995, six environmental CAPs remained open with scheduled completion dates ranging to September 1999.

The annual self-assessment was conducted by all site and New Orleans environmental groups in accordance with the self-assessment plan 1995. Self-assessments are reviewed annually for adequacy through independent internal assessments. Internal assessment findings are tracked to completion in the Consolidated Corrective Action Plan (PMO) and the Master Action Tracking System (contractor).

The 1995 internal assessment findings fell under categories II and III. Category II findings were primarily administrative in nature and disclosed no significant environmental impact. Category III findings addressed needed improvements as best management practices. See Section 7, Table 7-1, for a tabulation of 1995 findings by site. Appropriate corrective actions have been scheduled.

DOE SPRPMO appraisal teams conducted formal annual visits to each site, meeting with contractor management staff, reviewing environmental practices and performance indicators, and reviewing findings with M&O contractor staff.

Regulatory Inspections

The LDEQ performed inspections of Bayou Choctaw, New Orleans, St. James, Weeks Island, and West Hackberry in 1995. The Bayou Choctaw inspection was by the Office of Water Resources and reviewed the site discharge program which was found satisfactory in all respects. The New Orleans inspection was a file review of ground water data to support LDEQ in review of the WI Environmental Assessment. No issues were identified. St. James was inspected twice in regard to its remediation of contaminated soil from underground fuel tank removal. LDEQ was satisfied in both instances with the progress at St. James. Weeks Island was inspected first at its pipeline valve MLV-2 where a spill cleanup was declared satisfactory and then at its site in regard to its hazardous waste program. Three administrative issues were raised in a Notice of Violation (NOV). Two were in error, and the third had been resolved prior to issuance of the NOV. West Hackberry was inspected in regard to

its ground water program where lack of vent holes on three well caps was identified.

The Big Hill and Bryan Mound Discharge Prevention and Response Plan (DPRP) was re-certified by the Texas General Land Office (GLO) in 1995.

The Jefferson Parish Environmental Department, along with the Fire Department, visited the New Orleans Warehouse in response to smoke emanating from diesel motors undergoing maintenance operation. The concern was due to an initial citizen's report of open burning, which was incorrect. No environmental violations were identified.

The RCT visited Big Hill and Bryan Mound in 1995 to ascertain compliance with its new Rule 95 which regulates underground storage of hydrocarbons. Both sites were found satisfactory.

The U. S. Army Corps of Engineers inspected Bryan Mound in regard to a project in site wetlands, making a determination that a permit was, in fact, required for the project, and subsequently issuing the permit.

The TNRCC provided a potable water technical assistance visit to Bryan Mound in response to an SPR request for support. The TNRCC provided guidance on sampling and necessary training for the Bryan Mound configuration using a municipal water supply.

The TNRCC also visited Bryan Mound as part of its investigation into a paint subcontractor of that site who was accused of illegally handling hazardous waste off of the SPR facility. Enforcement action was taken against this contractor as a result of his actions.

Non-Routine Releases

In 1995, the six SPR sites reported two oil spills and three brine spills in quantities greater than one barrel (42 gallons) or as required by regulation (see Section 3.4 for more details). This is down from a total of ten reportable spills in 1994.

Total volume of oil spilled in 1995 was 354 barrels, and the total volume of brine spilled was 825 barrels. Oil spills are reported to the National Response Center (NRC) if they cause a film or sheen on navigable waters. During 1995, neither of the two SPR oil spill incidents required notifications to the NRC because they did not reach a navigable waterway. The two oil spill incidents included four barrels of crude which escaped through an open vent line onto cavern pad and 350 barrels of crude which leaked onto the ground and adjacent ditch due to a ruptured/failed 2" drainline. State agencies require notification if an oil spill exceeds one barrel (LA) or five barrels (TX) or if the potential for impact is recognized by making required NRC notifications. Brine spills are reported if they may affect water quality. All of the specified oil and brine spills were reported to appropriate agencies and immediately cleaned up, with no long-term impacts observed.

The longer term trend for spills and releases has declined substantially from 28 in 1990 to 13, 14, 12, and 10 in 1991 through 1994, respectively. The continued improvement in spill prevention and response was realized in 1995 with a total of only five spills or releases. No long-term adverse environmental impact resulted from any spill or release.

2.3 SUMMARY OF PERMITS (JAN. 1, 1995 THROUGH DEC. 31, 1995)

General

Permits currently in effect include six NPDES permits, six CAA permits, 45 COE wetlands permits (Section 404 of CWA), and over 100 oil field pit, underground injection well, and mining permits. In addition, a number of corresponding state discharge and other state and local permits are in effect. These permits are presented in tabular form in Section 3, Tables 3-2 through 3-7.

Permit Compliance

Routine compliance reports (monthly and quarterly NPDES Discharge Monitoring Reports (DMRs) were submitted to appropriate agencies in accordance with deadlines. The Bryan Mound NPDES permit was renewed during 1995 with new reporting and testing requirements, including bioassays of the brineline discharge. A number of minor modifications were made to discharge permits during 1995 in order to accommodate degas operations, align sampling and analysis requirements between state and federal discharge permits, facilitate minor discharge changes in accordance with operational adjustments, and minimize costs for sampling and analysis. The SPR received a general permit to discharge hydrostatic test water in Louisiana.

All air monitoring and reporting requirements have been conducted in accordance with the permit requirements. Quarterly VOC monitoring of all valves and pump seals in service continues to be performed at the Big Hill and Bryan Mound sites as required by the permits. VOC monitoring at the four Louisiana sites is not required by regulation or permits. An Emissions Inventory Questionnaire (EIQ) is submitted annually for the Bryan Mound site in accordance with the TNRCC regulations. The

EIQ establishes the amount of air pollutants (VOC and other regulated pollutants) that were emitted by the various sources in the site and can be compared to the permitted limits. The other sites do not require EIQ submission because their VOC emissions are below the regulatory limit for the ozone attainment classification in those areas.

Bryan Mound received its renewed air quality general permit and a standard permit for degas operations from the TNRCC. Bayou Choctaw and West Hackberry received mobile air quality permits for degas operations from LDEQ.

Other routine environmental reports and notifications have been submitted as required by applicable codes and permits.

Noncompliances

A total of eleven National Pollutant Discharge Elimination System (NPDES) permit noncompliances occurred out of a total of 10,788 permit related analyses performed in 1995 (see Section 5.3 for more detail). Four (36%) of the permit noncompliances experienced on the project were due to sampling, sample handling, or sampling related phenomena. Seven samples were outside of permit parameter limits accounting for 64%. The eleven noncompliances produce an overall project-wide 99.9% compliance rate for 1995. All noncompliances were of short duration and immediately resolved, causing no observable adverse environmental impact.

Notice of Violation (NOV)

During 1995, the SPR maintained a status of low risk to the environment. NOVs have declined significantly from 10 (all administrative) in 1990 to one in 1995.

The 1995 NOV was received in 1996 and quickly resolved. Issues on generation status and the annual report were found in error. A third issue on improper waste manifest was resolved prior to the NOV being issued. LDEQ found the SPR response satisfactory and closed the NOV.

3. ENVIRONMENTAL PROGRAM OVERVIEW

The environmental program is implemented by a prime contractor for the SPR on behalf of DOE (permittee). The environmental program is designed to support the SPR through tasks aimed at avoiding or minimizing adverse environmental effects from the SPR on surrounding lands, air, and water bodies.

The monitoring and inspection program, originally developed under guidance of the SPR Programmatic Environmental Action Report and Site Environmental Action Reports, now conforms with the monitoring program by DOE Order 5400.1. This program includes monitoring permitted NPDES outfalls and air emissions, conducting other required federal and state inspections, and surveillance sampling and analysis of site-associated surface and ground water quality. This makes possible the assessment of environmental impacts and early detection of water quality degradation that may occur from SPR operations.

The results of the individual program areas such as air emissions monitoring and reporting, NPDES compliance, water quality monitoring, and ground water monitoring for 1995 are discussed in sections 5 and 6.

3.1 ASSOCIATED PLANS AND PROCEDURES

Associated plans and procedures that support the SPR environmental program include site-specific Spill Facility Response Plans with spill reporting procedures. The site-specific Spill Prevention, Control, and Countermeasures Plans for Bayou Choctaw, Bryan Mound, New Orleans, and West Hackberry were revised in 1995. The Ground Water Protection Management Program document, the Environmental Monitoring Plan, and the Environmental Protection Implementation Program Plan were reviewed during 1995 by DM and DOE in accordance with DOE Order 5400.1.

3.2 REPORTING

Proper operation of the SPR with respect to the environment involves several types of reports and reporting procedures. The basic reports are summarized briefly in this section.

3.2.1 Spill Reports

The spill contingency plans include procedures for reporting spills to the SPR contractor, DOE, and appropriate regulatory agencies. Specific reporting procedures are dependent upon several key factors including the quantity and type of material spilled, immediate and potential impacts of the spill, and spill location (e.g., wetland or water body). Any spill considered significant at the site is first verbally reported to site management and then to the SPR contractor management in New Orleans and the on-site DOE representative. Verbal notification and associated written follow-ons to the appropriate regulatory agencies occur as required. Final written reports from the site are submitted after cleanup, unless otherwise directed by the DOE or appropriate regulatory agency.

3.2.2 Discharge Monitoring Reports

Wastewater discharges from SPR sites are authorized by EPA through the NPDES Program; through the LDEQ by the Louisiana Water Discharge Permitting System (LWDPS); and through the Railroad Commission of Texas (RCT) by the Texas Pollution Discharge Elimination System (TPDES) Program. Depending on site-specific permit requirements, discharge sample analyses are reported monthly to EPA for Big Hill, Bryan Mound, and West Hackberry and quarterly for the remaining SPR sites. All state permits issued to the SPR require quarterly reporting to the appropriate state agency (LDEQ and RCT). Included in each report is an explanation of the cause and actions taken to correct any noncompliance or bypass that may have occurred during the reporting period. State permits received during 1993 and 1994 reduce the frequency of testing and reporting for all SPR water discharge sources.

3.2.3 Other Reports

The SPR contractor provides several other reports to or on behalf of DOE. Table 3-1 contains a comprehensive list of environmental plans and reports.

Table 3-1. Federal, State, and Local Reporting Requirements

Regulation, Statute or Directive	Regulated Area	Enforcement Agency	Types of Required Permits, Applications, or Documentation	Routine Reporting Requirements
Clean Water Act as amended (FWPCA)	Wastewater Discharges	U.S. EPA, Region VI	NPDES Permit	Quarterly & monthly monitoring reports
		Louisiana Department of Environmental Quality (LDEQ)	Water Discharge Permit	Quarterly monitoring reports
		Railroad Commission of Texas (RCT)	Water Discharge Permit	Quarterly monitoring reports
	Spill Prevention, Control and Countermeasures (SPCC)	U.S. EPA, U.S. Coast Guard, U.S. Dept. of Transportation, LDEQ	SPCC Plan	Submit existing plan when spills on navigable waters exceed 1000 gallons or occur two or more times in 1 year.
	Dredging, maintenance, and any construction in wetlands for structures.(Section 404 & 10)	U.S. Corps of Engineers (COE)	Construct & Maintain Permit, Maintenance Notifications	Two week advance of work start, notice suspension, and end.
	Wildlife Refuges	U.S. Fish and Wildlife Service	Right-of-Way for Construction and Maintenance	None
Oil Pollution Act of 1990 (amendment of FWPCA)	Oil Spill Response	U.S. EPA, LDEQ, USCG, TNRCC	Facility Response Plan Oil Spill Response Certification	None
		U.S. Dept. of Transportation	Pipeline Response Plan	None
Oil Spill Prevention and Response Act of 1991	Oil Spill Response in Texas Coastal Zone	General Land Office	Discharge Prevention and Response Plan	Report spills of oil as required
			Discharge Prevention and Response Facility Cert.	None
Safe Drinking Water Act	Cavern formation, well workovers, and salt-water disposal wells	Louisiana Dept. of Natural Resources (LDNR), Office of Conservation, Underground Injection and Mining Division	Well Workover Permit (WH-1)	Well Workover Report.
			Cavern Inspection (29-M)	Semi-Annual Cavern Inspection Report
			Saltwater Disposal (UIC-10)	Annual Saltwater Disposal Well Report
			Cavern Integrity Test Report	Annual Cavern Integrity
			Oil Wells Integrity (W-10)	Annual Oil Well Status Report
		Railroad Commission of Texas (RCT)	Brine Injection Permit (H-10)	Annual Disposal/Injection Well Reports

Table 3-1 (Continued). Federal, State, and Local Reporting Requirements

Regulation, Statute or Directive	Regulated Area	Enforcement Agency	Types of Required Permits, Applications, or Documentation	Routine Reporting Requirements
Safe Drinking Water Act (continued)	Underground Storage Tanks	LDNR, TNRCC	Registration Number	Spills
Clean Air Act	Control of hydrocarbon emissions from tanks, valves, and piping	LDEQ, TNRCC	Air Emissions Permit	Annual Emissions Inventory Questionnaires
		TNRCC	Air Emissions Permit Special Requirement	Monthly Tank Emissions
Resource Conservation and Recovery Act	Hazardous waste generation and disposal	LDEQ	Annual Generators Report	Annual report to agency
			LA Notification of HW Activity	New Waste stream, change in generator status
			LA Uniform HW Manifest	Complete and submit form with disposal
	Hazardous Waste Disposal	TNRCC	TX Uniform HW Manifest	Complete and submit form with disposal
	Used Oil Burned for Recovery	LDEQ, TNRCC	Uniform HW Manifest (Recycling)	Complete and submit form with disposal to state
	Nonhazardous Oil Field Waste Disposal	LDNR	Non-Haz. Oil Field Waste Shipping Control Ticket	Complete and submit form with disposal
		RCT	Minor Permit	Complete and submit for non-RCT permitted disposal facilities
	Nonhazardous Special	LDEQ, TNRCC	Shipping Paper	Complete and submit form with disposal
Superfund Amendment Reauthorization Act	Reporting of inventories of hazardous substances and materials stored on the site	Louisiana Department of Public Safety and and Corrections, Texas Dept. of Health	Title III, Tier II	Annual Inventory Report
Pollution Prevention Act of 1990	Strategy to incorporate pollution prevention into ES&H goals	EPA, DOE	Pollution Prevention Plan Waste Minimization Plan, Waste Management Plan, Stormwater Pollution Prevention Plan	Annual Inspection and Update of Plan (re-write every 3 years)
Toxic Substances Control Act	PCB Storage and Use Asbestos	EPA	Plan	None
National Environmental Policy Act	Review of proposed projects for environmental considerations	U.S. Council on Environmental Quality (CEQ)	Environmental Impact Statements, Environmental Assessments	Only when not tiered under other EIS or EA.
			Categorical Exclusions	For projects that require consent.

Table 3-1 (Continued). Federal, State, and Local Reporting Requirements

Regulation, Statute or Directive	Regulated Area	Enforcement Agency	Types of Required Permits, Applications, or Documentation	Routine Reporting Requirements
Miscellaneous State Environmental Regulations	Use of Salt Domes	LDNR	Permit for Use of Salt Domes for Hydrocarbon	None
	Water withdrawal from coastal areas	TNRCC	Water Appropriation Permit	Annual Usage Report
	Pipeline Usage	RCT	Pipeline and Gathering System Certification (T-4C)	Annual Certification
	Storage of Oil in Underground Salt Domes	LDNR, RCT	Storage Permit	None
	Operation of Brine Ponds	LDNR, RCT	Operate and Maintain Permit	None
Miscellaneous Reports	Environmental Monitoring (5400.1)	DOE	Environmental Protection and Implementation Plan	Annual revision
	Environmental Monitoring (5400.1)	DOE	Ground Water Protection Management	Annual review (revision every 3 years)
	Environmental Monitoring (5400.1)	DOE	Environmental Monitoring Plan	Annual review (revision every 3 years)
	Environmental Monitoring (5400.1)	DOE	Site Environmental Report	Annual revision
	Environmental Monitoring	DOE	Performance Indicator	Quarterly Report
	Waste Management	DOE	Annual Report on Waste Generation and Waste Minimization Progress	Annual summary wastes of all
	Waste Management	DOE	Affirmative Procurement Report	Annual report
	Waste Management	LDEQ, TNRCC	Monthly Waste Inventory Form	Complete form for documentation
	Waste Management	LDEQ, TNRCC	Weekly waste inspection Form	Complete form for documentation
	General	DOE	ES&H Management Plan	Annual update

3.3 ENVIRONMENTAL PERMITS

The active environmental permits, required by regulatory agencies to construct, operate, and maintain the SPR, are discussed by site.

On June 28, 1995, the SPR received a general permit to discharge hydrostatic in the state of Louisiana. This will apply to all Louisiana SPR facilities including off-site pipelines.

3.3.1 Bayou Choctaw

Table 3-2 lists the active permits at Bayou Choctaw. Individual work permits are received from the Louisiana Underground Injection Control Division of LDNR for each well workover performed. State inspectors regularly visit the site to observe SPR operations. The site operated under a current LWDPS permit issued in March, 1994. The NPDES renewal application, forwarded to Region VI, USEPA in November 1993, and accepted as administratively complete on January 3, 1994, was not acted upon in 1995. A Nationwide Permit (NWP) authorization to reline the brine disposal pipeline and another authorizing construction of additional cable trays along various site piping routes was received in March 1995 from the New Orleans District of Corps of Engineers (NODCOE). A maintenance notification was also made to NODCOE for off-site pipeline work in September 1995.

Table 3-2. Active Permits at Bayou Choctaw

PERMIT NUMBER	ISSUING* AGENCY	PERMIT TYPE	EFFECTIVE DATE	EXPIRATION DATE	COMMENTS
LA0053040	EPA	NPDES	1/03/94		(1)
LAR00A280	EPA	NPDES*	12/31/92	12/31/97	(2)
WP0179	LDEQ (Disch.)	Water	3/06/94	3/05/99	(3)
1280-00015-00	LDEQ	Air	10/01/87	Open	
None	LDNR	Injection	1/11/83	Open	(4)
SDS-1	LDNR	Injection	9/09/77	Open	(5)
LMNOD-SP (Bayou Plaquemine) 17	COE	Constr. & Maintain	9/26/77	-	(6)
LMNOD-SP (Bull Bay) 3	COE	Constr. & Maintain	1/30/79	-	(7)
LMNOD-SP (Iberville Parish Wetlands) 7	COE	Constr. & Maintain	9/26/77	-	(8)
LMNOD-SP (Iberville Parish Wetlands) 10	COE	Constr. & Maintain	6/12/78	-	(9)
LMNOD-SP (Iberville Parish Wetlands) 17	COE	Constr. & Maintain	11/6/78	-	(10)
LMNOD-SP (Iberville Parish Wetlands) 31	COE	Constr. & Maintain	5/27/80	-	(11)
LMNOD-SP (Iberville Parish Wetlands) 102	COE	Constr. & Maintain	9/26/77	-	(12)

(1) Renewal application of 11/24/93 accepted as administratively complete on 1/3/94.
(2) NPDES* General Permit for Storm Water Associated with Industrial Activity effective 12/31/92; Notice of Intent made 9/30/92.
(3) Renewal permit effective 3/6/94. Fully implemented on 4/1/94.
(4) Letter of financial responsibility to plug and abandon injection wells.
(5) Permit approved use of salt dome cavities for storage of liquid hydrocarbons.
(6) Maintain 36-inch crude oil pipeline.
(7) Maintain Bull Bay 24" brine disposal pipeline recorded with applicable Registrar of Deeds.
(8) Construct and maintain well pads (brine disposal wells).
(9) Enlarge existing well pads and construct access roads (brine disposal Wells 1, 2, & 3.)
(10) Construct and maintain access road to brine disposal well area. NOTE: brine disposal pipeline was constructed under NWP authority and maintenance is allowed in conjunction with the access road permit.
(11) Construct and maintain well pad, levees, access road & appurtenances to cavern 102 and additional bank stabilization, warehouse pad and culvert per additions of 1983.
(12) Construct and maintain ring levee, drill site and appurtenances, Well 101.

3.3.2 Big Hill

Table 3-3 lists the active permits at Big Hill. The Big Hill site has an amendment to its TNRCC permit for appropriating additional state waters for the leaching, site utility, and fire protection systems. The permit requires a yearly report of water quantities used. In 1995, the site appropriated 0.599 million m^3 (482.36 acre-feet) of water from the Intracoastal Waterway exclusive of water for fire protection. This represents only 0.41%

of the total allowable withdrawal for a year. Also, in late 1994, Big Hill connected to the City of Winnie water supply. The water was certified for potable use in early 1995; however, the immediate change only resulted in replacing the on-site supply of fire fighting water.

Table 3-3. Active Permits at Big Hill

PERMIT NUMBER	ISSUING AGENCY	PERMIT TYPE	EFFECTIVE DATE	EXPIRATION DATE	COMMENTS
TX0092827	EPA	NPDES	12/22/93		(1)
TXR00B608	EPA	NPDES*	12/31/92	12/31/97	(2)
SWGCO-RP 16536 (01,02,03)	COE	Constr. & Maintain	01/11/84	-	(3)
P-7	F&WS	Constr.	07/31/86	07/31/88	(4)
		Operate	07/31/86	06/30/36	(5)
9256	TNRCC	Air	05/17/83	5/16/98	(6)
02937 & 02939	RCT	Operate	11/28/83	Open	(7)
P000226A & P000226B	RCT	Operate/ Maintain	09/19/84	Open	(8)
0048295	RCT	Operate	05/09/83	Open	(9)
0048320			06/23/83	Open	
UHS-006	RCT	Water (Disch.)	09/01/94	08/31/99	(10)
4045A	TNRCC	Water(Use)	11/14/83	Open	(11)

(1) Renewal submitted 11/24/93 - accepted as administratively complete 12/22/93.
(2) NPDES* General Permit for Storm Water Associated with Industrial Activity effective 12/31/92; Notice of Intent made 9/30/92.
(3) Permits to construct and maintain RWIS, raw water 48" pipeline, brine disposal 48" pipeline, crude oil 36" pipeline. Maintenance dredging clause renewed as needed.
(4) Completion of raw water, brine disposal, and crude oil pipeline extended. Amended to install offshore pipeline by trenching.
(5) Completion of pipeline construction extended. (48" Brine Pipeline)
(6) While under construction.
(7) Valid until ownership changes, system changes, or other physical changes are made in the system.
(8) Permits to operate and maintain anhydrite and brine/oil pits.
(9) Permits to create, operate, and maintain an underground hydrocarbon storage facility consisting of 14 caverns.
(10) Corresponds to TX0092827 (EPA-NPDES). Permit renewed by RCT with an effective date of 9/01/94.
(11) Permit amended in 1990 to allow for annual diversion of no more than 117,291 acre feet of water and to authorize diversion until termination of the project as a SPR operation.

The NPDES renewal application, forwarded to Region VI, EPA in November 1993 and accepted as administratively complete on December 22, 1993, was not acted upon in 1995. BH applied for a reduction in the TNRCC water appropriations permit from 117,291 acre feet to 30,000 acre feet in 1995 in order to realign BH water rights from leaching needs to standby and drawdown needs.

A minor modification to both the state and federal discharge permits was requested and granted changing the "Daily When Discharging" status to "Monthly By Grab" to accommodate the addition of a sump and configurational change at the RWIS. A maintenance notification was made to the U. S. Army Corps of Engineers Galveston District for painting and sandblasting work performed at the RWIS during 1995. Earlier in the year, a traveling screen repair notification was also made to cover that activity at the RWIS.

3.3.3 Bryan Mound

Table 3-4 lists the active permits for the Bryan Mound site. The Bryan Mound site has a second TNRCC permit for the appropriation of state waters for the leaching program, site utility, and fire protection systems. The permit requires a yearly report of the quantity of water used. In 1995, the site used a total of 1.07 million m^3 (860.21 acre/feet) of water from the Brazos River Diversion Channel. A total of 148.214 million m^3 (120,149 acre-feet) of water has been appropriated to date for site activities which represents 32.7% of the total volume permitted.

Maintenance dredging was performed in 1995 under permit 12347 (as amended). The RWIS maintenance dredging clause of that permit was extended to the year 2006 during 1995. The modification also includes approval for a spoil area expansion. Replacement brineline construction was completed in 1995 and the old brine line was abandoned in place after the diffusers were removed.

The NPDES renewal application, forwarded to Region VI, EPA in November 1993, and accepted as administratively complete on January 3, 1994, was renewed by EPA effective

September 1, 1995, including the newly constructed brine disposal pipeline discharge in this permit.

Bryan Mound applied for an air permit amendment in 1994 and received an approved air permit in 1995. The purpose of the amendment was to change the enforceable limits on the various sources to better reflect the current operating conditions and changes to emission calculation methodologies. The new permit requires that all site piping components greater than 2 cm (3/4 in) be monitored (including flanges).

Bryan Mound obtained a standard permit for the TNRCC for air emissions from the site degas plant which began operation in July 1995.

Bryan Mound modified the state TPDES permit UHS-004 to reflect monthly stormwater testing from the previous weekly requirement and received approval to delete metals testing from the stormwater outfalls after one year of data which produced no positive results. Both the discharge permits were modified to include a new outfall location for the degas unit.

Bryan Mound also received a modification to an existing COE permit, 13435(01), to allow a minor fill and construction in the wetland areas along the northern site boundary.

BM made application in 1994 and received a revised air emission permit from the TNRCC on January 11, 1995. This permit recognized the standby status of the facility. A presidentially-ordered drawdown and refill would be recognized as a variance from the permitted emission limitations.

Table 3-4. Active Permits at Bryan Mound

PERMIT NUMBER	ISSUING AGENCY	PERMIT TYPE	EFFECTIVE DATE	EXPIRATION DATE	COMMENTS
TX0074012	EPA	NPDES	09/01/95	08/31/00	(1)
TXR00B609	EPA	NPDES*	12/31/92	12/31/97	(2)
SWGCO-RP-12347(01)	COE	Dredging	04/24/95	12/31/06	(3)
3-67-782 (Docket#)	RCT	Injection	08/21/78	Open	(4)
3-70-377 (Docket#)	RCT	Injection	12/18/78	Open	(4)
P001447	RCT	Operate	10/30/84	Open	(5)
P001448	RCT	Operate	10/30/84	Closed	(6)
3681A	TNRCC	Water	7/20/81	Open	(7)
UHS-004	RCT	Water Disch	10/01/93	09/30/98	(8)
6176B	TNRCC	Air	01/11/95	Open	(9)
28076	TNRCC	Air	03/03/95	03/03/99	(10)
82-8475	TDH&PT	Constr.	01/01/83	Open	(11)
SWGCO-RP-11666	COE	Constr. & Maint.	10/15/77	-	(12)
SWGCO-RP-12112	COE	Constr. & Maint.	07/25/77	-	(13)
SWGCO-RP-12062(02)	COE	Constr. & Maint.	10/10/78	-	(14)
SWGCO-RP-14114(01)	COE	Constr. & Maint.	05/18/85	-	(15)
SWGCO-RP-16177	COE	Constr. & Maint.	09/07/82	-	(16)
04994	RCT	Operate	*06/95	-	(17)

(1) Renewal submitted 11/24/93. Accepted as administratively complete 1/3/94.
(2) NPDES* General Storm Water permit effective 12/31/92; Notice of Intent sent 9/30/92.
(3) Maintenance dredging of raw water intake extended to 12/31/06. (SWGCO-RP 12347 authorized constr. of RWIS). Extension/renewal authorizes spoil area addition.
(4) Approval of oil storage and salt disposal program.
(5) Authority to operate brine pond.
(6) Small brine pond closed August, 1989.
(7) Permit expires after consumption of 367,088 acre-feet of water or project ends.
(8) Corresponds with TX0074012 (EPA-NPDES). (Renewal submitted 1/30/89, RCT acted on permit in August, 1993; effective 10/1/93)
(9) Major amendment received January 11, 1995
(10) Degasification Unit
(11) Corresponds with SWGCO-RP-16177.
(12) for 30-inch crude oil pipeline to 3 miles SW from Freeport
(13) for 30-inch crude oil pipeline to 2 miles S from Freeport
(14) for 36-inch brine disposal pipeline & diffuser
Revision/amendment (01) deleted special condition (a) requiring maximized deep well injection; (02) approved construction of 24 inch replacement pipeline and diffuser in January 12, 1993.
(15) general permit for pipeline crossings by directional drilling in navigable waters
(16) place an 8-inch water line (PVC, potable)
(17) Pipeline distribution system registration to operate crude oil lines.
* Permit issuance in process.

3.3.4 St. James

Table 3-5 lists the active permits at St. James Terminal.

The NPDES renewal application, forwarded to EPA Region VI, EPA in November 1993, and accepted as

(CMD) and LDOTD relating to the drilling of shallow boreholes for the construction of a freeze wall plug over a crevasse in the salt that corresponds with the sink hole, by freezing the ground water via refrigeration wells. This plug provides a means of protecting against a sudden inflow of ground water into the WI mine through the crevasse as the oil is removed from the mine. In addition to registration of the boreholes and wells, a discharge of non-contact cooling water for the refrigeration units required permitting by the contractor.

The NPDES renewal application, forwarded to Region VI, EPA, in November 1993, and accepted as administratively complete on December 22, 1993, was not acted upon in 1995.

As part of the sinkhole investigations, tracer dye studies were implemented with agency concurrence, particularly with the prior input from the Groundwater Protection Division of LDEQ. The studies have remained inconclusive during the calendar year 1995 although in early 1996 a third tracer exercise indicated a hydraulic connection with the storage chamber by returning positive (visible) amounts of fluorescien dyed brine.

Table 3-6. Active Permits at Weeks Island

PERMIT NUMBER	ISSUING AGENCY	PERMIT TYPE	EFFECTIVE DATE	EXPIRATION DATE	COMMENTS
LA0056243	EPA	NPDES	12/22/93		(1)
LAR00A278	EPA	NPDES*	12/31/92	12/31/97	(2)
LMNOD-SP(Atchafalaya Floodway) 251	COE	Constr. Maintain	07/12/78	-	(3)
1105	LDEQ	Air	01/30/79	Open	(4)
SDS-8	LDNR	Injection	02/16/79	Open	(5)
WP1051	LDEQ	Water (Disch.)	01/17/87	01/16/92	(6)

(1) Renewal submitted 11/24/93. Accepted as administratively complete 12/22/93.
(2) NPDES* General Storm Water permit effective 12/31/92; Notice of Intent made 9/30/92.
(3) Recorded permit and amendments with applicable Parish Registrar of Deeds. Maintenance dredging clause renewed as needed.
(4) Requires annual operating report.
(5) Approval for use of salt dome cavities for storage of liquid hydrocarbons.
(6) Permit interpreted via LAC to expire 1/16/93; LWDPS renewal submitted for June 1992; accepted for review on 7/24/92. Draft permit received 1/10/94, currently processing.

3.3.6 West Hackberry

Active permits for West Hackberry are listed in Table 3-7.

Permit amendments and/or permitting actions for West Hackberry projects in 1995 include the in-place abandonment of the brineline from the site to the Gulf of Mexico. The project was altered to reflect a removal of service status for this line deferring its final disposition to site decommissioning activities not anticipated until 2025. Also included is the modification of and additions to the RWIS (pump-recycle project) which were permitted by the COE, LDEQ, and the CMD in early 1995. The relining of and life extension additions to the brine disposal pipeline connecting the site with the SPR saltwater disposal wells to the south received construction permits from the COE, LDEQ, and the CMD by mid-year 1995.

The NPDES renewal application, forwarded to Region VI, EPA in November 1993, and accepted as administratively complete on January 3, 1994, was not acted upon in 1995.

Table 3-7. Active Permits at West Hackberry

PERMIT NUMBER	ISSUING AGENCY	PERMIT TYPE	EFFECTIVE DATE	EXPIRATION DATE	COMMENTS
LA0053031	EPA	NPDES	01/03/94	01/02/99	(1)
LAR00A279	EPA	NPDES*	12/31/92	12/31/97	(2)
LMNOD-SP (LTCS) 26	COE	Dredging	02/08/79	02/08/99	(3)
LMNOD-SP (Black Lk) 31	COE	Dredging	10/26/82	09/39/96	(4)
LMNOD-SP (Black Lk) 43	COE	Constr.& Maintain	07/26/84	-	(5)
LMNOD-SP (Gulf of Mexico) 2574	COE	Constr.& Maintain	08/11/80	-	(6)
LMNOD-SE (LTCS) 40	COE	Constr.& Maintain	05/25/88	-	(7)
LMNOD-SP (Cameron Parish Wetlands) 162	COE	Constr. & Maintain	03/09/78	-	(8)
None	LDNR	Injection	08/07/79	Open	(9)
971198-9	LDNR	Injection	10/06/83	Open	(10)
WP1892	LDEQ	Water (Disch.)	03/10/94	03/09/99	(11)
1048	LDEQ	Air	10/26/78	Open	(12)
7777-00212-00	LDEQ	Air	3/20/95	11/20/95	(13)
SWGCO-RP-12342	COE	Constr. & Maint.	3/28/78	-	(14)
LMNOD-SP (Cameron Parish Wetlands) 152		Constr. & Maint.	3/16/78	-	(15)
LMNOD-SP (Cameron Parish Wetlands) 276		Constr. & Maint.	2/11/80	-	(16)

(1) Renewal submitted 11/24/93. Accepted as administratively complete 1/3/94.
(2) NPDES* General Storm Water permit effective 12/31/92; Notice of Intent made 9/30/92.
(3) Maintenance dredging for raw water intake.
(4) Maintenance dredging for fire water canal and extended boat slip access amendment of 1993.
(5) Construction of erosion control dike completed in 1986. Maintenance dredging open until 7/26/94; addition of rip-rap amendment of 1993 open until 1995.
(6) Amended to install parallel pipeline (05/29/86).
(7) Permit to construct and maintain 36" crude oil pipeline from site to Texoma/LC Meter Station.
(8) Permit to maintain 42" crude oil pipeline.
(9) Approval to create 16 additional salt dome cavities.
(10) Approval to construct and operate wells 117A and B.
(11) Includes Texoma/Lake Charles Meter Station-Outfall 004. Permit renewal issued with an effective date of 3/10/94; fully implemented on 4/1/94.
(12) Requires semi-annual status-of-construction report.
(13) Degasification Unit
(14) For 42" crude oil pipeline crossings of waters & waterways
(15) For brine disposal wells, well pads, and brine disposal pipelines, (12", 20", & 24")
(16) For well pads, levees, and access roads (Wells 110, 111, 112, 113, 114, & 115)

3.4 WASTE MINIMIZATION PROGRAM

The waste minimization program reduces the generation of all wastes including hazardous and nonhazardous sanitary wastes. The most significant SPR-wide waste minimization accomplishments during 1995 were:

a) added waste minimization review to petty cash requests to restrict materials entering the SPR; and

b) updated Qualified Products List as part of the waste minimization review prior to purchase.

The SPR generated only RCRA hazardous and sanitary (nonhazardous municipal and nonhazardous oil field) wastes during 1995. The SPR sent 4,230 kgs. (9,325 lbs.) of hazardous waste off site for incineration during 1995.

The SPR sent 1,376 metric tons (1,517 tons) of sanitary waste off site for disposal during 1995. Paper, used oil burned for energy, antifreeze, scrap metals, and laser printer cartridges were reclaimed or recycled off site. The SPR collected 30,212 kgs (66,606 lbs) of paper and 3,183 kgs (7,017 lbs) of cardboard for reclamation off site. The SPR generated 44,349 ltrs (11,716 gallons) of used oil burned for energy during 1995.

The Environmental Department staff distributed Pollution Prevention pens to all employees and caps to those who completed Pollution Prevention Opportunity Assessments. The SPR Pollution Prevention Interdepartmental Team conducted SPR-wide monthly conference calls to discuss pollution prevention topics, thus increasing its scope of activity. Pollution prevention information appeared in the SPR-wide publication, The ES&H Communiqué, via E-Mail and handouts.

Interdepartmental meetings, including environmental representatives, were held to review product acquisitions. Efforts continue to search for new methods of pollution prevention.

3.5 TRAINING

Site Environmental and Emergency Response Team (ERT) personnel have received training in environmental plans and procedures. Site management personnel are knowledgeable of environmental procedures, spill reporting procedures, the group-specific Spill Contingency Plans, the site-specific SPCC Plans, Facility Response Plans, and compliance awareness. ERT personnel from all sites participate in annual spill response refresher training currently provided by the Texas A&M University, Engineering Extension Service. On-site drills and exercises are also provided to practice spill cleanup and sharpen control skills. Site response personnel are trained to rapidly and effectively contain and cleanup oil, brine, and hazardous substance spills under the circumstances typical at each SPR site.

All site personnel received compliance awareness training via "The Active Force of Protection" videotape. Spill Prevention Control and Countermeasures (SPCC) and Hazardous Waste Handling training is mandatory and provided to site personnel annually.

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4. ENVIRONMENTAL RADIOLOGICAL PROGRAM INFORMATION

There are no radioactive process effluents from any SPR facility. The only radioactive materials at any SPR facility are sealed sources in certain field instruments.

4.1 SEALED SOURCES

A total of 62 nuclear density gauges (SGH Model Nos. 5190, 5191, and 5202) are located on pipelines within the West Hackberry and Bryan Mound sites. The gauges are used for monitoring fluid density changes (oil versus brine) in pipelines. Each gauge unit contains between 100 and 4000 millicuries (mCi) of cesium 137. Gauge wipe tests are performed every three years as required by the general license. The gauges for the Bayou Choctaw pipelines were removed in 1995. The gauges at West Hackberry and Bryan Mound were removed as part of life extension projects in FY `95. The DOE is a general licensee under the manufacturer, Texas Nuclear. No radiation leakage has been detected from any of the gauges to date.

4.2 NATURALLY OCCURRING RADIOACTIVE MATERIALS (NORM)

A contracted survey, conducted at all SPR sites and the commercial pipe yard where SPR piping is stored, was completed in early 1991. The results, no readings of elevated levels at any location, were submitted to the state as required by Louisiana and Texas regulations. No future monitoring is required due to the negative results of this 1991 NORM survey.

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5. ENVIRONMENTAL NON-RADIOLOGICAL PROGRAM INFORMATION

A primary goal of DOE and the SPR contractor is to ensure that all SPR activities are conducted in accordance with sound environmental practices and the environmental integrity of the SPR sites and their respective surroundings is maintained.

Effective environmental surveillance monitoring (separate from discharge permit effluent compliance monitoring) provides a mechanism for assessing the impact of SPR activity on air, surface water, and ground water (Section 6). Site monitoring programs were developed as management tools to provide the information necessary for limiting unwarranted environmental impacts, thus serving the public interest by ensuring environmentally sound operation of the SPR.

5.1 AIR QUALITY

The regulated air pollutants emitted by the SPR facilities are either hazardous in nature or have an impact on the ambient air quality. The non-hazardous pollutants that have an impact on air quality are non-methane/non-ethane volatile organic compounds (VOC), nitrous oxides (NO_x), sulfur dioxides (SO_2), carbon monoxide (CO), and particulate matter (PM_{10}). The hazardous air pollutants (HAP) are benzene, toluene, ethylbenzene, and xylene. As crude oil that was stored under pressure in caverns is moved to surface facilities, its individual components vaporize emitting VOCs and hazardous pollutants from such sources as valves, pumps seals, storage tanks, tankers, and brine ponds. These emissions do not occur from functional pressured systems such as the storage caverns. All of the facilities are equipped with emergency generators that emit less than one ton per year of NO_x, SO_2, CO, and PM_{10} during periodic equipment maintenance.

Oil stored at Bayou Choctaw, Big Hill, Bryan Mound, and West Hackberry has become entrained with methane and ethane, which is released when the oil is depressured,

stripping the valuable higher weight VOCs from the crude oil. In order to reduce the resultant pollution, a project to strip excess methane and ethane, while retaining higher weight VOCs, was started at Bryan Mound and West Hackberry in 1995 and will proceed to Bayou Choctaw and Big Hill in 1996.

There are two types of air monitoring required at the SPR facilities. They are VOC fugitive emission testing and tank seal inspections.

The two Texas facility permits (Big Hill and Bryan Mound) require screening all piping components and pump seals for VOC leaks. This is done quarterly at both sites with an organic vapor analyzer (OVA). Currently, the Louisiana facility permits do not require this type of screening; however, it may be required with the new air permits. In order to use more accurate calculation factors these components need to be screened for effectiveness in minimizing VOC releases. In 1995, a contract was awarded to count and tag all piping components at Bryan Mound, Big Hill, Bayou Choctaw, and West Hackberry that require fugitive monitoring. This contract is being performed to improve the recordkeeping and reporting of fugitive emissions required by the regulatory agencies.

If a facility in a nonattainment area for ozone emits more than nine metric tons (10 tons) VOC per year, it must submit annual Emission Inventory Questionnaires (EIQ). These EIQs reflect the amount of pollutants emitted from the facility using industry acceptable calculations during a calendar year. Currently, the only facility required to submit an EIQ in 1995 is Bryan Mound because it is over the threshold of nine metric tons per year (typ) (10 tpy).

The second type of monitoring is seal inspection of the internal and external floating roof tanks. St. James, Big Hill, and Bryan Mound have floating roof tanks that require inspection of the primary (every five years) and secondary (once a year with the exception of Big Hill which requires semi-annual) seals. The inspections involve checking the seals for visible tears, holes, or cumulative gaps that exceed a regulatory limit.

5.1.1 Bayou Choctaw

Bayou Choctaw, located in a serious nonattainment area for ozone, operated in accordance with all air quality regulatory requirements. Total emissions from the facility were calculated using method AP-42 (EPA, 1985) to be less than nine metric tpy (10 tpy) (a "nonsignificant facility" as noted in the air quality regulations for Louisiana). Nonsignificant facilities are exempt from emissions monitoring requirements and EIQ submission. There were no major configuration changes which would have resulted in additional air emissions during 1995. The only monitoring required at Bayou Choctaw is visual inspection of the valves in crude oil service on the cavern pads to determine visual leaks. No air quality monitoring using actual monitoring equipment was required or conducted during 1995.

5.1.2 Big Hill

The Big Hill facility, located in a serious nonattainment area for ozone, operated in accordance with applicable air quality regulatory requirements and all conditions of the air quality permit. Quarterly monitoring of all valves and pump seals in crude oil service, as required by the permit, using an organic vapor analyzer (OVA), began in 1990 when crude oil fill was initiated. The secondary tank seals for the surge tank BHT-7, inspected semi-annually in accordance with state regulations, were within regulatory limits. An EIQ is not required at Big

5.1.4 St. James Terminal

St. James Terminal, located in a transitional attainment area for ozone, operated in accordance with all air quality permit and regulatory requirements during 1995. The permitted emissions during stand-by are 27.2 metric tpy (30 tpy) of VOC with allowance to exceed 90.72 metric tpy (100 tpy) through a variance during drawdown. A temporary variance was obtained in late 1995 for drawdown of oil which will not begin until 1996. Yearly secondary seal gap measurements are the only type of monitoring required at St. James. The secondary seals on all six external floating roof tanks were within required limits. No air quality monitoring was required or conducted during 1995.

5.1.5 Weeks Island

Weeks Island is one of three SPR sites in an attainment area for ozone. The current air permit reflects the stand-by emissions at the site as 5.53 metric tpy (6.1 tpy) of VOC and 9.11 metric tpy (10.04 type) of nitrous oxides. With the exception of approved variances, the site operated within these permitted limits. Weeks Island began drawdown of crude oil in late 1995; however, this activity did not substantially alter emissions. Air quality monitoring was neither required nor conducted during 1995.

5.1.6 West Hackberry

West Hackberry, located in an ozone attainment area, operated in accordance with all air quality permit and regulatory requirements during 1995. Hydrocarbon emissions were well below the 50.4 metric tpy (55.4 tpy) permitted for filling operations under the general permit. During 1995, an air permit modification application was submitted to LDEQ to reflect current operational conditions which changes normal operating conditions to the standby mode. The amount of allowable

VOC emissions from the site will change to about 36 metric tpy (40 tpy) during standby mode. This is due to additional sources identified at the facility such as the use of frac tanks during workovers and identification of additional valves, pump seals, and flanges as well as elimination of insignificant sources from the permit. It also accounts for more recent data regarding emissions from the brine pond. It is expected that these piping components will have to be screened annually for leaks to maintain minor VOC source designation. During 1995 the West Hackberry facility degas plant was permitted under a separate mobile permit with VOC emission limits of 2 metric tpy (2.2 tpy). The degas plant operated for about four months at West Hackberry during 1995.

5.2 SURFACE WATER QUALITY MONITORING

During 1995, surface waters of the Bayou Choctaw, Big Hill, Bryan Mound, and West Hackberry SPR sites were sampled and monitored for general water quality according to the SPR Environmental Monitoring Plan. Monitoring is conducted to provide early detection of surface water quality degradation resulting from SPR operations. It is separate from, and in addition to, the water discharge permit monitoring program and is not required by any federal or state regulatory agency. Surface water quality monitoring was not conducted at St. James Terminal or Weeks Island because of the low potential to impact surface waters at these two sites. Table 5-1 identifies frequency of specific parameters measured at each SPR site for both DMR and surface water quality.

Data and statistics are presented in tabular form by site in Tables 5-2 through Table 5-5. All observed values that were below detectable limit (BDL) were evaluated as one-half the detection limit for statistical calculation purposes. In addition to commonly used statistical methods, the coefficient of variation (CV) was

incorporated to evaluate the data. The coefficient of variation is a mathematical tool used to quickly identify data sets with a high incidence of variation. Values approaching or exceeding 100 percent indicate that one standard deviation from the stated mean encompasses zero. Such occurrences invalidate the data from a statistical utility standpoint. The usefulness of this treatment is to draw attention to highly variable data sets for further evaluation as to the source or cause of the variability. Extremely low values of CV (approaching or equal 0.0) indicate little or no variation which may be caused by a preponderance of measurements below the method limit of detectability. A quick cross-check for a data set with a low CV and a large quantity of BDLs would confirm that the measurements made were near or below detection limit throughout the year.

Table 5-1. Physicochemical Parameters

PHYSICO-CHEMICAL PARAMETERS	SAMPLE IDENTIFICATION AND FREQUENCY BY SITE													
	DAILY					WEEKLY		MONTHLY						QRT
	BC	BH	BM	SJ	WH	BH	BM	BC	BH	BM	SJ	WI	WH	
pH	15, 17-20 101 HPP SWD1 SWD2 SWD3	003	TX-002	001	001 6-9 11 101-117 HPP SOT			001 002 A-F	001 002 004 A-G TX-003 & other storm water	001 A-J 101-116 1,2 4,5 TX-003 & other storm water		01A 01B 002	002 A-F 001 004 Veh. Rinse TX-22	SJ002, 003
SALINITY			001		001 HPP			A-F	A-G 001 TX-003 & other storm water	A-J TX-003 & other storm water			A-F	
TEMP.					001			A-F	A-G 001	A-J 001			A-F	
TOTAL DISSOLVED SOLIDS					001	001				001			A-F	
TOTAL SUSPENDED SOLIDS					001	001 002		001 002	004	002* 001		01B 002 003	002, A-F Veh. Rinse	SJ002, 003
DISSOLVED OXYGEN		*** 001			001			A-F	A-G	A-J		A-F		
BOD5							001	001 002	004	002*		01B 002	002	SJ002, 003
COD			TX-002						004	A-J				
OIL & GREASE	15,17-20, 101, HPP, SWD1 SWD2 SWD3	001 003	TX-001	001	001 101-117 HPP				TX-003 & other storm water	001 101-116 1,2 4,5 TX-003 & other storm water		01A	004 Veh. Rinse TX-22	A-G
TOC		003		001	6-9,11 101-117 HPP, SOT		001, TX-003 & other storm water	A-F	A-G	A-J TX-003 & other storm water		E	A-C, E-F, 004 Veh. Rinse	WH TX-22
FECAL COLIFORM												01B, 002	002	
RESIDUAL CHLORINE			TX-002											
FLOW	001, 002 15,17-20, 101, HPP, SWD1 SWD2 SWD3	001	TX-001, 002 001	001	001 HPP**	002 004**				002* 004	002, 003	01A, 01B, 002, 003	002 004 Veh. Rinse TX-22	

* Sampling performed twice per indicated period.
** Sampling performed 5 days/week
***Sampling performed daily except weekends and holidays when injecting oxygen scavenger chemical

HPP: High Pressure Pump Pad
SWD: Salt Water Disposal (Injection Well)
SOT: Slop Oil Tank

5.2.1 Bayou Choctaw

Samples were collected and analyzed monthly, where possible, for seven surface water monitoring stations. Monitoring stations A through G are identified in Figure 5-1. Parameters monitored include pH, salinity, temperature, dissolved oxygen (DO), oil and grease, and total organic compound (TOC) (Table 5-2). A discussion of each parameter follows.

5.2.1.1 Hydrogen Ion Activity (pH)

The annual median values of pH for all the monitored stations ranged from 6.5 to 7.7 s.u. This indicates that natural waters are generally neutral. Fluctuations observed are attributed to environmental and seasonal factors such as variations in rainfall, temperature, and aquatic system flushing.

5.2.1.2 Salinity (SAL)

In 1995, average annual salinities remained 1.0 ppt or less at all stations except B and C which averaged 2.5 and 1.1 ppt, respectively. Similar to last year, several spikes were observed at these stations that could possibly be due to off-site sources (station B in particular), traces of historical contamination, or the result of evaporation where dissolved salts were concentrated.

BAYOU CHOCTAW

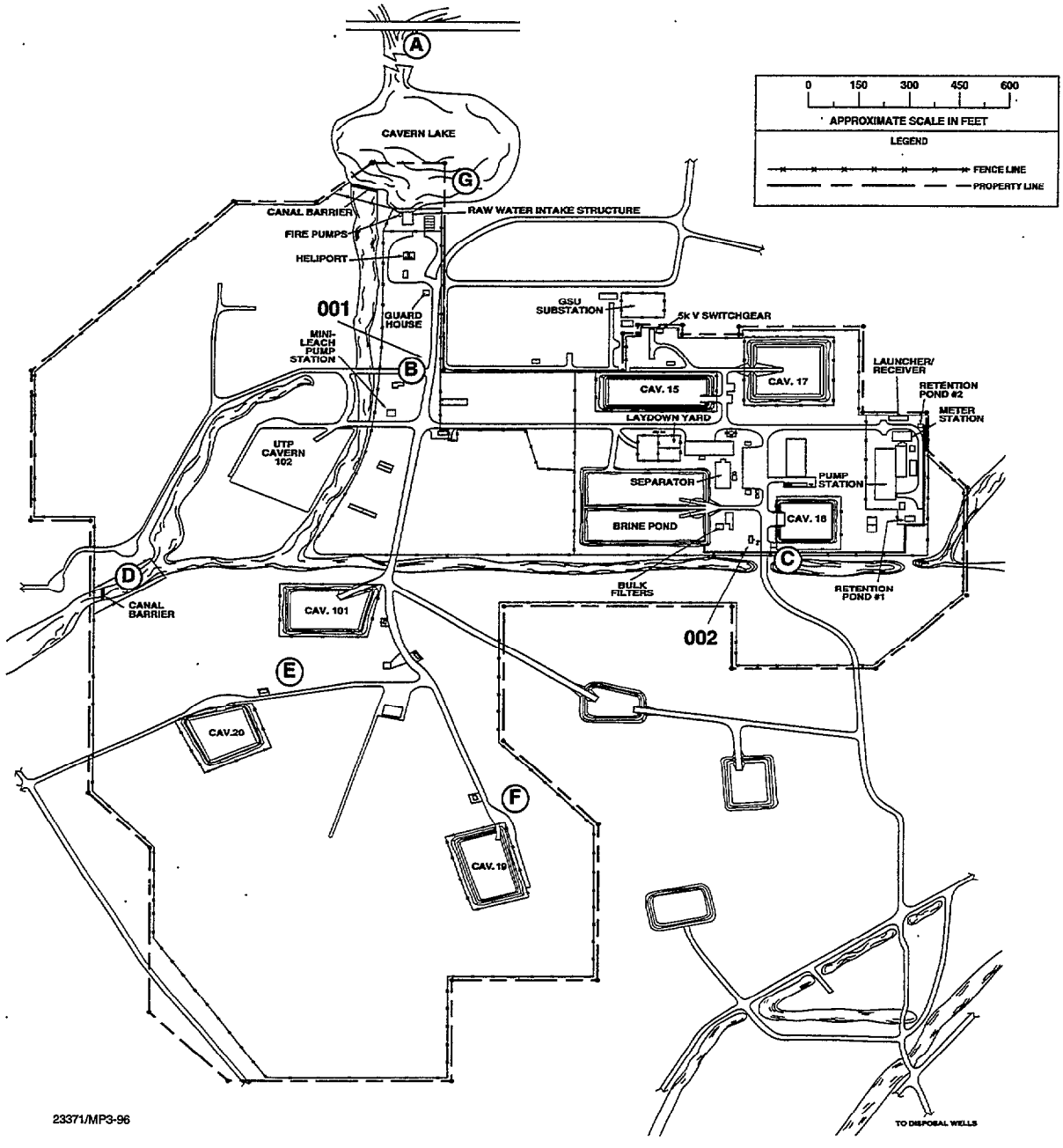


Figure 5-1
(Sheet 1 of 2) Bayou Choctaw Environmental Monitoring Stations

Federal Discharge Monitoring Stations

001 Discharge from sewage treatment plant (administration building)

002 Discharge from sewage treatment plant (control building)

Stormwater Discharges

Stormwater and pump flush from pump pads

Stormwater runoff from well pads 15, 17-20, and 101

Water Quality Monitoring Stations

A Canal north of Cavern Lake at perimeter road bridge

B Ditch running under the road to warehouse on West side of the road in area of heat exchangers.

C East-West Canal at Intersection of road to brine disposal wells

D East-West Canal at cavern 10

E Wetland Area near well pad 20

F Wetland Area near well pad 19

G Near Raw Water Intake

Figure 5-1
(Sheet 2 of 2) Bayou Choctaw Environmental Monitoring Stations

Table 5-2. 1995 Data Summary for Bayou Choctaw Monitoring Stations

Station	Statistical Parameters	pH (s.u.)	Temperature (deg. C)	Salinity (ppt)	Oil & Grease (mg/l)	Dissolved Oxygen (mg/l)	Total Organic Carbon (mg/l)
A							
	Sample Size	12	12	12	4	12	12
	Number of BDL			10	4		
	Maximum	7.9	30.0	1.0	2.5	7.7	10.8
	Minimum	6.7	12.0	0.5	2.5	1.8	3.2
	Mean	NV	21.9	0.6	2.5	3.5	6.7
	Median	7.0	22.0	0.5	2.5	2.7	6.3
	Standard Deviation	NV	6.1	0.2	0.0	1.9	2.4
	Coefficient of Variation	NV	27.8	33.4	0.0	54.0	35.6
B							
	Sample Size	11	11	11	4	11	11
	Number of BDL			2	4		
	Maximum	8.1	32.0	7.0	2.5	13.5	10.2
	Minimum	7.1	10.0	0.5	2.5	1.0	2.0
	Mean	NV	22.4	2.5	2.5	6.7	6.4
	Median	7.7	22.0	1.0	2.5	6.2	5.5
	Standard Deviation	NV	7.3	2.2	0.0	4.0	2.8
	Coefficient of Variation	NV	32.5	89.5	0.0	59.4	43.3
C							
	Sample Size	12	12	12	4	12	12
	Number of BDL			8	4		
	Maximum	7.4	30.0	4.0	2.5	8.4	8.4
	Minimum	6.5	13.0	0.5	2.5	1.4	5 0
	Mean	NV	21.3	1.1	2.5	3.5	6.7
	Median	6.5	21.0	0.5	2.5	2.7	6.8
	Standard Deviation	NV	6.0	1.2	0.0	2.3	1.0
	Coefficient of Variation	NV	28.1	107.5	0.0	64.9	15.7
D							
	Sample Size	12	12	12	4	12	12
	Number of BDL			11	4		
	Maximum	7.8	30.0	1.0	2.5	4.8	8.8
	Minimum	6.7	13.0	0.5	2.5	1.4	3.0
	Mean	NV	21.9	0.5	2.5	3.0	5.9
	Median	7.1	21.5	0.5	2.5	3.1	6.3
	Standard Deviation	NV	6.0	0.14	0.0	1.0	2.0
	Coefficient of Variation	NV	27.1	26.7	0.0	32.1	33.8
E							
	Sample Size	10	10	10	3	10	10
	Number of BDL			9	3		
	Maximum	7.5	31.0	4.0	2.5	8.7	11.3
	Minimum	6.6	13.0	0.5	2.5	0.4	4.6
	Mean	NV	21.7	0.9	2.5	3.5	6.9
	Median	7.0	21.5	0.5	2.5	2.6	5.8
	Standard Deviation	NV	6.4	1.1	0.0	2.8	2.6
	Coefficient of Variation	NV	29.6	130.2	0.0	80.9	37.4

Note: BDL = Number of samples that were below the detectable limit.
NV = Not a valid number or statistically meaningful.

Table 5-2 (Continued).

1995 Data Summary for Bayou Choctaw Monitoring Stations

Station	Statistical Parameters	pH (s.u.)	Temperature (deg. C)	Salinity (ppt)	Oil & Grease (mg/l)	Dissolved Oxygen (mg/l)	Total Organic Carbon (mg/l)
F							
	Sample Size	10	10	10	3	10	10
	Number of BDL			6	3		
	Maximum	7.2	30.0	1.0	2.5	6.6	8.9
	Minimum	6.5	12.0	0.5	2.5	0.2	4.8
	Mean	NV	21.6	0.7	2.5	3.1	6.1
	Median	6.8	23.0	0.5	2.5	3.4	5.8
	Standard Deviation	NV	6.5	0.3	0.0	2.0	1.4
	Coefficient of Variation	NV	30.0	36.9	0.0	63.8	22.9
G							
	Sample Size	11	11	11	4	11	11
	Number of BDL			10	4		
	Maximum	8.3	31.0	1.0	2.5	8.3	9.6
	Minimum	6.9	14.0	0.5	2.5	1.4	3.7
	Mean	NV	21.5	0.6	2.5	4.4	6.6
	Median	7.2	22.0	0.5	2.5	4.2	6.9
	Standard Deviation	NV	5.9	0.2	0.0	2.0	1.8
	Coefficient of Variation	NV	27.5	27.6	0.0	45.2	27.4

Note: BDL = Number of samples that were below the detectable limit.
NV = Not a valid number or statistically meaningful.

5.2.1.3 Temperature

Observed temperature ranged from 10.0° C in late winter to 32.0° C in mid summer. Temperature fluctuations were consistent among all stations and are attributed solely to meteorological conditions since Bayou Choctaw produces no thermal discharges.

5.2.1.4 Dissolved Oxygen (DO)

The consistency in DO observations suggests that SPR runoff and discharges do not significantly reduce the DO of receiving waters. Low levels observed below 2.0 mg/l at various times are attributed to high temperature and high organic loading combined with low flow and minimal flushing typically observed in a wetland environment. Peak levels above 9.0 mg/l are attributed to high primary productivity.

5.2.1.5 Oil and Grease

Oil and grease levels were below detectable levels (<5 mg/l) at all stations throughout 1995. The data favorably reflect continued good site housekeeping and effective site spill prevention, control, and response efforts.

5.2.1.6 Total Organic Carbon (TOC)

Average annual TOC concentrations ranged from 5.9 to 6.9 mg/l. High TOC readings correlate with high organic loading which is usually found in stagnant or sluggish water bodies of limited volume, such as an evaporating pool of water. This range of TOC is indicative of biologically stable surface waters.

5.2.1.7 General Observations

Based on the above discussion, the following general observations are made regarding the quality of Bayou Choctaw surface waters.

a. The surrounding surface waters continue to have a relatively neutral pH.

b. Except for one excursion at station B, observed salinities remained generally low and within the historical range. Those areas of slightly elevated salinities are not attributed to SPR activity in 1995.

c. Temperature variations were caused by seasonal changes. There are no thermal processes used at any SPR site.

d. Low DO levels occasionally observed are attributed to high temperatures and organic loading resulting

from low flow and minimal flushing typically observed in backwater swamp areas.

e. Consistently low oil and grease levels observed indicate that site oil spills are effectively managed, minimizing any impact on the Bayou Choctaw environs.

5.2.2 Big Hill

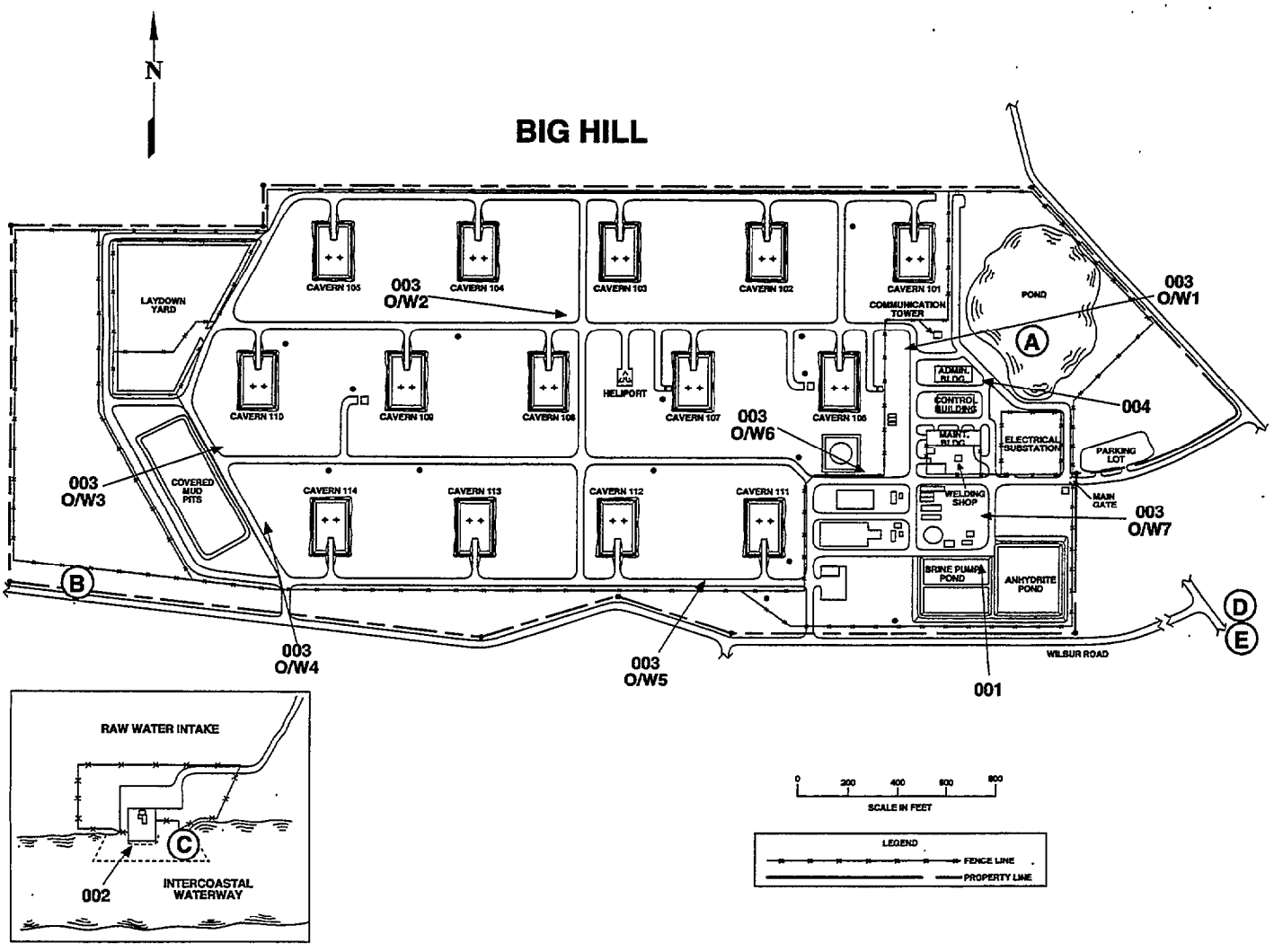
Monitoring stations were established at five locations (Figure 5-2) to assess site-associated surface water quality and to provide early detection of any surface water quality degradation that may result from SPR operations. Parameters including pH, temperature, salinity, oil and grease, dissolved oxygen, and total organic carbon were monitored (Table 5-3).

5.2.2.1 Hydrogen Ion Activity (pH)

The 1995 data show the pH of site and surrounding surface waters remained between 5.9 and 8.6 s.u. The annual median values of pH for each of the monitored stations ranged from 6.5 to 7.4 s.u. No seasonal trend was observed, but higher pHs were observed in more saline waters. The pH was generally higher throughout the year at the brackish Intracoastal Waterway (ICW) than at any other station. Brackish water occasionally found at the Wilber Road and Gator Hole stations also had slightly elevated pH.

5.2.2.2 Salinity (SAL)

Annual average salinities were generally low, ranging from fresh on the site throughout the year to 15.0 ppt at the RWIS during late summer. It was observed that the further south the station location, the slightly higher the salinity and its variability due to seasonal effects, tides, and weather. The fresh water environment evident at the STP pond (Station A) and the Pipkin Reservoir (E)



2071/BHMP/4-96

Figure 5-2(Sheet 1 of 2). Big Hill Environmental Monitoring Stations

Federal Discharge Monitoring Stations

001 Brine disposal to Gulf of Mexico

002 Hydroclone and blowdown at raw water intake structure

003 Stormwater discharges

O/W1 Stormwater from well pads 101, 102, 106, 107

O/W2 Stormwater from well pads 103, 104, 105

O/W3 Stormwater from well pads 108, 109, 110

O/W4 Stormwater from well pads 113, 114

O/W5 Stormwater from well pads 111, 112

O/W6 Stormwater from BHT-7 (crude oil surge tank) diked area

O/W7 Stormwater from pump and meter pads

004 Discharge from sewage treatment plant (RCT only)

Water Quality Monitoring Stations

A Pond receiving effluent from site sewage treatment plant (STP)

B Wilber Road ditch - southwest of site

C RWIS at Intracoastal Waterway

D Pipkin Reservoir - (1.8 Miles from map location)

E Gator Hole (3.1 Miles from map location)

Figure 5-2 (Sheet 2 of 2). Big Hill Environmental Monitoring Stations

Table 5-3. 1995 Data Summary for Big Hill Monitoring Stations

Station	Statistical Parameters	pH (s.u.)	Temperature (deg. C)	Salinity (ppt)	Oil & Grease (mg/l)	Dissolved Oxygen (mg/l)	Total Organic Carbon (mg/l)
Gator Hole							
	Sample Size	12	12	12	12	12	12
	Number of BDL			4	12	1	
	Maximum	7.6	29.0	10.4	2.5	8.0	25.6
	Minimum	6.2	11.0	0.5	2.5	.03	7.0
	Mean	NV	22.7	2.2	2.5	3.3	15.5
	Median	6.7	25.0	1.3	2.5	3.4	15.1
	Standard Deviation	NV	6.1	2.9	0.0	2.7	4.3
	Coefficient of Variation	NV	27.0	132.1	0.0	81.7	27.8
Pipkin Reservoir							
	Sample Size	12	12	12	12	12	12
	Number of BDL			12	12		
	Maximum	7.9	30.0	0.5	2.5	8.3	77.7
	Minimum	6.1	10.0	0.5	2.5	0.5	10.3
	Mean	NV	21.9	0.5	2.5	2.9	18.9
	Median	6.5	23.0	0.5	2.5	2.3	14.1
	Standard Deviation	NV	6.4	0.0	0.0	2.4	18.7
	Coefficient of Variation	NV	29.4	0.0	0.0	82.1	99.3
RWIS							
	Sample Size	12	12	12	12	12	12
	Number of BDL			4	12		
	Maximum	7.7	31.0	15.0	2.5	9.8	13.7
	Minimum	6.3	11.0	0.5	2.5	4.0	5.0
	Mean	NV	23.1	5.3	2.5	6.9	9.3
	Median	7.4	23.6	3.4	2.5	7.1	9.7
	Standard Deviation	NV	6.9	5.3	0.0	1.6	2.8
	Coefficient of Variation	NV	29.9	101.4	0.0	23.7	30.4
STP Pond							
	Sample Size	12	12	12	12	12	12
	Number of BDL			12	12		
	Maximum	8.6	29.0	0.5	2.5	7.0	13.3
	Minimum	5.9	13.0	0.5	2.5	0.5	2.9
	Mean	NV	23.0	0.5	2.5	3.0	7.2
	Median	6.7	26.0	0.5	2.5	2.0	6.6
	Standard Deviation	NV	5.6	0.0	0.0	2.5	3.0
	Coefficient of Variation	NV	24.3	0.0	0.0	83.2	41.1
Wilber Ditch							
	Sample Size	12	12	12	12	12	12
	Number of BDL			5	12		
	Maximum	7.5	32.0	5.9	2.5	8.9	17.8
	Minimum	6.7	11.0	0.5	2.5	1.0	8.0
	Mean	NV	23.3	2.2	2.5	5.0	12.6
	Median	7.1	25.0	2.1	2.5	5.8	12.8
	Standard Deviation	NV	6.6	1.5	0.0	2.5	2.9
	Coefficient of Variation	NV	28.5	65.3	0.0	49.8	23.4

Note: BDL = Number of samples that were below the detectable limit.
NV = Not a valid number or statistically meaningful.

transitioned to brackish at the Gator Hole (F) and the ICW (G). Marsh changes from fresh to intermediate regime were evident. The Gator Hole and the ICW stations which are located in a tidally affected brackish water environment are more subject to variations in salinity.

Salinity observed in the Wilber Road ditch (C) that flows along the south side of the site were greater than that on the site. Possible sources include oil field and agricultural activities in the area. The coefficient of variation for salinity readings taken over the year was much higher at the Wilber Road ditch, the Gator Hole, and the ICW than other stations which indicates that salinity is highly variable at these locations.

5.2.2.3 Oil and Grease

Results for all stations at all times were below the detectable limit. No indication of crude oil from SPR activities was found at these stations during sampling episodes.

5.2.2.4 Temperature

Temperatures observed in 1995 ranged from 10°C to 32°C and exhibited the characteristics expected from seasonal meteorological changes. Observed temperatures fell below 20°C only during the months of January, February, and December. Temperature fluctuations were very similar among all stations.

5.2.2.5 Dissolved Oxygen (DO)

Dissolved oxygen was generally greatest in the winter and spring and lowest from summer through fall. The range of DO fluctuation observed during 1995 was surprisingly similar among stations ranging from about six to eight throughout the year. The lowest variability was at the RWIS where the greater flow and depth of the ICW provided a more constant dissolved oxygen level.

5.2.2.6 Total Organic Carbon (TOC)

Average annual TOC concentrations ranged from 7.2 to 18.9 mg/l. The higher TOC levels observed are indicative of potential biological decomposition events.

5.2.2.7 General Observations

Based on the above discussion, the following general observations are made regarding the quality of Big Hill surface waters.

a. The fresh surface waters had a near neutral pH, but pH was generally higher in brackish water.

b. Observed salinities were low on the site and increased in natural fashion from fresh water at the site to intermediate brackish water regimes at the ICW. Salinities observed in the Wilber Road ditch may be due to non-SPR, industrial, or agricultural activities.

c. Surrounding surface waters were not contaminated by SPR crude oil.

d. Temperature variations followed seasonal meteorological changes.

e. Dissolved oxygen and total organic carbon fluctuations were within typical ranges indicative of seasonal and meteorological influences.

5.2.3 Bryan Mound

Surface waters surrounding the Bryan Mound site were monitored throughout 1995. Blue Lake was sampled at seven stations during the months of February, April, May, June, July, and August. Mud Lake was sampled at three

stations in May only. Low tides restricted access to Mud Lake during other sampling periods.

Surface water monitoring stations are identified in Figure 5-3. Stations A through C and E through G are located along the Blue Lake shoreline to monitor effects of site runoff. Station D, located farther away from the site in Blue Lake, serves as a control. Stations H and I are located along the Mud Lake shoreline to monitor effects of site runoff. Station J, located near the central point of the lake, serves as a control.

Parameters monitored in the Bryan Mound surface waters include pH, temperature, salinity, oil and grease, and TOC (Table 5-4).

5.2.3.1 Hydrogen Ion Activity (pH)

In 1995 pH of Blue Lake and Mud Lake was slightly basic, indicative of natural waters devoid of carbon dioxide and generally hard in regard to mineral content. Marine and brackish waters, such as those in Blue Lake and Mud Lake, typically have somewhat elevated pH levels and high mineral content.

The pH fluctuations in Bryan Mound surface waters were quite small and considered within the normal range of variability.

BRYAN MOUND

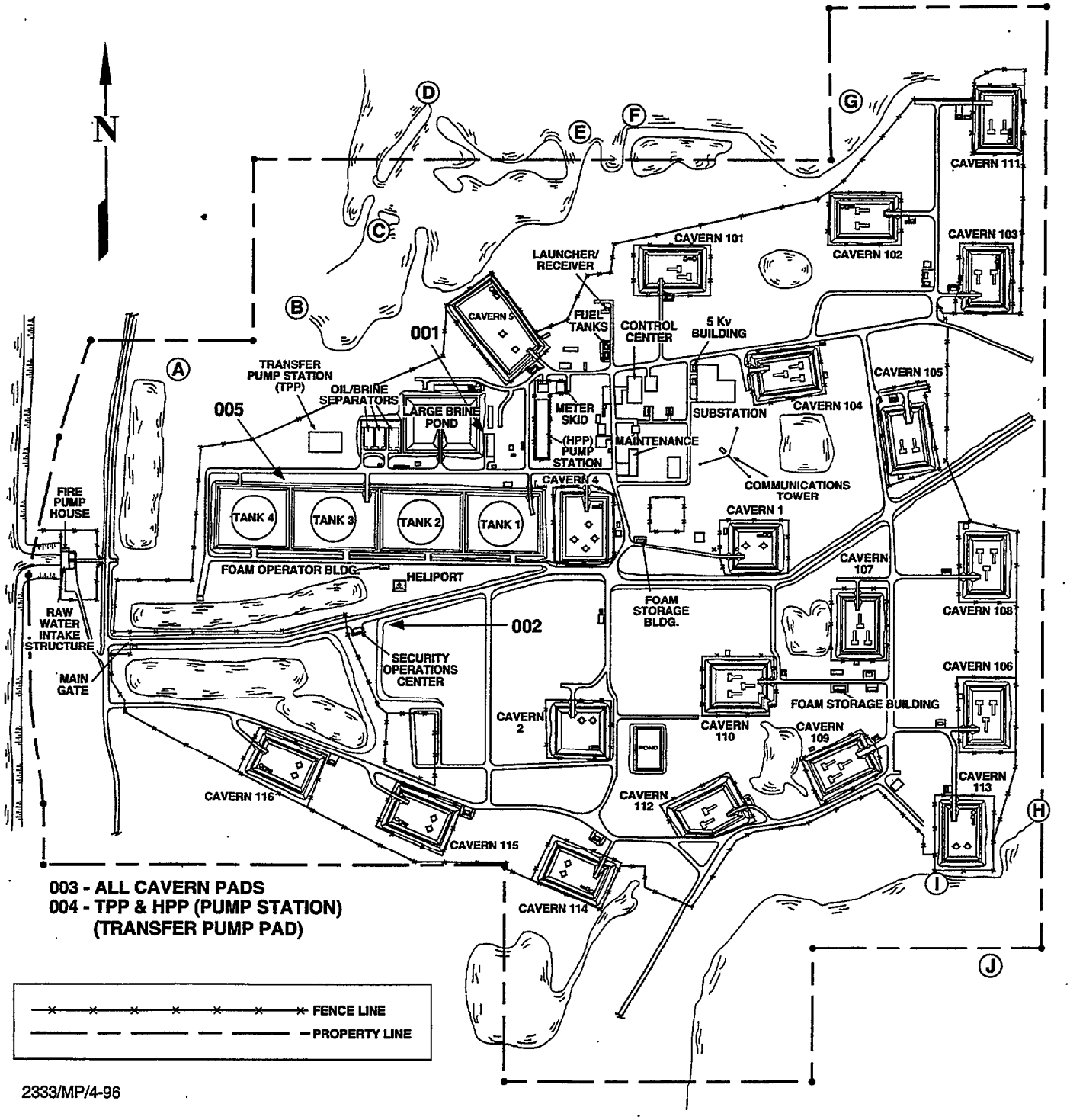


Figure 5-3

(Sheet 1 of 2). Bryan Mound Environmental Monitoring Stations

Federal Discharge Monitoring Stations

001	Brine disposal
002	Discharge from the sewage treatment plant
003	Stormwater discharges
	Runoff from well pads 1, 2, 4, 5, and 101-116
	Runoff from the high-pressure pump pad
	Runoff from transfer pump pad
	Runoff from surge tank area

Water Quality Monitoring Stations

A	Blue Lake
B	Blue Lake
C	Blue Lake
D	Blue Lake - Control Point 1
E	Blue Lake
F	Blue Lake
G	Blue Lake
H	Mud Lake
I	Mud Lake
J	Mud Lake - Control Point 2

Figure 5-3 (Sheet 2 of 2). Bryan Mound Environmental Monitoring Stations

Table 5-4. 1995 Data Summary for Bryan Mound Monitoring Stations

Station	Statistical Parameters	pH (s.u.)	Temperature (deg. C)	Salinity (ppt)	Oil & Grease (mg/l)	Total Organic Carbon (mg/l)
A						
	Sample Size	6	6	6	2	6
	Number of BDL				2	
	Maximum	8.5	31.0	4.7	2.5	31.3
	Minimum	8 2	17.0	3.6	2.5	18.6
	Mean	NV	25.0	4.0	2.5	23.7
	Median	8.4	27.0	4.0	2.5	21.9
	Standard Deviation	NV	5.8	0.4	0.0	4.9
	Coefficient of Variation	NV	23.2	10.1	0.0	20.7
B						
	Sample Size	6	6	6	2	6
	Number of BDL				2	
	Maximum	8.7	31.0	4.7	2.5	30.6
	Minimum	8.2	17.0	3.6	2.5	19.0
	Mean	NV	25.0	4.0	2.5	23.4
	Median	8.4	27.0	4.0	2.5	21.9
	Standard Deviation	NV	5.8	0.4	0.0	4.6
	Coefficient of Variation	NV	23.2	10.1	0.0	19.6
C						
	Sample Size	6	6	6	2	6
	Number of BDL				2	
	Maximum	8.7	30.0	4.7	2.5	28.5
	Minimum	8.3	17.0	3.6	2.5	17.7
	Mean	NV	24.8	4.0	2.5	22.3
	Median	8.5	27.0	4.0	2.5	22.0
	Standard Deviation	NV	5.6	0.4	0.0	4.0
	Coefficient of Variation	NV	22.6	10.1	0.0	17.8
D						
	Sample Size	6	6	5	2	6
	Number of BDL				2	
	Maximum	8.7	31.0	4.6	2.5	30.5
	Minimum	8.2	17.0	3.7	2.5	18.9
	Mean	NV	25.2	4.0	2.5	22.2
	Median	8.4	27.0	4.0	2.5	20.2
	Standard Deviation	NV	5.9	0.3	0.0	4.6
	Coefficient of Variation	NV	23.6	8.3	0.0	20.6
E						
	Sample Size	6	6	5	2	6
	Number of BDL				2	
	Maximum	8.8	31.0	4.6	2.5	30 6
	Minimum	8.2	17.0	3.7	2.5	18.4
	Mean	NV	25.2	4.1	2.5	22.7
	Median	8.3	26.5	4.1	2.5	21.1
	Standard Deviation	NV	5.6	0.3	0.0	4.1
	Coefficient of Variation	NV	22.1	7.9	0.0	18.1

Note: BDL = Number of samples that were below the detectable limit.
NV = Not a valid number or statistically meaningful.

Table 5-4 (continued). 1995 Data Summary for Bryan Mound Monitoring Stations

Station	Statistical Parameters	pH (s.u.)	Temperature (deg. C)	Salinity (ppt)	Oil & Grease (mg/l)	Total Organic Carbon (mg/l)
F						
	Sample Size	6	6	6	2	6
	Number of BDL				2	
	Maximum	8.8	31.0	4.7	2.5	29.5
	Minimum	8.2	18.0	3.6	2.5	18.6
	Mean	NV	25.2	4.0	2.5	22.6
	Median	8.3	26.5	4.0	2.5	21.1
	Standard Deviation	NV	5.6	0.4	0.0	4.1
	Coefficient of Variation	NV	22.1	9.8	0.0	18.1
G						
	Sample Size	6	6	6	2	6
	Number of BDL				2	
	Maximum	8.7	31.0	4.7	2.5	30.4
	Minimum	8.2	17.0	3.6	2.5	17.5
	Mean	NV	25.2	4.0	2.5	22.8
	Median	8.3	27.0	4.0	2.5	21.9
	Standard Deviation	NV	6.0	0.4	0.0	4.8
	Coefficient of Variation	NV	23.6	9.7	0.0	21.1
H						
	Sample Size	1	1	1	1	1
	Number of BDL				1	
	Maximum	8.4	25.0	10.2	2.5	3.6
	Minimum	8.4	25.0	10.2	2.5	3.6
	Mean	NV	NV	NV	NV	NV
	Median	NV	NV	NV	NV	NV
	Standard Deviation	NV	NV	NV	NV	NV
	Coefficient of Variation	NV	NV	NV	NV	NV
I						
	Sample Size	1	1	1	1	1
	Number of BDL				1	
	Maximum	8.7	25.0	9.2	2.5	4.6
	Minimum	8.7	25.0	9.2	2.5	4.6
	Mean	NV	NV	NV	NV	NV
	Median	NV	NV	NV	NV	NV
	Standard Deviation	NV	NV	NV	NV	NV
	Coefficient of Variation	NV	NV	NV	NV	NV
J						
	Sample Size	1	1	1	1	1
	Number of BDL				1	
	Maximum	8.4	25.0	9.0	2.5	5.8
	Minimum	8.4	25.0	9.0	2.5	5.8
	Mean	NV	NV	NV	NV	NV
	Median	NV	NV	NV	NV	NV
	Standard Deviation	NV	NV	NV	NV	NV
	Coefficient of Variation	NV	NV	NV	NV	NV

Note: BDL = Number of samples that were below the detectable limit.
NV = Not a valid number or statistically meaningful.

5.2.3.2 Salinity (SAL).

Observed salinity fluctuations ranged from 3.6 to 4.7 ppt in Blue Lake and 9.0 to 10.2 ppt in Mud Lake. Salinity fluctuations are attributed to meteorological and tidal conditions rather than site operations, since salinities observed at control sample stations D and J were consistent with those found along the site shoreline. The higher salinities in Mud Lake are primarily caused by the strong tidal and wind influence on the lake and its more direct link with the Gulf of Mexico.

5.2.3.3 Temperature

Temperatures observed in 1995 ranged from 17°C to 31°C and exhibited the characteristics expected from seasonal meteorological changes. Mud Lake's slightly cooler summer temperature is attributed to stronger tidal movement there than in Blue Lake.

5.2.3.4 Total Organic Carbon (TOC)

In 1995 observed average TOC in Blue Lake ranged from 22.2 to 23.7 mg/l. Observed TOC in Mud Lake was much lower (range: 3.6 to 5.8 mg/l) than Blue Lake in May when the Mud Lake sample stations were accessible for sampling. Higher TOC measured in Blue Lake is attributed to primary productivity and low mixing. The TOC levels observed in both lakes are indicative of healthy conditions.

5.2.3.5 General Observations

Based on the above discussions, the following general observations are made regarding the quality of Bryan Mound surface waters.

a. The observed pH was stable and slightly basic in Blue Lake and Mud Lake, typical of brackish waters.

b. Temperature and salinity fluctuations observed during the year are attributed to meteorological and tidal conditions rather than site operations.

c. High TOC levels observed in Blue Lake are attributed to high primary productivity and low mixing of this surface water body.

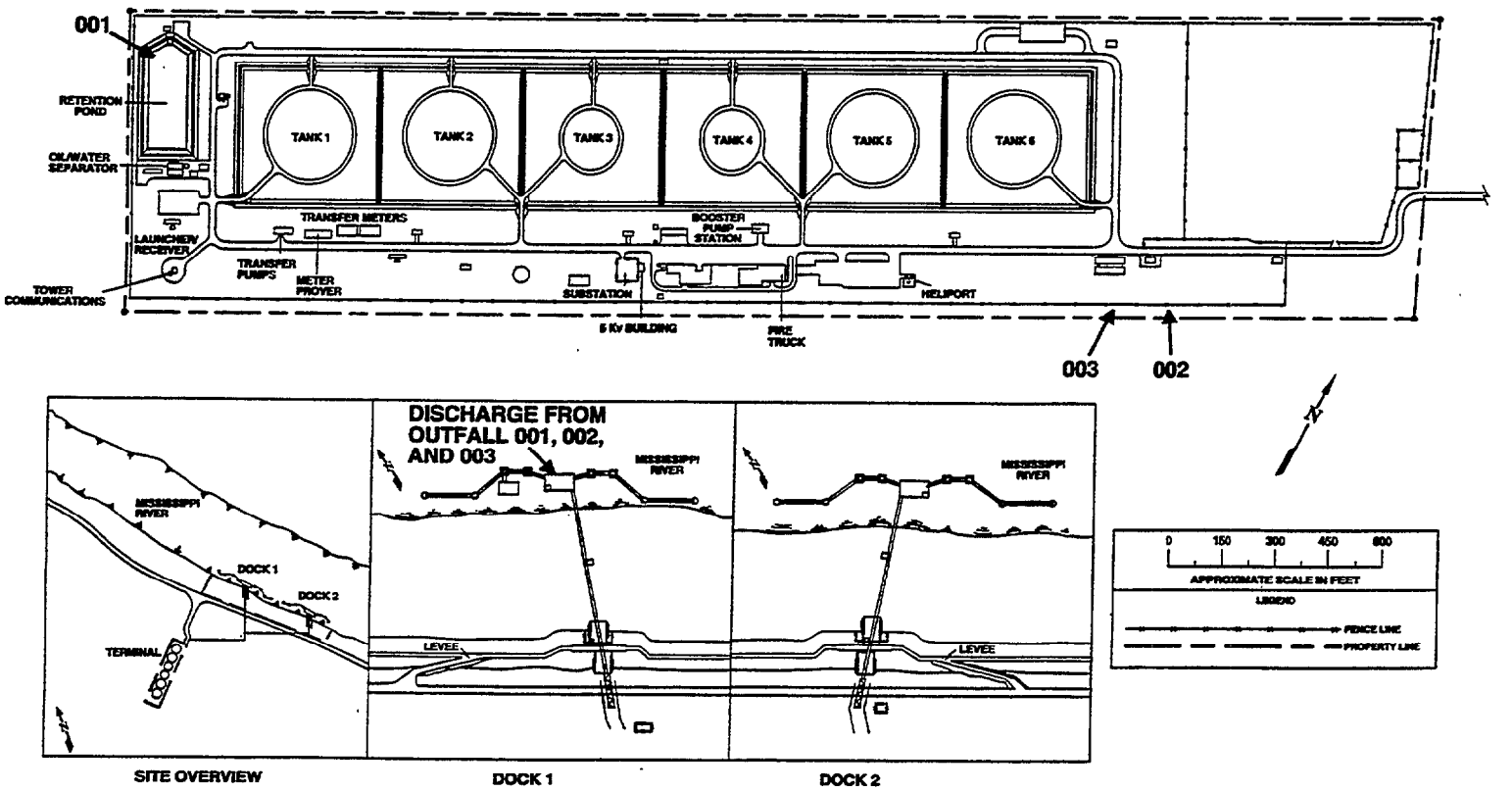
5.2.4 St. James Terminal

St. James Terminal is located in a low-lying agricultural area beyond the right descending (west) levee of the Mississippi River. All precipitation is effectively drained westward from the terminal and surrounding sugar cane fields by a series of ditches back to bottom land hardwood areas.

The two St. James docks are located on the right descending (west) bank of the Mississippi River. They are curbed with all runoff pumped to the stormwater treatment system and retention pond. The site retention pond, which also collects stormwater runoff from the six crude oil storage tank containment areas, is discharged intermittently through outfall 001 (Figure 5-4) into the Mississippi River. Two wastewater treatment plants, which serve the site control and maintenance buildings, discharge as state outfalls 002 and 003 through outfall 001 into the Mississippi River.

At St. James, the Mississippi River has a large flow volume and rapid currents providing a strong assimilative capacity. The intermittent nature of discharges from site outfalls, the characteristic hydrographic features of the Mississippi River, and a state-conducted water quality monitoring program limit the value of a site-directed water quality monitoring program in the Mississippi River. There are no other surface waters located near the site.

ST. JAMES



2334/MP/ENV/C/STJ/4-95

Figure 5-4

(Sheet 1 of 2). St. James Terminal Environmental Monitoring Stations

Federal Discharge Monitoring Stations

001 Discharge from retention pond

002 Discharge from package sewage treatment plant

003 Discharge from package sewage treatment plant

There are no water quality monitoring stations at St. James Terminal.

Figure 5-4

(Sheet 2 of 2). St. James Terminal Environmental Monitoring Stations

5.2.5 Weeks Island

The Weeks Island site is located on the Weeks Island salt dome approximately 30 m (100 ft) above sea level. The surrounding topography is of rather sharp relief with several small ponds located outside of SPR boundaries. None of the SPR outfalls discharge directly into these ponds. Other surface waters at this site are intermittent in nature, draining rapidly and thoroughly after any precipitation. The site outfalls (Figure 5-5) discharge small volumes into surface runoff at a substantial distance from receiving waters. The lack of potentially impacted DOE-owned surface waters precludes the need for surface water quality monitoring. Outfalls 004 and 01B are discharged with 01A through a single surface drain, similar to the St. James arrangement.

5.2.6 West Hackberry

In 1995, six surface water quality stations (Figure 5-6) were monitored monthly at West Hackberry. Parameters monitored include pH, temperature, salinity, DO, oil and grease, and TOC (Table 5-5).

5.2.6.1 Hydrogen Ion Activity (pH)

The pH of site and surrounding waters ranged between 6.2 and 9.4 s.u., and median values ranged from 6.9 to 8.3 s.u. Highest readings at all stations were observed during winter. Readings were consistently higher and exhibited less variability at the concrete north foam retention pond on the site (station E) than at other locations. Water sampled at the retention pond is primarily phreatic (commonly well water) run-off from the site high-pressure pump pad, which is buffered by the concrete retention pond. Surface water sampled at other stations was meteoric in origin. Fluctuations observed

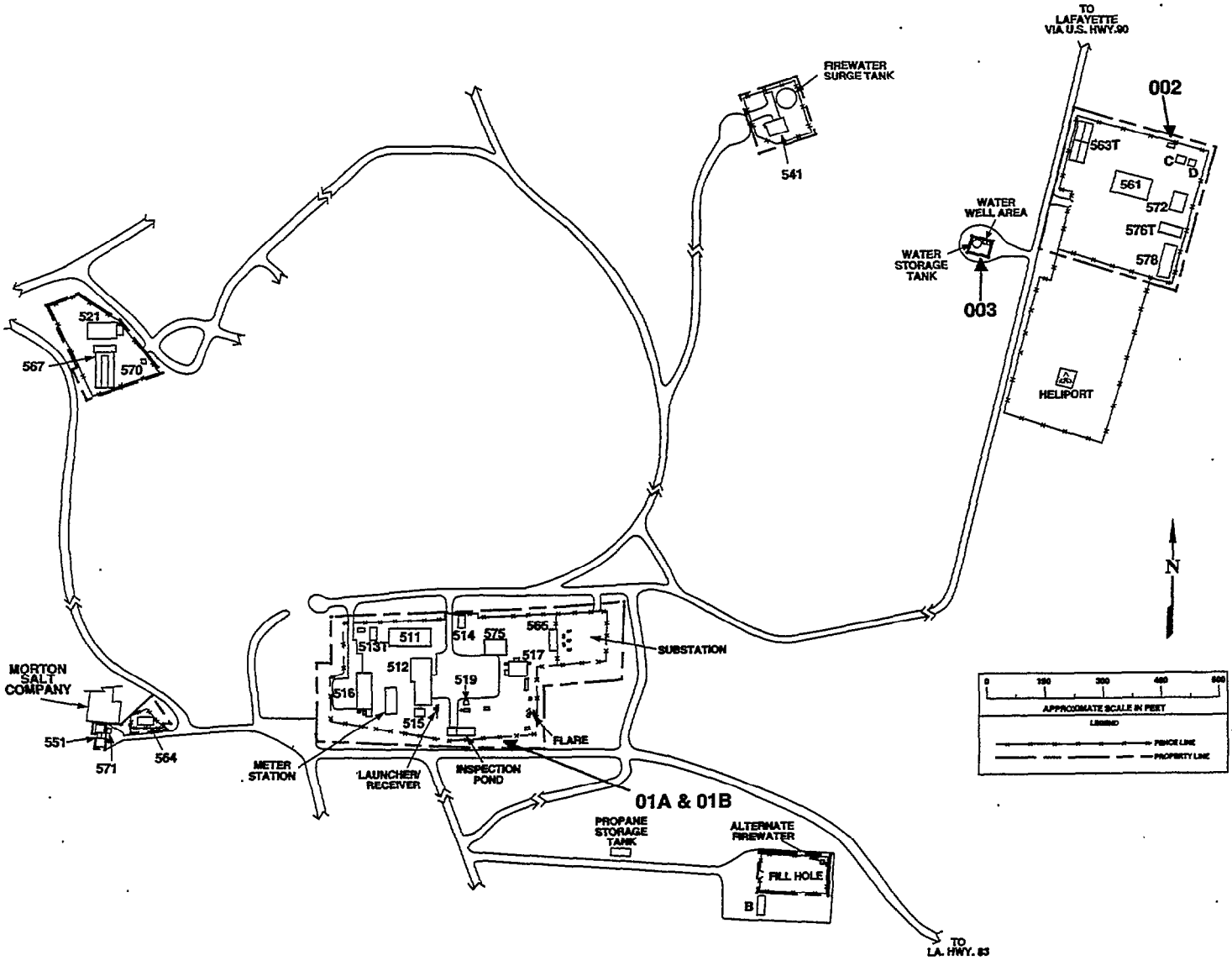


Figure 5-5

(Sheet 1 of 2). Weeks Island Environmental Monitoring Stations

Federal Discharge Monitoring Stations

01A Storm water runoff
01B Discharge from sewage treatment plant
002 Discharge from sewage treatment plant
003 Discharge from iron removal system
004 Discharge from mine air dryer condensate

There are no water quality monitoring stations at Weeks Island.

Figure 5-5
(Sheet 2 of 2). Weeks Island Environmental Monitoring Stations

are relatively minor and attributed to environmental and seasonal factors such as variation in rainfall, temperature, algae and biotic growth, and aquatic system flushing.

5.2.6.2 Salinity (SAL)

Meteorological factors such as wind, tide, and rainfall contributed to the salinity variation observed in brackish Black Lake and the Intracoastal Waterway (ICW). Salinity ranges observed in these water bodies (0.5 to 14.5 ppt in Black Lake and 0.5 to 14.5 ppt in the ICW) are more conducive to supporting euryhaline organisms and those with sufficient mobility to avoid salinity stresses that occur with seasonal changes. Mean annual salinity observed at the ICW (4.6 ppt) was slightly lower than that of Black Lake (6.1 to 6.7 ppt). This may be due to the larger surface area per volume of water in Black Lake, making it more susceptible to evaporative induced salinity effects.

Salinities observed at the two upland site stations were affected by surface runoff and not Black Lake. Ditch salinities at the southwest corner of the site (station D) reached 5.0 ppt, and salinity at the high pressure pump pad reached 4.5 ppt, which are common for this brackish environment.

5.2.6.3 Temperature

Observed temperatures in 1995 were consistent with observations at other sites and were indicative of regional climatic effects. No off-normal measurements were observed. Recorded temperatures ranged from 15°C to 31°C and were generally consistent among stations.

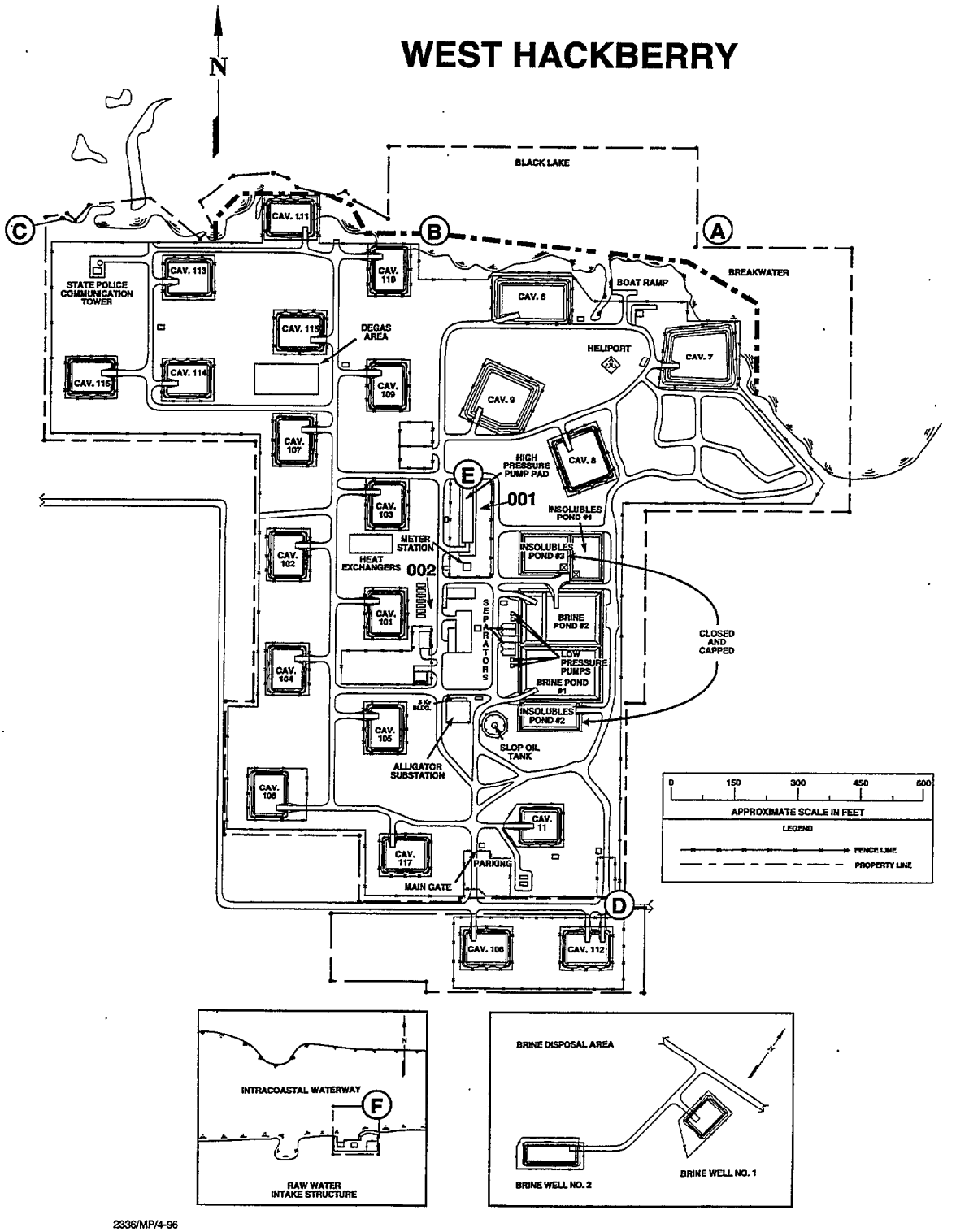


Figure 5-6
(Sheet 1 of 2) West Hackberry Environmental Monitoring Stations

Federal Discharge Monitoring Stations

001 Brine disposal

002 Discharge from sewage treatment plant

003 Storm water and pump flush from high-pressure pump pad Storm water runoff from well pads 6-9, 11, and 101-117

004 Storm water from the Texoma/Lake Charles meter station

Water Quality Monitoring Stations

A Black Lake

B Black Lake

C Black Lake

D Southeast drainage ditch

E High-pressure pump pad

F Raw water intake structure (Intracoastal Waterway)

Figure 5-6
(Sheet 2 of 2). West Hackberry Environmental Monitoring Stations

Table 5-5. 1995 Data Summary for W. Hackberry Monitoring Stations

Station	Statistical Parameters	pH (s.u.)	Temperature (deg. C)	Salinity (ppt)	Oil & Grease (mg/l)	Dissolved Oxygen (mg/l)	Total Organic Carbon (mg/l)
A							
	Sample Size	12	12	12	4	12	12
	Number of BDL				4		
	Maximum	7.9	30 0	14.5	2.5	9.6	12.2
	Minimum	6.9	16.0	1.0	2.5	6.1	7.2
	Mean	NV	24.0	6.7	2.5	7.8	9.5
	Median	7.5	25.0	6.0	2.5	7.4	9.1
	Standard Deviation	NV	4.7	5.1	0.0	1.2	1.9
	Coefficient of Variation	NV	19.9	76.8	0.0	15.4	20.0
B							
	Sample Size	12	12	12	4	12	12
	Number of BDL				4		
	Maximum	7.9	30.0	14.2	2.5	9.5	15.4
	Minimum	6.9	16.0	1.0	2.5	5.9	7.5
	Mean	NV	24.0	6.6	2.5	7.7	10.4
	Median	7.5	25.0	5.0	2.5	7.4	10.2
	Standard Deviation	NV	4.5	5.1	0.0	1.2	2.2
	Coefficient of Variation	NV	18.8	76.7	0.0	15.5	21.0
C							
	Sample Size	12	12	12	4	12	12
	Number of BDL			1	4		
	Maximum	8.0	30.0	13.5	2.5	9.5	17.5
	Minimum	7.0	16.0	0.5	2.5	6.6	8.0
	Mean	NV	23.6	6.1	2.5	7.8	11.4
	Median	7.5	25.0	4.0	2.5	7.4	11.5
	Standard Deviation	NV	4.7	5.2	0.0	1.1	2.5
	Coefficient of Variation	NV	19.8	85.7	0.0	14.4	22.3
D							
	Sample Size	11	11	11	3	11	11
	Number of BDL			2	3		
	Maximum	8.5	30.0	5.0	2.5	10.8	26.3
	Minimum	6.8	17.0	0.2	2.5	3.4	4.6
	Mean	NV	23.0	1.3	2.5	6.1	12.5
	Median	7.3	23.0	1.0	2.5	6.6	11.7
	Standard Deviation	NV	4.9	1.3	0.0	2.4	6.6
	Coefficient of Variation	NV	21.3	102.3	0.0	39.2	52.4
E							
	Sample Size	12	12	12	4	12	12
	Number of BDL			3	4		
	Maximum	9.4	28.0	4.5	2.5	11.4	26.6
	Minimum	6.9	17.0	0.2	2.5	6.4	2.6
	Mean	NV	22.9	1.4	2.5	8.2	8.6
	Median	8.3	23.0	1.0	2.5	8.5	5.0
	Standard Deviation	NV	3.5	1.3	0.0	1.5	7.6
	Coefficient of Variation	NV	15.2	96.2	0.0	18.1	88.7

Note: BDL = Number of samples that were below the detectable limit.
NV = Not a valid number or statistically meaningful.

Table 5-5 (Continued) .1995 Data Summary for W.Hackberry Monitoring Stations

Station	Statistical Parameters	pH (s.u.)	Temperature (deg. C)	Salinity (ppt)	Oil & Grease (mg/l)	Dissolved Oxygen (mg/l)	Total Organic Carbon (mg/l)
F							
	Sample Size	12	12	12	4	12	12
	Number of BDL			1	4		
	Maximum	7.9	31.0	14.5	2.5	9.3	26.3
	Minimum	6.2	15.0	0.5	2.5	4.5	4.1
	Mean	NV	23.8	4.6	2.5	7.1	10.7
	Median	6.9	23.5	2.0	2.5	7.1	10.6
	Standard Deviation	NV	4.6	5.0	0.0	1.4	5.9
	Coefficient of Variation	NV	19.3	109.2	0.0	20.0	54.9

Note: BDL = Number of samples that were below the detectable limit.
NV = Not a valid number or statistically meaningful.

5.2.6.4 Dissolved Oxygen

The DO levels observed at all stations are suitable for aquatic life. Dissolved oxygen was somewhat variable at all site stations. Greater surface area and water movement through currents and wave action provided continuous aeration of the lake and ICW water. Water movement at the ditch station D and the retention pond were sufficient to provide some aeration throughout 1995.

Dissolved oxygen levels were generally higher in winter than at any other time of the year. This trend was more apparent in Black Lake and the ICW than at the site stations.

5.2.6.5 Total Organic Carbon

Average annual TOC concentrations ranged from 8.6 to 12.5 mg/l. Seasonal peaks were observed during winter in Black Lake and the ICW.

Monthly TOC concentrations were generally quite similar at all stations throughout 1995.

5.2.6.6 Oil and Grease

Observed oil and grease levels were below the detectable level (5 mg/l) at all stations throughout 1995. The data reflect effective spill prevention and housekeeping by the site.

5.2.6.7 General Observations

The following observations are made, based on the above discussion, concerning operational impacts on the West Hackberry aquatic environs.

a. pH and temperature remained fairly stable and were only affected by seasonal factors.

b. The salinities observed throughout 1995 were consistent with the brackish environment.

c. Oil and grease levels were below the detectable limit at all stations throughout 1995 which is indicative of good housekeeping.

d. Dissolved oxygen levels at site and Black Lake stations were consistently high and did not appear adversely affected by site operations.

e. Total organic carbon concentrations were quite similar at all stations throughout the year suggesting no substantial transient biological events.

5.3 WATER DISCHARGE PERMIT MONITORING

The water discharge permit monitoring program fulfills the requirements of the EPA NPDES, and corresponding state TPDES and LWDPS programs. All SPR point source discharges are conducted in compliance with these federal and state programs. SPR personnel regularly conducted

point source discharges from all sites during 1995. These discharges are grouped as:

a. brine discharge to the Gulf of Mexico;
b. stormwater runoff from tank, well, and pump pads;
c. rinse water from vehicles at specific locations draining to permitted outfalls; and
d. effluent from package sewage treatment plants.

Corrective actions implemented to mitigate noncompliance recurrence included developing or modifying applicable procedures, retraining and certifying personnel, initiating special studies, and repairing faulty equipment.

In 1995, a total of 10,788 analyses were performed to monitor wastewater discharge quality from the SPR in accordance with NPDES and corresponding state permits. The SPR was in compliance with permit requirements for approximately 99.9% of the analyses performed. A total of 11 permit noncompliances were reported (Tables 5-7, 5-9, 5-11, 5-14, and 5-16) during the calendar year (CY) 1995. Four (36%) of the permit noncompliances experienced on the project were due to sampling, sample handling, or sampling related phenomena. Seven samples were outside of permit parameter limits accounting for 64%.

Parameters monitored varied by site and discharge. Table 5-1 identifies frequency of specific parameters measured at each SPR site. The data measurement variations are discussed by site.

5.3.1 Bayou Choctaw

A total of 1,186 measurements was performed on permitted outfalls and reporting stations to monitor NPDES and state permit compliance during 1995. Table 5-6 provides the permit required monitoring parameters and limits for

the Bayou Choctaw outfalls. There was one noncompliance in 1995 (Table 5-7) resulting in a site compliance performance of 99.9%.

Most monitoring is related to water discharges regulated under the EPA (NPDES) permit and a corresponding permit issued by the Louisiana Department of Environmental Quality (LDEQ) Office of Water Resources. Discharges are from two package sewage treatment plants (STP), and stormwater runoff from well pads, pump pads (containment areas), and the site vehicle rinsing station.

An administratively complete NPDES renewal application, submitted in 1993, is pending EPA action, so the site continues to operate in accordance with its previous NPDES permit.

Table 5-6. Parameters for the Bayou Choctaw Outfalls

Location/Discharge	Parameter	Compliance Range
Sewage Treatment Plants	Flow	(Report only)
	BOD_5	<45 mg/l max
		<30 mg/l avg
	TSS	<45 mg/l max
		<30 mg/l avg
	pH	6.0 - 9.0
	Fecal Coliform	<400 co./100 ml
Stormwater and Vehicle Rinsing	Flow	(report only)
	Oil and Grease	<15 mg/l
	pH	6.0 - 9.0
	TOC	<50 mg/l

Table 5-7. 1995 Permit Noncompliance at Bayou Choctaw

Outfall Location	Permit Parameter	Value (Limit)	Cause
Well Pad #19	pH	No Sample	Storm water discharge was measured for pH with a multi-strip paper in order to expedite a necessary discharge. This is not an NPDES-approved technique resulting in a technical noncompliance.

5.3.2 Big Hill

A total of 2,288 measurements was performed to monitor NPDES and state discharge permit compliance during 1995. Table 5-8 provides the permit required monitoring parameters and limits for the Big Hill outfalls. There were four noncompliances during 1995 (Table 5-9) resulting in a 99.8% site compliance performance level.

Water discharges at Big Hill are regulated and enforced through the EPA NPDES permit program and the similar RCT discharge permit program (TPDES). An administratively complete NPDES renewal application, submitted in 1993, is pending EPA action, so the site continues to operate in accordance with its previous NPDES permit. No significant changes were requested in the latest application. The discharges at the facility involve brine to the Gulf of Mexico, hydroclone blowdown into the Intracoastal Waterway, effluent from the sewage treatment plant, vehicle rinsing station, and stormwater from well pads and pump pads. There were no discharges during 1995 from the hydroclone blowdown system.

Table 5-8. Parameters for the Big Hill Outfalls

Location/Discharge	Parameter	Compliance Range
Brine to Gulf	Flow	0.27 million m^3/day
	Velocity	>6.1 m/sec (20 ft/sec)
	Oil & Grease	<15 mg/l max
		<10 mg/l avg
	TDS	(report only)
	TSS	(report only)
	pH	6.0 - 9.0 SU
	DO	detectable (when using 0_2 scavenger)
Stormwater and Car Wash	Oil and Grease	<15 mg/l
	TOC	< 50 mg/l
	pH	6.0 - 9.0 SU
	Salinity	8 ppt (RWIS report only)
Sewage Treatment Plant (TPDES only)	Flow	(report only)
	BOD_5	<45 mg/l max
		<20 mg/l avg
	COD	<250 mg/l max
		<150 mg/l avg
	TSS	<45 mg/l max
		<20 mg/l avg
	pH	6.0 - 9.0 SU
Hydroclone Blowdown (not used)	Flow	report
	TSS	report
	pH	6.0 - 9.0 SU

Table 5-9. 1995 Permit Noncompliances at Big Hill

Outfall Location	Permit Parameter	Value (Limit)	Cause
Brine Disposal Outfall 001	Below Min. Exit Velocity	< 20 FPS (20 FPS)	Leaking isolation valve to brine disposal line resulted in a discharge rate below the minimum allowed nozzle exit velocity.
Foam Retention Pond	TOC	80.0 mg/l (50 mg/l State) (75 mg/l Fed)	Storm water discharge had a confirmed high TOC level. Trace residual foam or algae growth in pond may have affected retained storm water prior to discharge.
Cav. 106	pH	9.58 S.U. (6.0 - 9.0 S.U.)	Storm water overflowed Cav. 106 dike drain sump & bypassed oil/water separator. Routine samples indicated high pH value.
Brine Disposal Outfall 001	Oil & Grease	No Sample	No sample was obtained on a brine flow to the Gulf of Mexico.

5.3.3 Bryan Mound

A total of 2,503 measurements was performed on permitted outfalls for the purpose of monitoring NPDES and state discharge permit compliance during 1995. Table 5-10 provides the permit required parameters and limits for the Bryan Mound outfalls. There were five noncompliances during 1995 (Table 5-11) resulting in a 99.8% site compliance performance level.

Table 5-10. Parameters for the Bryan Mound Outfalls

Location/Discharge	Parameter	Compliance Range
Brine to Gulf	Flow	0.17 million m^3/day
	Velocity	>6.1 m/sec (20 ft/sec)
	Oil & Grease	<15 mg/l
	TDS	(report only)
	TSS	(report only)
	pH	6.0 - 9.0 SU
Stormwater	Flow	(report only)
	Oil and Grease	<15 mg/l
	TOC	< 50 mg/l
	pH	6.0 - 9.0 SU
	Metals: As, Hg, Se	0.3 mg/l, 0.01 mg/l, & 0.3 mg/l (RCT only)
Sewage Treatment Plant	Flow	(report only)
	BOD_5	<45 mg/l max <20 mg/l avg
	COD	<250 mg/l max (RCT only) <150 mg/l avg
	Chlorine	1.0- - 4.0 mg/l
	pH	6.0 - 9.0 SU

Table 5-11. 1995 Permit Noncompliances at Bryan Mound

Outfall Location	Permit Parameter	Value (Limit)	Cause
HPPP	Ph	10.3 S.U. (6.0 - 9.0 S.U.)	Storm water discharge exceeded permit limits, possibly due to stagnant water on limestone prior to torrential rainfall.
STP	pH	4.1 S.U. (6.0 - 9.0 S.U.)	Routine daily pH reading indicated a low measurement possibly due to a short-term upset or received acid influent.
STP	Residual Chlorine	< 1.0 mg/l (1.0 - 4.0 mg/l)	During a long holiday weekend, residual chlorine measurements fell below the required range. This short-term upset may have been related to low flows typically experienced during weekends.
001	Oil & Grease	No Sample	On 2 separate samples, error was committed by an outside contract lab during the solvent extraction process resulting in 2 non-compliances.

Water discharges at Bryan Mound are regulated and enforced through the EPA NPDES permit program and the similar RCT discharge permit program for state waters (TPDES). A revised NPDES permit was issued for Bryan Mound effective September 1995. It includes the new brine line which discharges 3.5 nautical miles offshore. The NPDES will require periodic copper monitoring and biological assays as new requirements. The three permitted discharges are brine to the Gulf of Mexico; stormwater from the tank farm, well pads, and pump pads; and package sewage treatment plant effluent.

5.3.4 St. James

A total of 176 measurements was performed on permitted outfalls to monitor NPDES and state discharge permit compliance. Table 5-12 provides the permit required monitoring parameters and limits for the St. James outfalls. There were no noncompliances in 1995 resulting in a perfect (100%) compliance level. An administratively complete NPDES renewal application, submitted in 1993, is pending EPA action, so the site continues to operate in accordance with its previous NPDES permit.

Outfall 001 consists of stormwater from the site retention pond. Outfalls 002 and 003 are for the two site package sewage treatment plants. All three outfalls discharge through a common pipe to the Mississippi River.

Table 5-12. Parameters for the St. James Outfalls

Location/Discharge	Parameter	Compliance Range
Retention Pond	Flow	(report only)
	Oil & Grease	<15 mg/l
	pH	6.0 - 9.0 SU
	TOC	<50 mg/l
Sewage Treatment Plant	Flow	(report only)
	BOD_5	<45 mg/l
	TSS	<45 mg/l
	pH	6.0 - 9.0 SU

5.3.5 Weeks Island

A total of 274 measurements were performed on permitted outfalls to monitor NPDES compliance during 1995. Table 5-13 provides the permit required monitoring parameters and limits for the Weeks Island outfalls. There was one noncompliance in 1995 (Table 5-14) resulting in a site compliance performance level of 99.6%.

The water discharges at Weeks Island are regulated and enforced in accordance with the EPA NPDES permit program and the state water discharge program (LWDPS). There are separate outfalls (01B and 002) for each package sewage treatment plant. Outfall 01A handles all of the stormwater runoff collected in an on-site retention pond (Figure 5-7). There was no discharge from the iron removal unit (outfall 003) in 1995. The water condensing unit for the mine air (outfall 004) operated nearly continuously in 1995.

An administratively complete NPDES renewal application, submitted in 1993, is pending EPA action, so the site continues to operate in accordance with its previous NPDES permit. In these renewals the Mine Air Condensate outfall (004) is being proposed for commingling with the 01A (Inspection Pond) discharge.

Table 5-13. Parameters for the Weeks Island Outfalls

Location/Discharge	Parameter	Compliance Range
Stormwater	Flow	(report only)
	Oil and Grease	<15 mg/l
	pH	6.0 - 9.0 SU
	TOC	<50 mg/l
	TSS	<45 mg/l
	COD	<125 mg/l
Sewage Treatment Plant	Flow	(report only)
	BOD_5	<45 mg/l
	TSS	<45 mg/l
	Fecal Coliform	<400 colonies/100 ml
	pH	6.0 - 9.0 SU
Mine Air Dryer Condensate Water	Flow	(report)
	pH	6.0 - 9.0 S.U.
	TOC	(report)

Table 5-14. 1995 Noncompliance at Weeks Island

Outfall Location	Permit Parameter	Value (Limit)	Cause
OIA, Insp. Pond	Oil	Sheen Below Outfall	Heavy rain & wind caused trace amounts of oil within the inspection pond separator to overflow beyond the outfall.

5.3.6 West Hackberry

A total of 4,361 measurements was performed on permitted outfalls to monitor NPDES compliance during 1995. Table 5-15 provides the permit required parameters and limits for the West Hackberry outfalls. There were no noncompliances in 1995; therefore, the site compliance level was perfect for 1995.

Table 5-15. Parameters for the West Hackberry Outfalls

Location/Discharge	Parameter	Compliance Range
Brine to Gulf	Flow	0.17 million m^3/day
	Velocity	>7.6 m/sec (20 ft/sec)
	Oil & Grease	<15 mg/l
	TSS	(report only)
	TDS	(report only)
	pH	6.0 - 9.0 SU
	DO	detectable (when using 0_2 scavenger)
Sewage Treatment Plant	Flow	(report only)
	BOD_5	<15 mg/l
	TSS	<45 mg/l
	Fecal Coliform	400 col./100 ml
	pH	6.0 - 9.0 SU
Stormwater	Flow	(report only)
	Oil and Grease	<15 mg/l
	TOC	< 50 mg/l
	pH	6.0 - 9.0 SU

The water discharges at the West Hackberry site are regulated and enforced in accordance with the EPA NPDES permit program and LDEQ's state water discharge program (LWDPS). The three categories of discharges and their parameters (Figure 5-8) at West Hackberry are brine disposal to the Gulf of Mexico; sewage treatment plant effluent; vehicle rinsing, station, and stormwater runoff from well pads and pump pads.

5.4 ENVIRONMENTAL OCCURRENCES

The majority of the non-routine releases of pollutants occur with the spills of crude oil and brine into the environment from the SPR operations. Even though the SPR was considered to be in a stand-by mode for most of 1995, small quantities of crude oil and brine were moved through site equipment. During the second half of 1995, Bryan Mound and West Hackberry moved substantial amounts of oil and brine in conjunction with degas operations at

those sites. Weeks Island began moving oil off site as part of decommission activities in November 1995.

5.4.1 Oil Spills

There were two oil spills during 1995 totaling 56.3 m^3 (354 bbls). One spill accounted for 350 barrels and was contained, recovered, and returned to storage. No spills resulted in environmental damage.

In 1995, the total amount of oil moved (received and transferred internally) was approximately 9.9 million m^3 (62.084 MMB). The total number of crude oil spills, total volume spilled, and the percent volume spilled of total volume moved are shown in Table 5-16 for each year from 1982 through 1995.

Table 5-16. Number of Crude Oil Spills

Year	Total Spills	Volume Spilled m^3 (barrels)	Percent Spilled of Total Throughput
1982	24	847.0 (5,328)	0.00704
1983	21	380.9 (2,396)	0.00281
1984	13	134.8 (848)	0.00119
1985	7	85.4 (537)	0.00122
1986	5	1232.5 (7,753)	0.01041
1987	5	2.5 (16)	0.00002
1988	6	8.8 (55)	0.00001
1989	11	136.4 (858)	0.00004
1990	14	74.8 (467)	0.00003
1991	6	37.9 (237)	0.0004
1992	5	1.9 (12)	0.00006
1993	6	36.9 (232)	0.0007
1994	7	6.2 (39)	0.0003
1995	2	56.3 (354)	0.0006

The oil spills involving quantities in excess of 0.16 m^3 (1 bbl) that occurred during 1995, both contained and uncontained, are presented in Table 5-17. Oil spills in excess of one barrel are mid-level (by total volume) spilled during the 14 year period. No spills of oil occurred during the months of January, February, March, April, May, June, July, October, November, and December.

Both of the spills experienced during 1995 had causes which included drain line failure and loss of oil during nitrogen venting prior to welding. No trend is readily apparent in the low number of event occurrences this year.

Table 5-17. 1995 Oil Spills

Date	Location	Amount	Cause/ Corrective Action
09/07/95	WH	0.6 m^3 (4 Bbls)	While nitrogen was being placed into the Cvn. 110 oil manifold to inert the line prior to welding repairs, the venting of the nitrogen caused an estimated 4 bbls. of crude oil to escape through an open vent line or cavern pad. Oil was vacuumed and water was used to flush and clean residuals.
08/25/95	WH	55.6 m^3 (350 Bbls)	During a routine cavern. to cavern. oil movement, a 2" drainline ruptured / failed and allowed oil to leak onto the ground and an adjacent ditch. 350 bbls. were lost outside of the inspection pit. Contaminated soils from the ditch and from around the pit have been overexcavated and properly disposed of off site.

5.4.2 Brine Spills

During 1995 there were three brine spills totaling 131.1 m^3 (825 bbls). None of the brine spilled resulted in environmental damage. No long term adverse environmental impact was observed from any CY 95 SPR brine spill.

The SPR disposed of 4.63 million m^3 (28.92 MMB) of brine (mostly saturated sodium chloride solution, some discharges were of lower salinities than normally attributed to brine) during 1995. Approximately 75.6% of the brine was disposed in the Gulf of Mexico via the Big Hill (44.4% of the total), and the Bryan Mound (29.6% of the total) brine disposal pipelines. In preparation for long-term removal from service, a single flow day through the West Hackberry offshore brineline occurred amounting to 1.6% of the total brine disposal. The remainder was disposed in saline aquifers via injection wells at the Bayou Choctaw (19.1% of the total), and West Hackberry

(5.3% of the total) sites. In 1995 less than 0.1% of the total was disposed at permitted off-site disposal wells. Saltwater recirculation was continued at the Weeks Island site throughout the year. The saltwater is taken from sumps within the oil storage chamber and reintroduced at the top of salt near the sinkhole location. This permitted activity has been found to be an effective mitigative factor in preventing continued sinkhole growth and water seepage. This recirculating volume of 44,299 bbls is not considered in the disposal figures but is incorporated in the brine spill performance calculation.

The total number of spills, total volume spilled, and percent volume spilled of total volume disposed are shown in Table 5-18 for each year from 1982 through 1995.

The brine spills involving quantities in excess of 0.16 m^3 (1 bbl), both contained and uncontained, during 1995 are described in Table 5-19. Corrosion/erosion has been the leading cause of brine spills over the past few years. Other types of failures (gasket/flange/other equipment) have contributed somewhat. The second major factor is operator error. During 1995, only one of the three spills was attributed to operator/contractor error. The remaining two spills were the result of corrosion/erosion. As provided in Table 5-18, over the period 1982 to 1995, CY '95 experienced the second lowest number of spill incidents in the 14 year period.

Table 5-18. Number of Brine Spills

Year	Total Spills	Volume Spilled m^3 (barrels)	Percent Spilled of Total Throughput
1982	43	443.8 (2,792)	0.0005
1983	44	259.4 (1,632)	0.0002
1984	17	314.0 (1,975)	0.0003
1985	16	96,494.8 (607,000)	0.1308
1986	7	275.6 (1,734)	0.0017
1987	22	96.5 (608)	0.0003
1988	12	93.8 (586)	0.0001
1989	17	31,231.6 (825,512)	0.1395
1990	12	11,944.3 (74,650)	0.0170
1991	7	1,156.8 (7,230)	0.004
1992	9	48.0 (302)	0.003
1993	6	59.2 (370)	0.001
1994	2	14.4 (90)	0.0006
1995	3	131.1 (825)	0.0028

Table 5-19. 1995 Brine Spills

Date	Location	Amount	Cause/ Corrective Action
10/16/95	BM	1.6 m^3 (10 Bbls)	An estimated 10 Bbls of diluted brine was lost to the ground near the High Pressure Pump Pad. The brine was contained in an adjacent storm water ditch and retrieved by vacuum truck. The spill originated from a pipe failure at an elbow on an 8" flush line.
06/23/95	BC	3.2 m^3 (20 Bbls)	During pigging operations preceding brineline relining work, residual brine overflowed a temporary holding tank onto ground and surrounding wetlands. Spill containment was initiated. Affected area was flushed and vacuumed.
04/03/95	BM	126.3 m^3(795 Bbls)	During a cavern to cavern oil transfer related to the upcoming degasing project, the 20" brineline header failed while high pressure pumps were operating. Pumps were shut down and spill control and countermeasures were implemented. Brine did reach Blue Lake, and recovery efforts returned the majority of the spilled fluids to the brine pond. Blue Lake salinity was not observed to change. Affected areas were washed down with fresh water.

5.5 SARA TITLE III REPORTING REQUIREMENTS

To fulfill requirements set forth in the Emergency Planning and Community Right-To-Know Act of 1986, the SPR submitted SARA Title III Tier Two forms for 1995, for each site. Tables 5-20 through 5-27 list chemical name, maximum daily value (lbs) for regulatory specified ranges, and location of hazardous chemicals on the SPR above Threshold Planning Quantity (TPQ), or 10,000 lbs. for sites in Texas.

There were no extremely hazardous substances in excess of the TPQ in 1995, negating the possibility of reportable releases. Off-site SPR pipelines containing crude oil were reported separately from SPR sites (Table 5-26 and 5-27).

Table 5-20.
Louisiana SARA Title III Tier Two Summary at Bayou Choctaw

Chemical Name (Category)	* Max Daily Amount (lbs)	Location
Alkydimethylbenzylammonium Chloride in Methanol & Water	100 - 999	High Pressure Pump Pad
Ammonium bisulfite	10,000 - 99,999	Adjacent to Brine Pond
Argon	1,000 - 9,999	Laboratory
Bromotrifluoromethane (Halon 1303)	1,000 - 9,999	Control Room in Operations Bldg.
Crude oil, petroleum flammable and combustible liquid	≥ 1 billion	Six underground storage caverns in salt dome & site piping
Diesel fuel	10,000 - 99,999	Fuel station, flood pump and generators near exit, water pumps near NW entrance
FC-600 3M Light-water ATC/AFFF	10,000 - 99,999	Foam deluge and storage bldgs.
Gasoline	10,000 - 99,999	Fuel station near SW exit, emergency generator at disposal wells
Oil, flammable and combustible	1,000 - 9,999	Flammable storage and maintenance buildings
Paint, flammable or combustible	1,000 - 9,999	Flammable storage and maintenance buildings
Sodium Chloride	1,000 - 9,999	H20 Bldg.
Sodium Hypochlorite	1,000 - 9,999	Laboratory, Foam Bldg.

* Reporting range specified by LA SARA Title III Tier Two Reporting Requirement

Table 5-21.
Texas SARA Title III Tier Two Summary at Big Hill

Chemical Name (Category)	* Max Daily Amount (lbs)	Location
Ammonium bisulfite	10,000 - 99,999	Near brine pond
Crude oil, petroleum, flammable and combustible liquid	≥ 1 billion	14 underground storage caverns in the dome, surge tank, and site piping
Diesel fuel	10,000 - 99,999	Fuel station, Raw Water Intake Structure, Firewater Fuel Tank, Emergency Generator Tank
FC-600 3M Light-water ATC/AFFF	10,000 - 99,999	Foam storage bldg., Site fire system
Gasoline	10,000 - 99,999	Fuel station
Oil, flammable and combustible	10,000 - 99,999	Warehouse, laboratory, Raw Water Intake Structure, Maintenance Laydown Yard

* Reporting range specified by Texas SARA Title III Tier Two Reporting Requirement

Table 5-22.
Texas SARA Title III Tier Two Summary at Bryan Mound

Chemical Name (Category)	*Max Daily Amount (lbs)	Location
Crude oil, petroleum, flammable and combustible liquid	≥ 1 billion	20 underground storage caverns, 4 surge tanks and site piping
Diesel fuel	10,000 - 99,999	Fuel Station and Raw Water Intake Structure
FC-600 3M Light-water ATC/AFFF	100,000 - 999,000	Site fire systems, Foam storage bldg., laydown and excess yards, and degas location
Freon	10,000 - 99,999	Degas location
Gasoline	10,000 - 99,999	Fuel Station
Methyldiethanolamine (MDEA)	10,000 - 99,999	Degas location
Paints, flammable or combustible	10,000 - 99,999	Flammable Storage Bldg.

* Reporting range specified by Texas SARA Title III Tier Two Reporting Requirement

Table 5-23.
Louisiana SARA Title III Tier Two Summary at St. James Terminal

Chemical Name (Category)	*Max Daily Amount (lbs)	Location
Alkydimethylbenzylammonium Chloride in Methanol and Water	1,000 - 9,999	West End of Main Site
Bromotrifluoromethane	100 - 999	Control room in Ops Bldg. on south side of site
Compressed gas (except helium, neon, argon, krypton, xenon)	100 - 999	Lab, meter station, inside and outside of Ops Bldg.
Crude oil, petroleum flammable and combustible liquid	100,000,000 - 499,999,999	Six storage tanks and site piping
Diesel fuel	10,000 - 99,999	Fuel station in laydown area, dock fire pumps, site emergency generator, and fire pump near fuel station
FC-600 3M Light-water ATC/AFFF	10,000 - 99,999	Fire truck bay, fire systems on main site and dock
Gasoline	10,000 - 99,999	Fuel station at Maintenance Bldg. area
Oil, flammable or combustible	1,000 - 9,999	Flammable storage bldg., lab, and flammable storage cabinet on side of Ops Bldg.
Paint, flammable or combustible	1,000 - 9,999	Flammable storage bldg. and paint shed near laydown area
Potassium bicarbonate	1,000 - 9,999	Fire truck bay in Maintenance Bldg.
Propane or liquefied petroleum gas supplied as pressurized	100 - 999	Lab, emergency generator at docks
Thinner, flammable or combustible	100 - 999	Flammable storage bldg.

* Reporting range specified by LA SARA Title III Tier Two Reporting Requirement

Table 5-24.
Louisiana SARA Title III Tier Two Summary at Weeks Island

Chemical Name (Category)	*Max Daily Amount (lbs)	Location
Acid Liquid, N.O.S.	100 - 999	Laydown area, paint shed, flammable storage cabinet
Bromotrifluoromethane (Halon 1301)	10,000 - 99,999	Control room in Ops Bldg. and mine service shaft
Cement	100 - 999	Service shaft in mine, construction laydown yard
Compressed gas (except helium, neon, argon, krypton, xenon)	100 - 999	Flammable storage bldg.
Crude oil, petroleum, flammable and combustible liquid	≥ 1 billion	One underground storage cavern in salt dome and site piping
Diesel fuel	1,000 - 9,999	Fire equipment and maintenance bldg., fuel station in laydown yard
FC-600 3M Light-water ATC/AFFF	10,000 - 99,999	Fire equipment at maint. and foam storage bldg.
Freon	100 - 999	Property storage warehouse
Gasoline	10,,000 - 99,999	Fuel station in laydown area, property storage tank
Insecticide, liquid N.O.S.	1,000 - 9,999	Laydown yard, flammable storage bldg.
Oil, flammable and combustible	1,000 - 9,999	Laydown yard, flam storage
Paint, flammable or combustible	1,000 - 9,999	Laydown yard paint shed and flammable storage bldg.
Potassium bicarbonate	1,000 - 9,999	Fire truck area
Propane or liquefied petroleum	10,000 - 99,999	Fill site rd., main site
Thinner, flammable and combustible	100 - 999	Flammable storage bldg.

* Reporting range specified by LA SARA Title III Tier Two Reporting Requirement

Table 5-25.
Louisiana SARA Title III Tier Two Summary at West Hackberry

Chemical Name (Category)	*Max Daily Amount (lbs)	Location
Ammonium bisulfite, solution	1,000 - 9,999	Oil/brine sep. chem cabinet
Antifreeze compound	1,000 - 9,999	Workover rig yard, A-Whse
Bromotrifluoromethane (Halon 1303)	1,000 - 9,999	Control room and lab
Compressed gas (except helium, neon, argon, krypton, xenon)	100 - 999	Lab, propane tank area
Crude oil, petroleum, flammable and combustible liquid	≥ 1 billion	22 underground caverns in salt dome and site piping
Diesel fuel	10,000 - 99,999	Site fuel station and workover rig yard
Diethylene glycol	1,000 - 9,999	Degas location
FC-600 3M Light-water ATC/AFFF	10,000 - 99,999	Foam storage bldg. and site fire systems
Freon 22	10,000 - 99,999	Degas location
Gasoline	10,000 - 99,999	Fuel station and pipeline bldg.
Insecticides, liquid N.O.S.	1,000 - 9,999	Laydown yd, pipeline shed, D-Whse
Methyldiethanolamine	1,000 - 9,999	Degas location
Oil, flam. and combustible	10,000 - 99,999	Warehouse, property yard, flam. storage bldg. Degas
Paint, flam. or combustible	1,000 - 9,999	Flammable storage and warehouse bldg., workover rig yard
Potassium bicarbonate	1,000 - 9,999	Foam storage bldg.
Propane or liquefied petroleum gas	10,000 - 99,999	Maint. bldg., MCC, fire training area, Lk Chas meter station
Thinner, flam. or combustible	1,000 - 9,999	A-Whse, flam. storage cabinet, fuel station

* Reporting range specified by LA SARA Title III Tier Two Reporting Requirement

Table 5-26.
Louisiana SARA Title III Tier Two Summary in Off-site Pipelines

Chemical Name (Category)	*Max Daily Amount (lbs)	Location
Crude oil, petroleum, flammable and combustible liquid	1,000,000 - 9,999,999	Off-site pipeline in Ascension Parish, LA
Crude oil, petroleum, flammable and combustible liquid	50,000,000 - 99,999,999	Off-site pipelines in Assumption Parish, LA
Crude oil, petroleum, flammable and combustible liquid	50,000,000 - 99,999,999	Off-site pipelines in Calcasieu Parish, LA
Crude oil, petroleum, flammable and combustible liquid	10,000,000 - 49,999,999	Off-site pipelines in Cameron Parish, LA
Crude oil, petroleum, flammable and combustible liquid	1,000,000 - 9,999,999	Off-site pipeline in Iberia Parish, LA
Crude oil, petroleum, flammable and combustible liquid	10,000,000 - 49,999,999	Off-site pipeline in Iberville Parish, LA
Crude oil, petroleum, flammable and combustible liquid	10,000,000 - 49,999,999	Off-site pipeline in St. Martin Parish, LA
Crude oil, petroleum., flammable and combustible liquid	50,000,000 - 99,999,999	Off-site pipeline in St. Mary Parish, LA
Crude oil, petroleum, flammable and combustible liquid	10,000,000 - 49,999,999	Off-site pipelines in St. James Parish, LA

* Reporting range specified by LA SARA Title III Tier Two Reporting Requirement

Table 5-27.
Texas SARA Title III Tier Two Summary in Off-site Pipelines

Chemical Name (Category)	*Max Daily Amount (lbs)	Location
Crude oil, petroleum, flammable and combustible liquid	50,000,000 - 99,999,999	Off-site pipelines in Brazoria County, TX
Crude oil, petroleum, flammable and combustible liquid	10,000,000 - 49,999,999	Off-site pipeline in Galveston County, TX
Crude oil, petroleum, flammable and combustible liquid	50,000,000 - 99,999,999	Off-site pipeline in Jefferson County, TX (Big Hill)
Crude oil, petroleum, flammable and combustible liquid	1,000,000 - 9,999,999	Off-site pipeline in Jefferson County, TX (W. Hackberry)
Crude oil, petroleum, flammable or combustible liquid	10,000,000 - 49,999,999	Off-site pipeline in Orange County, TX

* Reporting range specified by Texas SARA Title III Tier Two Reporting Requirement

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6. GROUND WATER MONITORING AND PROTECTION INFORMATION

Ground water monitoring is performed at Bayou Choctaw, Big Hill, Bryan Mound, and West Hackberry. Salinity and the presence of hydrocarbons are monitored although ground water monitoring is not required by any federal or state regulations or permits at Bayou Choctaw, Big Hill, and Bryan Mound. Monitoring is required at West Hackberry in accordance with a monitoring plan agreed upon by DOE and the LDNR. West Hackberry ground water monitoring and recovery activities were reported quarterly to the LDNR in 1995.

Brine and hydrocarbon contamination of ground water is being surveyed at all sites in a two phase study. Phase I, completed in December 1992, consisted of a non-intrusive ground surface survey where instrumentation was used to detect potential brine contamination soil gas analysis. Phase II activities for verification of contamination was contracted for in 1995 with field work to be completed in 1996. Phase II will consist of sampling and testing ground water from monitoring wells that will be installed in areas of potential contamination identified in the Phase I survey.

In the past, the SPR has used the traditional three to five well volumes evacuation in preparation for well sampling. Based on a comparative field study completed at the Big Hill site in 1995, the SPR has begun transitioning to a low flow sampling technique which greatly reduces the sampling time and generation of waste water. Phase I of this ground water sampling technique began at Big Hill, Bryan Mound, and West Hackberry in 1995.

Ground water data collected for the past five years are presented. Ground water characteristics of each site are discussed within each site section.

6.1 BAYOU CHOCTAW

The Plaquemine Aquifer is the main source of fresh water for the site and several surrounding municipalities. It is located approximately 18 m (60 ft) below the surface and extends to a depth of 150 to 182 m (500-600 ft). The upper 18 m (60 ft) of sediments in the aquifer consist of predominantly Atchafalaya

clay. The interface of freshwater and saline water occurs at a depth of 122 to 150 m (400-500 ft) below the surface. Ground water in the Plaquemine Aquifer communicates with the Mississippi River, flowing away from it during the high river stage and towards the river in the low stage.

There are four monitoring wells (MW1, MW2, MW3, and MW4) at the Bayou Choctaw facility (Figure 6-1). These wells were drilled roughly 30 feet below land surface (bls) to monitor impact from the brine pond and other shallow contamination.

Ground water salinities observed at all four wells (Figure 6-2) are above ambient for a fresh water environment and are presumably elevated by past and possibly present brine handling activities.

All four wells exhibit seasonal salinity fluctuations that are affected by rainfall. Highest salinities have usually occurred in late winter and early spring, and lowest salinities have been observed in late spring and summer.

Past surface brine spills may have also affected ground water salinities observed in these shallow wells. The salinity range observed at well MW3 is much greater than that of the other three wells. Ground water surface piezometric data of the wells show that ground water movement is to the southeast. A 1992 brine spill on the nearby low pressure pump pad north of the well may have elevated the salinity in that area, and its movement was captured by MW3.

Long-term salinity trends have been established which, examined within the context of the southeastern ground water movement, assist in identifying possible areas or sources of contamination. Wells MW1 and MW2 exhibit a decrease in salinity throughout 1995 from an all time high earlier in the year to near an all time low later in the year. Both wells are situated upgradient of the brine pond area, with respect to ground water movement. The source of contamination may be

residual from historical activity that occurred northwest of the pond. Although it captures the most saline ground water, MW3 is slowly decreasing in salinity over time. The salinity trend observed at MW3 over the past five years differs from that observed at the other wells. This indicates that some other brine source is affecting MW3.

Despite frequent fluctuations, there is no salinity trend observed at well MW4. The fresh water observed in early 1995 is a sampling artifact. This well is situated away from and down gradient of the brine pond and higher salinity well MW3.

Future ground water data, including that of the planned all-sites Phase II verification survey, and on-going inspections of the brine pond and site piping will assist in determining if contamination originated from SPR activities.

BAYOU CHOCTAW

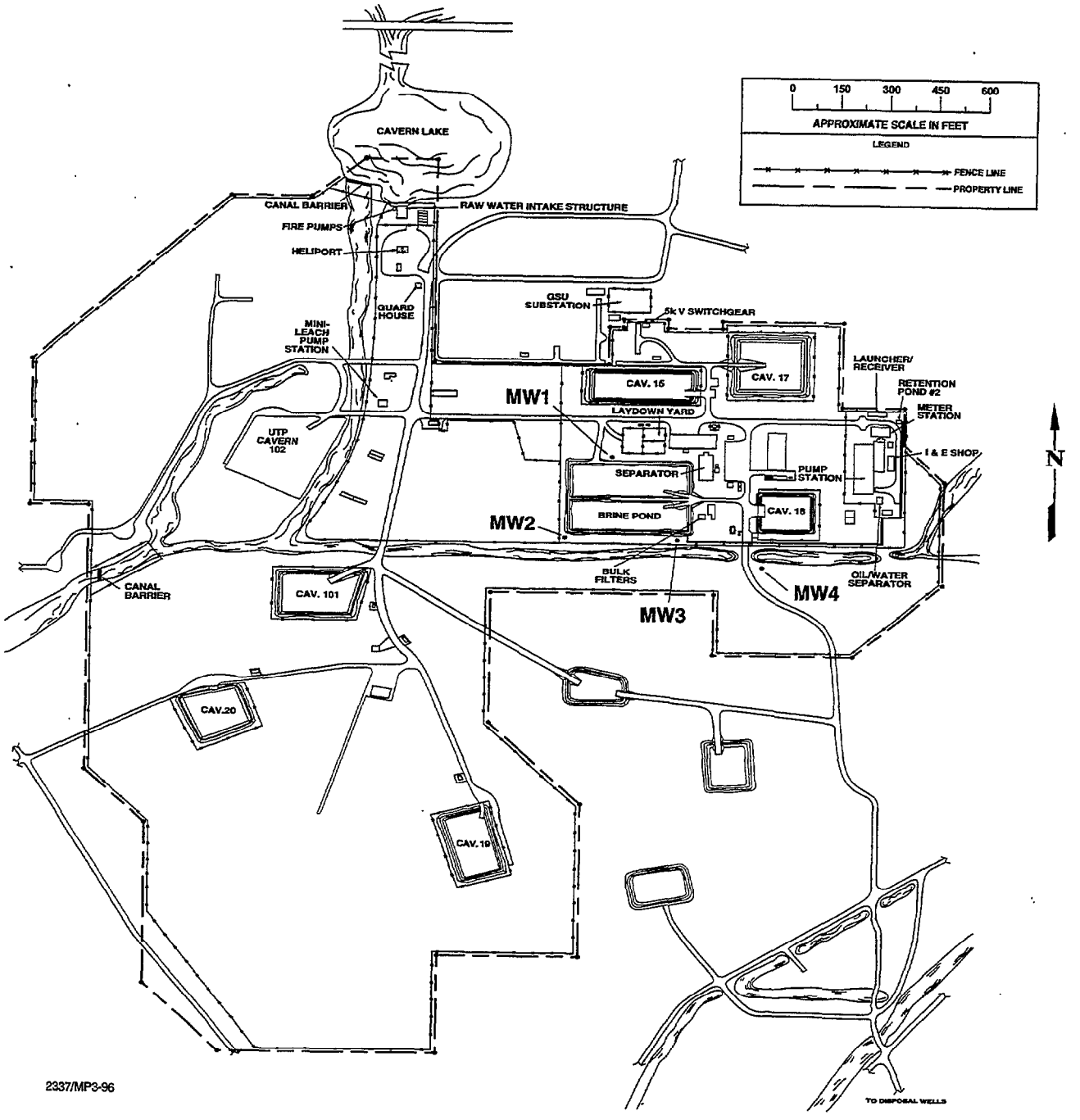
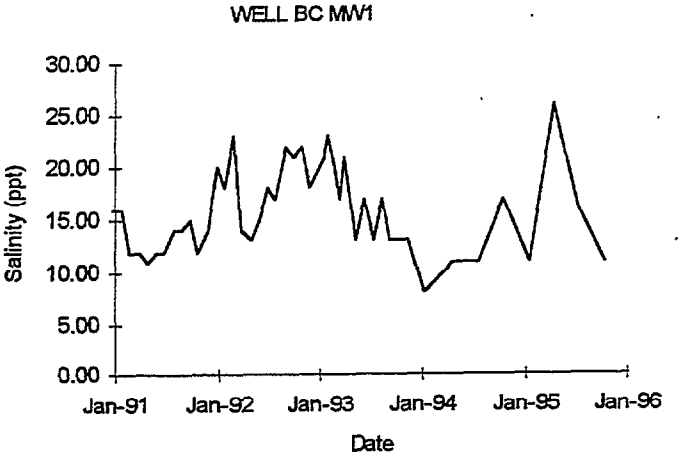


Figure 6-1.

Bayou Choctaw Ground Water Monitoring Wells



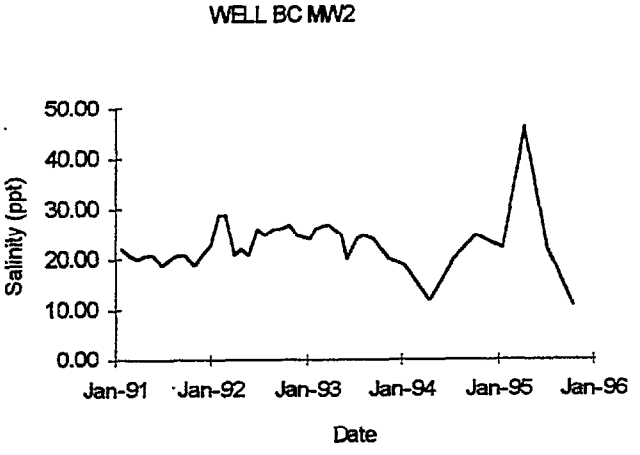
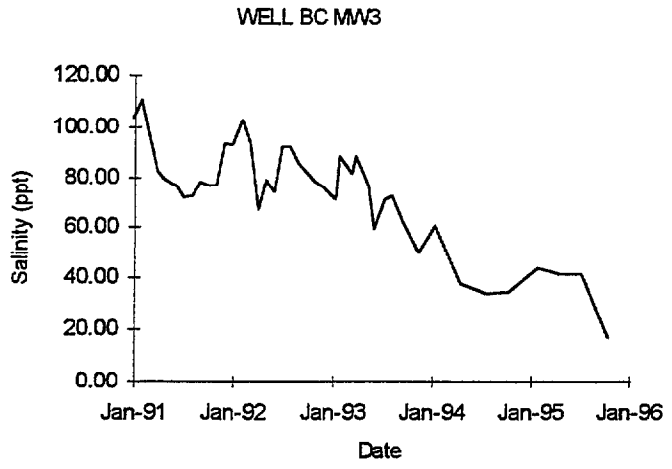


Figure 6-2.

Bayou Choctaw Groundwater Monitoring Well Salinities



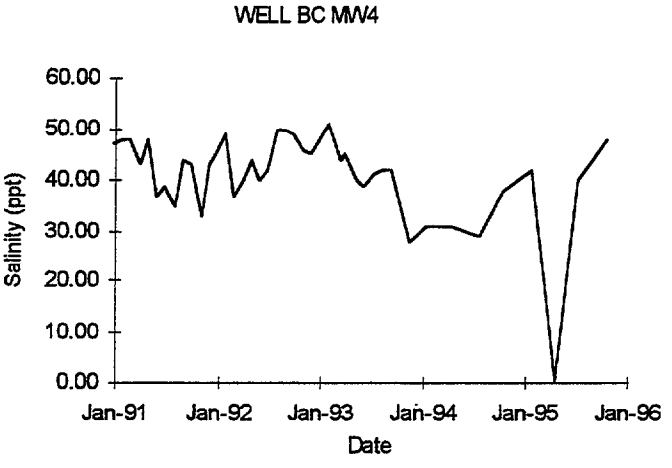


Figure 6-2. (Continued)
Bayou Choctaw Groundwater Monitoring Well Salinities

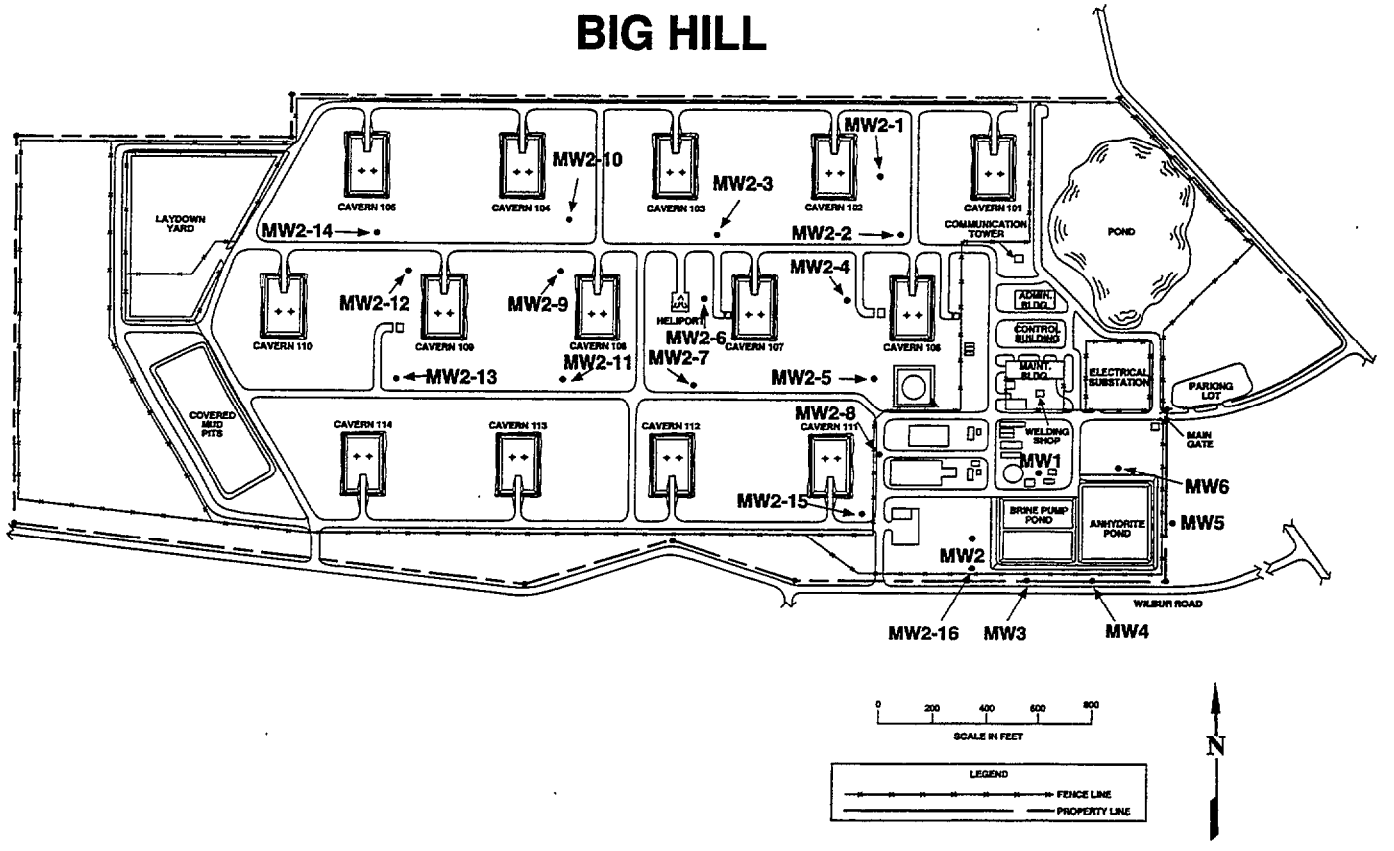
6.2 BIG HILL

The three major subsurface hydrological formations in the Big Hill area are the Chicot and Evangeline aquifers and the Burkville aquitard. The major source of fresh water is the Chicot Aquifer which is compressed over the Big Hill salt dome. Fresh water in the upper Chicot Aquifer is limited from near the surface to a depth of -30 m (-98 ft) mean sea level. The town of Winnie uses fresh water from the upper Chicot Aquifer.

Beaumont and Port Arthur draw fresh water from the lower Chicot Aquifer.

Sampling of six monitoring wells (wells MW1 to MW6) around the brine disposal pond system (Figure 6-3) began in 1987. Big Hill began sampling these wells by the low-flow method in May 1995. The pond system is composed of three Hypalon-lined ponds, of which two have a protective concrete top coat. All three have an underdrain system contained within a slurry wall keyed to a clay bed. Salinity data collected from the six wells for the past five years indicate a consistency among them. Salinity of ground water from all wells remained at or below the detection limit (1.0 ppt) of the salinity meter used (Figure 6-4). All observed values that are below detection limit were evaluated as one-half the BDL for statistical calculations. Observed salinity changes are too low to indicate contamination.

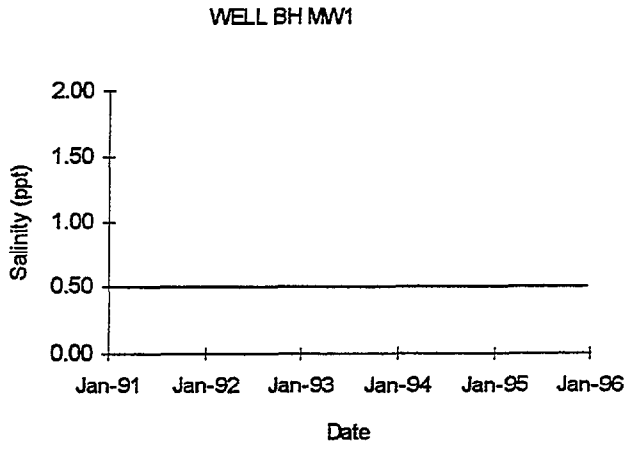
Also located on the site are 16 2-inch brine piping leak detection monitoring wells (wells MW2-1 to MW2-16). These wells were sampled by the traditional pump and purge technique. Unlike those around the brine pond, these smaller wells were installed adjacent to buried brine piping on the site to detect brine, should it be released from the piping, and do not intercept an aquifer (Figure 6-3). As a result, two wells were dry, four wells were damaged and out-of-commission in 1995, and the remaining 10 were easily evacuated to dryness during sampling. Salinities at nine of the ten wells did not exceed 2.0 ppt. Only ground water from well MW2-15, east of Cavern 111, had elevated salinities of 7.2 to 12.5 ppt which are attributed to past brine piping failure. The maximum observed salinities at this location decreased from a 1994 maximum of 17.1 ppt.

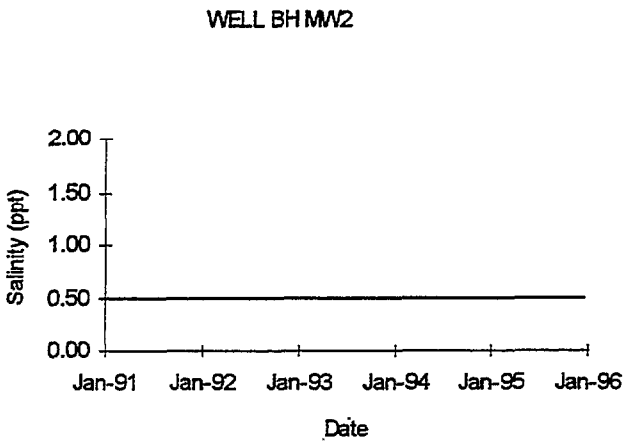


3348/BHMP/4-96

Figure 6-3.

Big Hill Ground Water Monitoring Wells





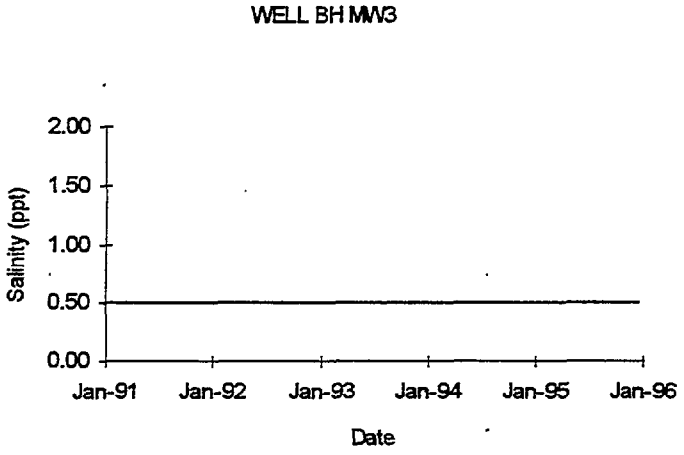
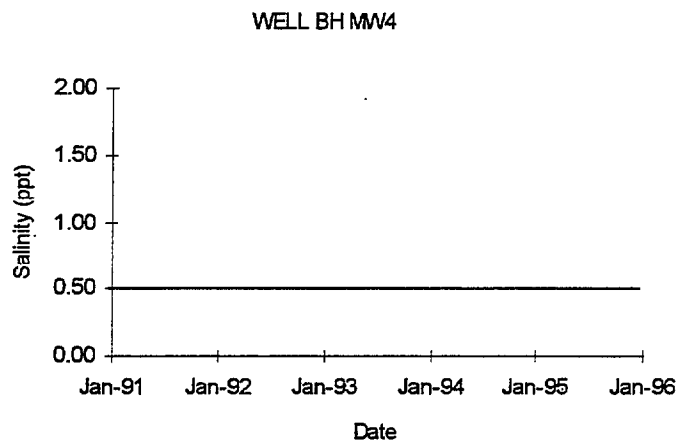
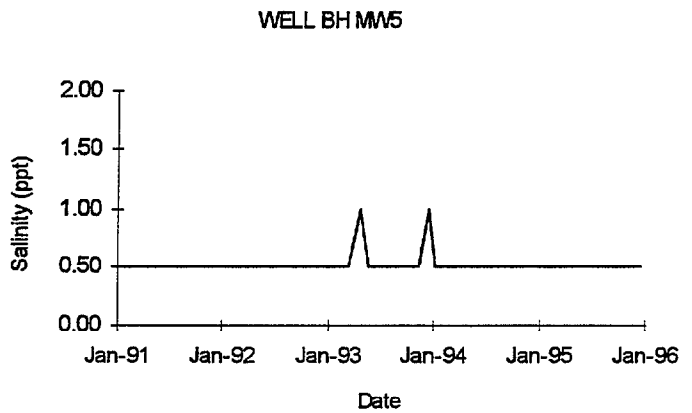


Figure 6-4.

Big Hill Ground Water Monitoring Well Salinities





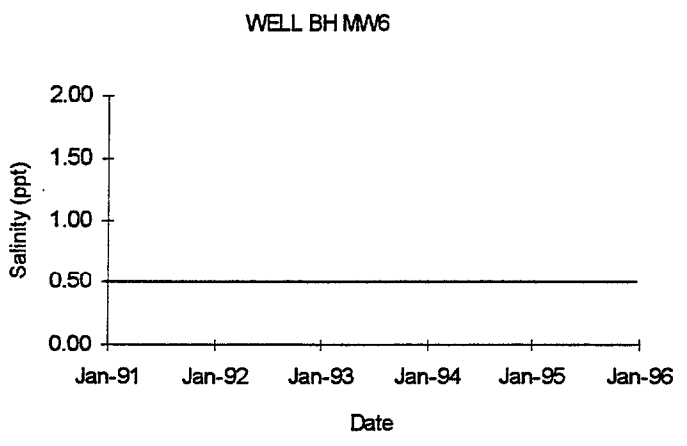


Figure 6-4. (Continued)
Big Hill Groundwater Monitoring Well Salinities

6.3 BRYAN MOUND

Site monitoring wells installed in 20 and 50 foot bls zones indicate that no fresh water exists over the salt dome. Monitoring well salinities ranged from 4.0 to 124.0 ppt in 1995. However, the Chicot and Evangeline Aquifers are fresh to slightly saline in the Bryan Mound area, and fresh water for Brazoria County is obtained from the upper portions of the Chicot upgradient of Bryan Mound.

Fifteen monitoring wells were drilled at Bryan Mound in four phases between 1981 and 1990 (Figure 6-5). Sampling began shortly after installation. Bryan Mound began using the low flow technique for sampling these wells in September 1995. Wells BP1S, BP2S, and PZ2S are out of service due to casing damage. BP1S is discussed further below.

A 1991 study determined that site ground water movement in the shallow (20 foot bls) zone was in the northerly direction toward Blue Lake while that of the deep (50 foot bls) zone was in the southeasterly direction toward Mud Lake. Local movement is affected by the domal upthrusting. The aquifers exhibit a very low average linear velocity (ranging from 2.5 to 3.3 ft/yr) due to the clay content of the water bearing strata and very low hydraulic gradients (ranging from 0.001 ft/ft to 0.002 ft/ft). This characteristic reduces the risk of contaminating potable aquifers of the salt dome.

Three areas where ground water salinity exceeds ambient (greater than 20.0 ppt) have been located. The first area stretches from the brine pond eastward to the brine pump pads and to the site of a brine pond demolished in 1989. The second area lies southeast of the security operations center (SOC), and the third lies south of the maintenance building.

Elevated salinities observed at shallow monitor wells PZ1S, MW1S, and BP1S since their installation may be attributed to

brine pond activity. The large brine pond with a Hypalon (chlorosulfonated polyethylene) membrane was constructed in 1978. The pond was renovated with installation of a new Hypalon liner and a concrete weight coat in 1982. The Bryan Mound brine pond is scheduled for replacement with an aboveground tank in FY 1998. Ground water salinity observed in the pond area and to the north and east could be the result of previous or continued leakage from the pond or from adjacent buried piping. Salinities of deep complements to wells PZ1S and BP1S (PZ1D and BP1D) are much lower and considered ambient for the site. They indicate no contamination of the deep zone around the present pond and no communication with the shallow zone.

Salinity of deep zone well MW1D (complement to shallow zone well MW1S) has constantly been over 100 ppt for over three years, is greater than that of any shallow well, and is much greater than any other deep well. This well, which increased in salinity in 1995, may be in a brine plume that extends north of unlined brine pits that preceeded the SPR. The high salinity of the deep well may also indicate upgradient communication of the two zones in that area.

Southeast of the SOC, an anhydrite disposal area used during construction and leaching phases of the site may be the source of brine contamination in the second area where high salinity ground water is found. The contamination is intercepted in the shallow zone by wells MW5S and PZ3S and has been relatively consistent over the long term.

A brine contamination source in the third area of elevated salinity, near the maintenance building, has not been identified and probably pre-dates SPR activity. Salinities exceeding ambient levels are observed in both zones at wells MW2S and MW2D.

BRYAN MOUND

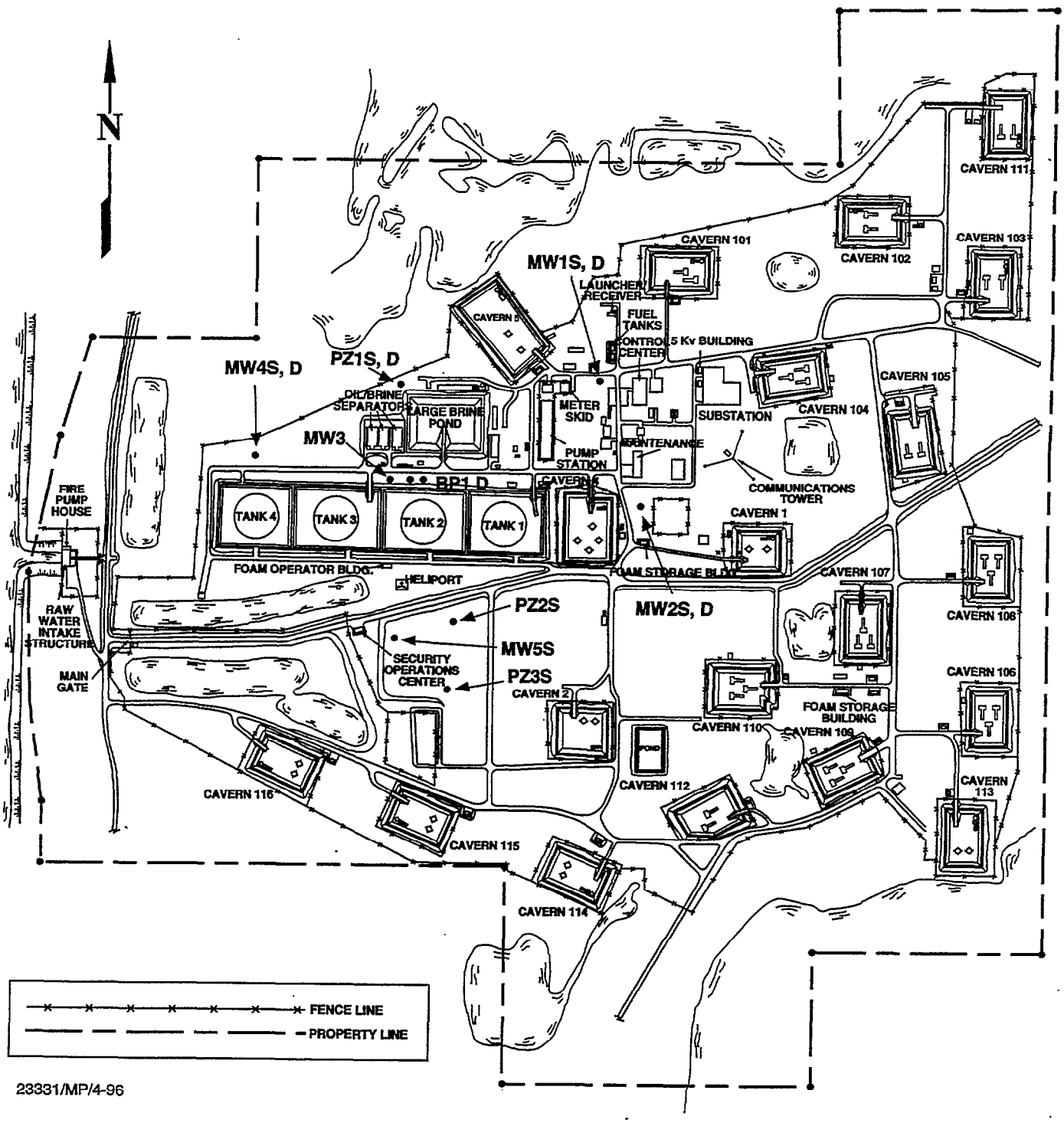


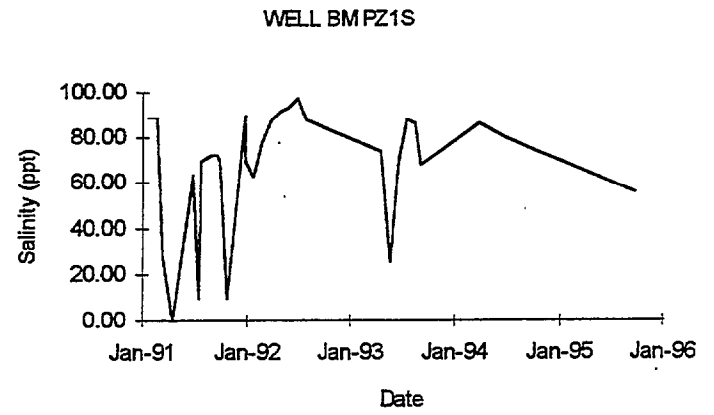
Figure 6-5.

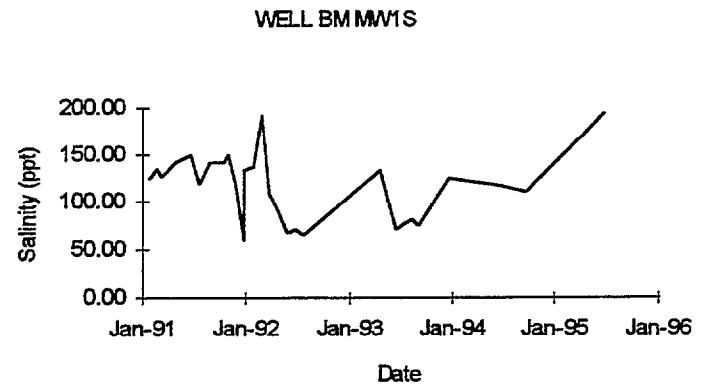
Bryan Mound Ground Water Monitoring Wells

Brine contamination is not evident at the northwest corner of the site. Shallow zone monitor wells MW3S and MW4S near the southwest corner and west of the brine pond, respectively, have remained relatively stable in the 5 to 10 ppt range. The ground water salinity at the northwest corner of the site is consistent with salinities observed in Blue Lake, the adjoining surface water feature.

Wide salinity fluctuations observed in Figure 6-6 graphs prior to 1993 are due to changing sampling methodology. Observed salinity was directly related to the degree of well purging prior to deep zone monitor wells PZ1D, BP1D, and MW4D north and west of the brine pond exhibit lower salinities than wells to the east and south sampling. Consistent purging methodology was instituted in September 1993.

Salinity trends are evident in contaminated and uncontaminated areas. Elevated ground water salinities observed in both zones in the brine pond and pump pad area have remained relatively constant overall, despite fluctuations encountered. (An increase in salinity was observed at wells MW1S and MW1D in 1995.) High salinities observed in the shallow zone near the SOC and in both zones near the maintenance building appear to be stable or increasing slightly over the long term. Salinities observed in uncontaminated deep and shallow zones at the northwest corner of the site increased slightly during the 1995.





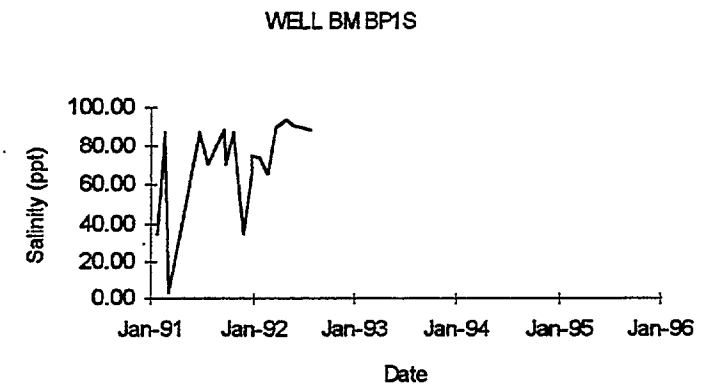
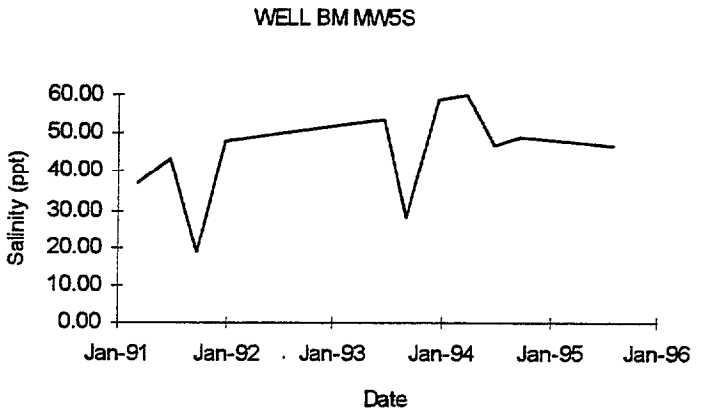
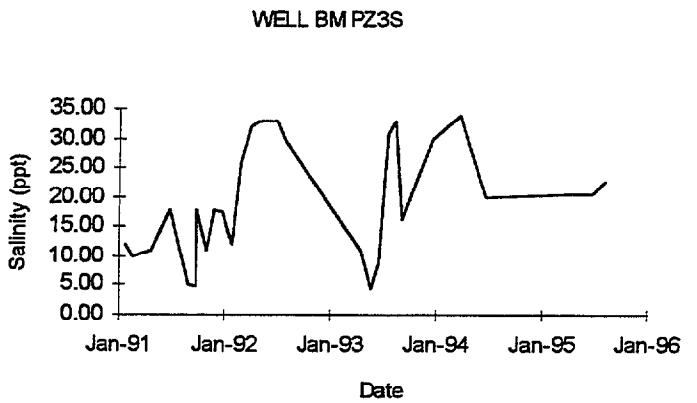


Figure 6-6.
Bryan Mound Groundwater Monitoring Well Salinities





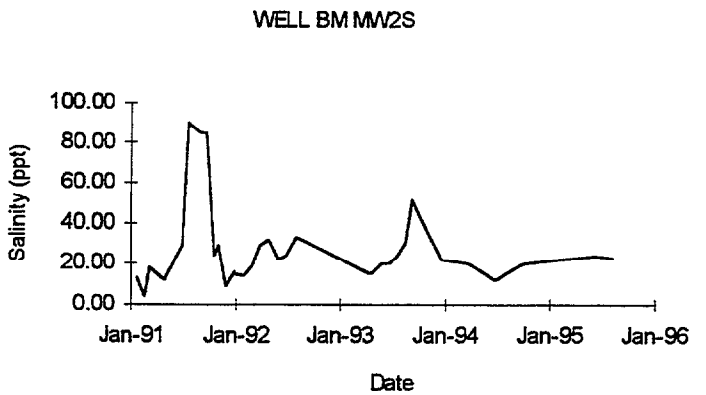
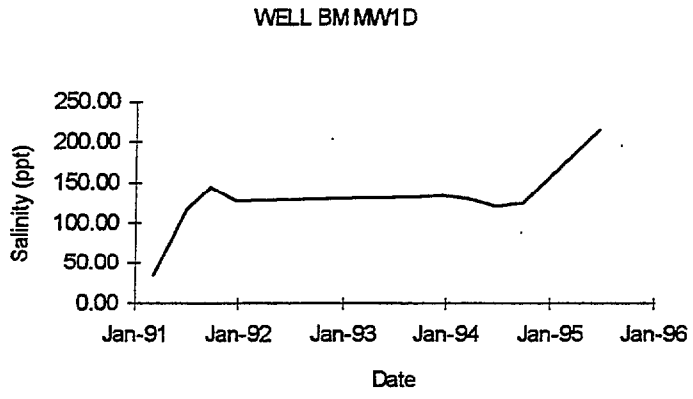
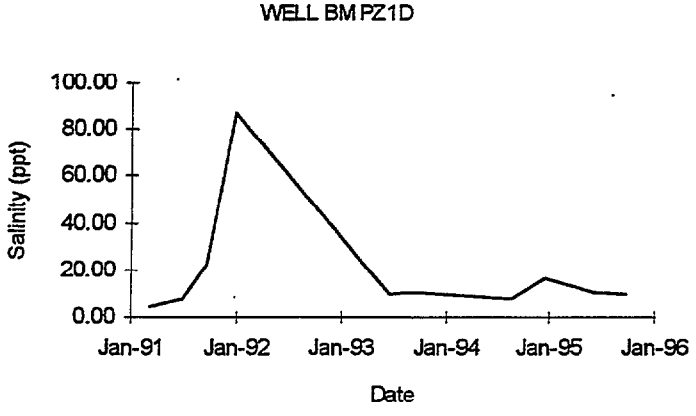


Figure 6-6 (Continued)
Bryan Mound Ground Water Monitoring Well Salinities





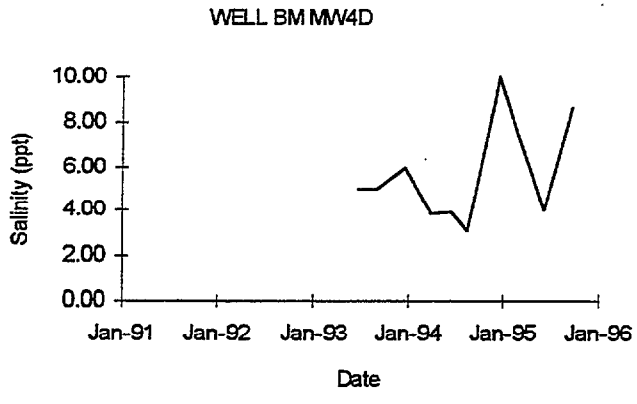
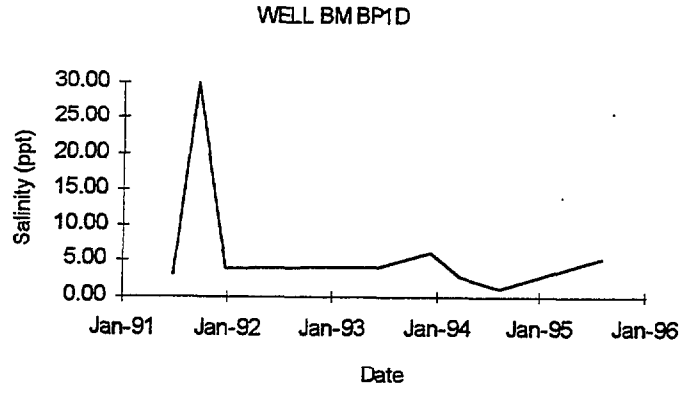
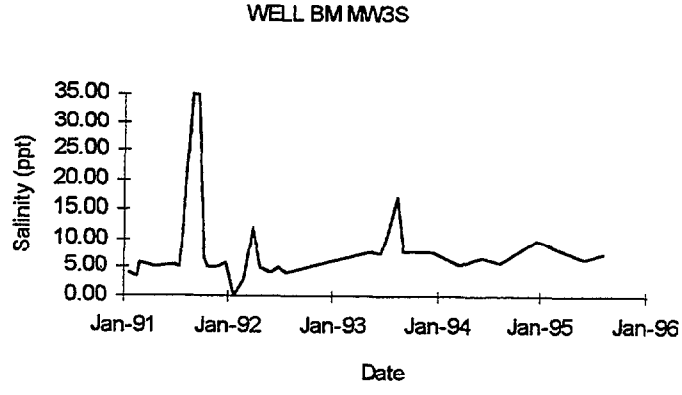


Figure 6-6 (Continued)
Bryan Mound Ground Water Monitoring Well Salinities





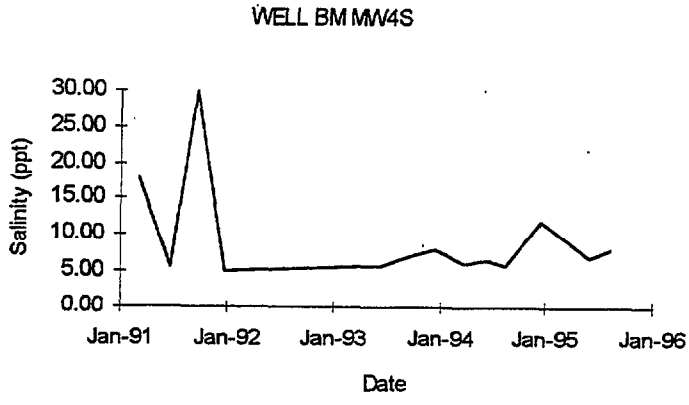


Figure 6-6 (Continued)
Bryan Mound Ground Water Monitoring Well Salinities

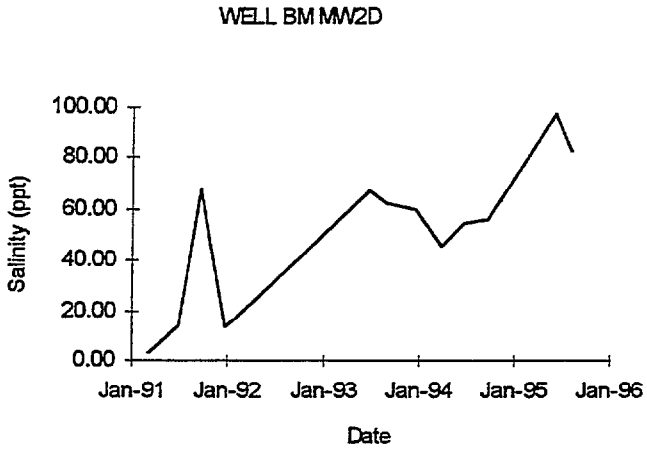


Figure 6-6 (Continued)
Bryan Mound Ground Water Monitoring Well Salinities

6.4 ST. JAMES

The Chicot Aquifer is the principal regional aquifer at St. James. The upper strata of the Chicot Aquifer is in direct hydrologic contact with the Mississippi River. Most of the ground water contained in this aquifer is slightly brackish. In the St. James area only the uppermost units contain fresh water.

No ground water monitoring wells have been installed at the St. James site due to the absence of brine and chronic crude oil spillage. There is no evidence of leakage; however, underground diesel and gasoline tanks removed in 1995 were found to have leaked. Contaminated soil was removed and remediated to the satisfaction of the state.

6.5 WEEKS ISLAND

The Chicot formation is the principal aquifer in the Weeks Island area. The aquifer surface is approximately at sea level near Weeks Island and slopes slightly northwest towards a cone of depression attributed to heavy withdrawals in the Lake Charles area. The fresh water sand layers provide water for the local area.

A sink hole found three years ago on Morton Property may potentially affect crude oil storage in the underlying mine and has prompted further investigation. The sink hole is located east of the mine's crude oil fill hole and has continued to grow since 1993. Its volume and depth have been monitored closely from the surface, seismic tests were performed to characterize soil from the surface to below the hole at the dome interface, and six monitoring wells were installed around it to monitor ground water piezometric levels. A plug has been established under the sink hole to bridge the corresponding feature in the salt dome by freezing the water table in the area. This plug has effectively abated communication of ground water with the oil storage chamber. In the meantime, relocation of the mine inventory to Bayou Choctaw and Big Hill began in 1995.

6.6 WEST HACKBERRY

The Chicot Aquifer, which flows closest to the surface in the Hackberry area, contains predominantly fresh water with salinity increasing with proximity to the Gulf of Mexico. The majority of the ground water pumping from the Chicot Aquifer takes place in the Lake Charles area. Pumping is so great that a cone of depression has been created which has reversed the flow direction to the north. The fresh/saline water interface is approximately 213 m (700 ft) below land surface (bls). Zones contaminated and monitored at West Hackberry are near the surface, the shallow zone at roughly 6 m (20 ft) bls and the deep zone at roughly 15 m (50 ft) bls.

The 1991 Contamination Assessment Report and Remedial Alternatives Analysis identified the brine pond as a source of ground water contamination. The brine pond is one of five adjoining ponds comprising a pond system that contains brine and anhydrite solids pumped from the storage caverns. As an abatement measure, the brine pond was cleaned, and cracks in the walls and floor were grouted to stop leakage. Ground water

recovery around the pond was also increased. The West Hackberry brine pond is scheduled for replacement in October 1998.

Eleven monitoring wells and 15 recovery wells (Figure 6-7) were installed on the West Hackberry site in five phases. All wells are used to monitor or control brine contamination beneath the brine pond system. West Hackberry began using the low flow technique for sampling these wells in December 1995. Salinity data gathered over the past five years at all wells are depicted in Figure 6-8.

Ground water recovery at the brine pond has improved over the past four years. Gaps in the line graphs in Figure 6-8 denote periods when pumps were inoperable or when wells were dry.

Observed recovery well salinities depict a complex picture of ground water contamination beneath the pond system. Salinities are greater in the shallow zone than the deep zone with the exception of deep zone wells P1D and P4D on west and east sides of the brine pond, respectively, where salinities exceed that of all other wells.

A brine plume extends east-northeastward through the shallow zone from the southwest corner of the brine pond, and its saline ground water is captured by six recovery wells. Wells P1S and P5S intercept the plume on the west side of the pond, wells RW1S and RW2S on the south side, and P3S and P4S on the east side. Wide salinity fluctuations of data graphed were caused by salinity stratification in the wells and oscillating cones of depression. Prior to mid-1993, submersible recovery well pumps ran intermittently and could not develop stable cones of depression and resultant stable salinities. One salinity peak that exceeded 200 ppt in January 1993 in Well P5S was caused by a brief siphoning of brine from the pond into the well.

A slight decreasing salinity trend is observed at wells P1S, P5S, and RW1S along the west side of the brine pond. A stable to slightly increasing salinity trend is apparent at wells RW2S, P2S, and P3S along the east half of the pond system. With ground water movement to the east, it is expected that wells on the west side of the pond will capture more fresh, uncontaminated ground water from the west as the source of brine contamination decreases. This response may be delayed to the east.

It appears that the elevated deep zone salinities are confined around wells P1D and P4D since no plume has been identified in the deep well network. Salinities of deep zone recovery wells RW1D and RW2D near high salinity P1D, and wells P3D, RW3D, and RW4D north of high salinity P4D remain near ambient (although trending slightly downward). Salinity of deep recovery well RW5D south of P4D remains above ambient (17.0 ppt annual average) and may be located at the edge of the contaminated area intercepted by P4D.

Shallow monitoring wells P8, P9, and P11 at caverns 8, 9, and 11, respectively, are located away from the brine pond and intercept ambient to near-ambient ground water. These wells have exhibited little change over the past five years, but wells P8 and P11 have detected slight localized contamination. The source of contamination at P8 has not been determined. Temporarily elevated salinities observed at well P11 were caused by a brackish water leak four years ago from an adjacent fire water system.

Shallow zone monitoring wells P6S, P12S, and P13S, and deep zone monitoring wells P2D, P6D, P12D, P13D, and MW1D are nearer the brine pond than the monitoring wells at the caverns and, with the exception of wells P12S and P13S, also intercept ambient ground water. Well P12S is the only downgradient monitoring well that intercepts the shallow zone brine plume extending eastward from the brine pond. Its salinity is

elevated (33.6 ppt annual average in 1995) and has been generally consistent since sampling began in 1992. Prior to 1995, well P13S was trending slightly upward, but during 1995, salinity appeared to stabilize or slightly decline. The slightly elevated salinity may be due to residual localized contamination from a nearby brine line leak in 1992.

Cones of depression have been sustained in both zones as a result of successful ground water recovery. The differences in shallow and deep zone potentiometric surfaces and the rapid lowering of the piezometric heads during pumping indicate that the two zones are confined.

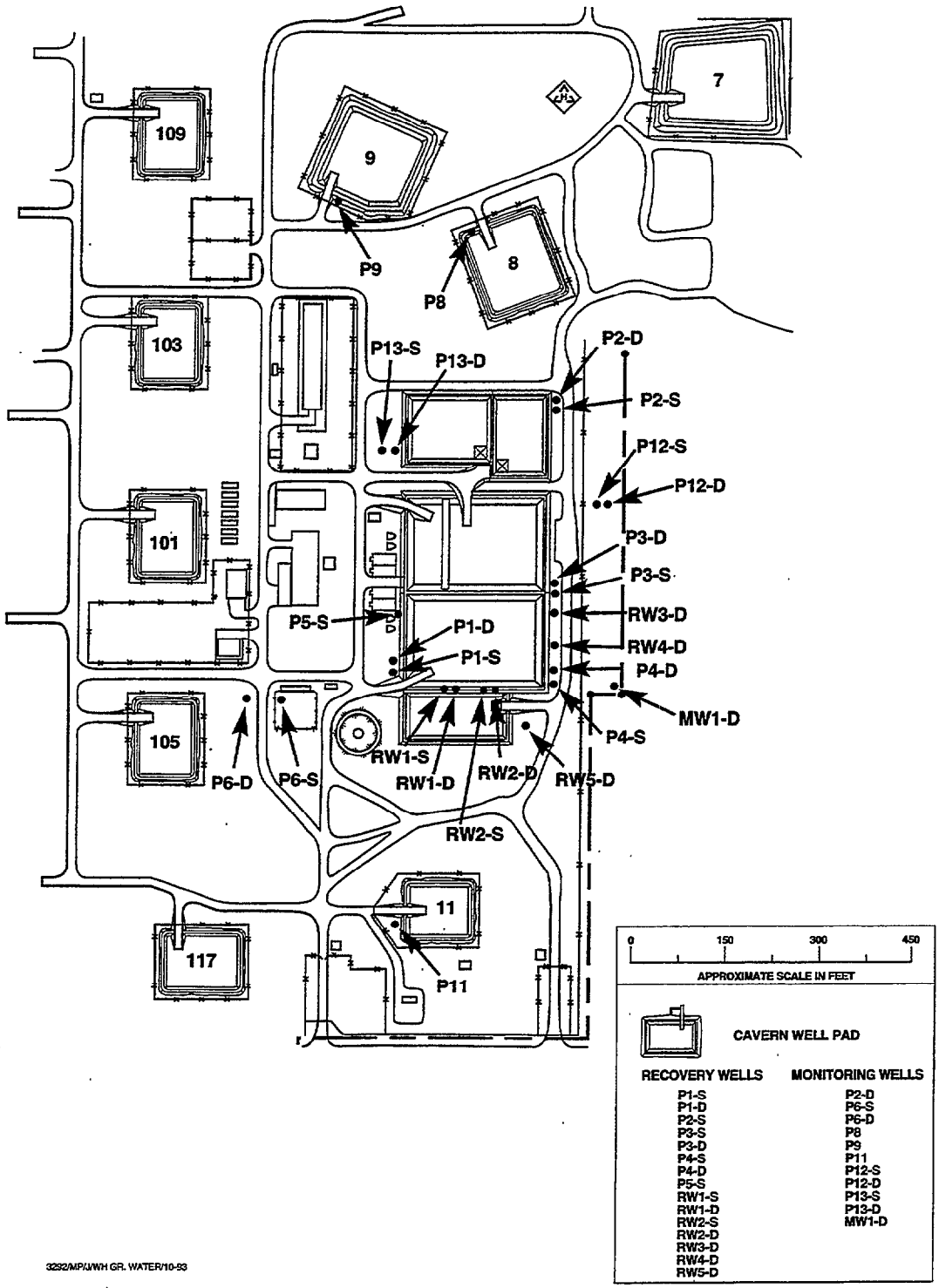
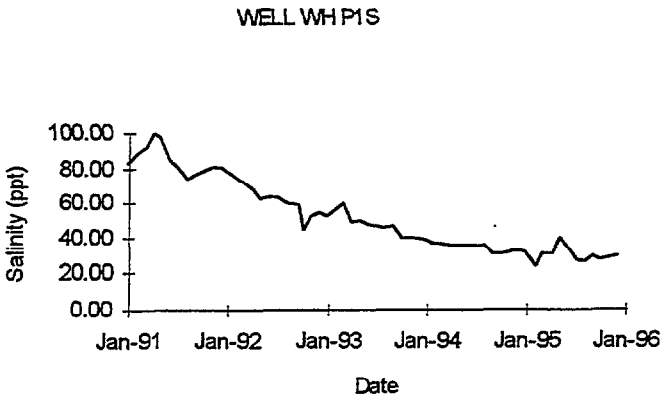
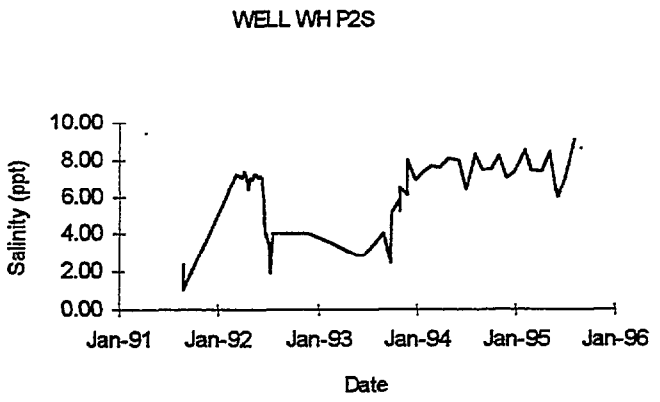


Figure 6-7.

West Hackberry Ground Water Monitoring Wells





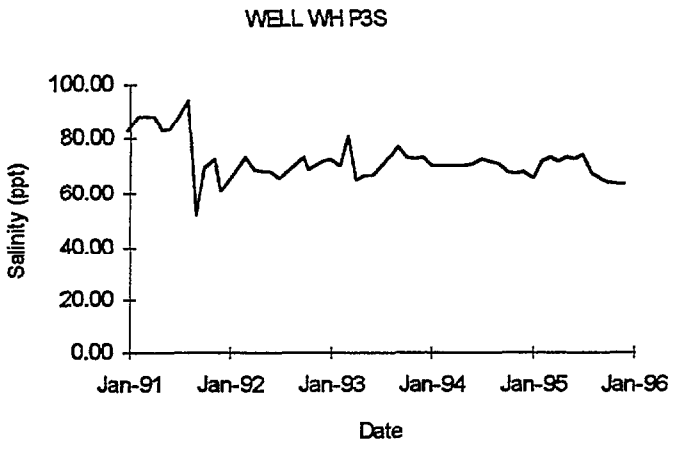
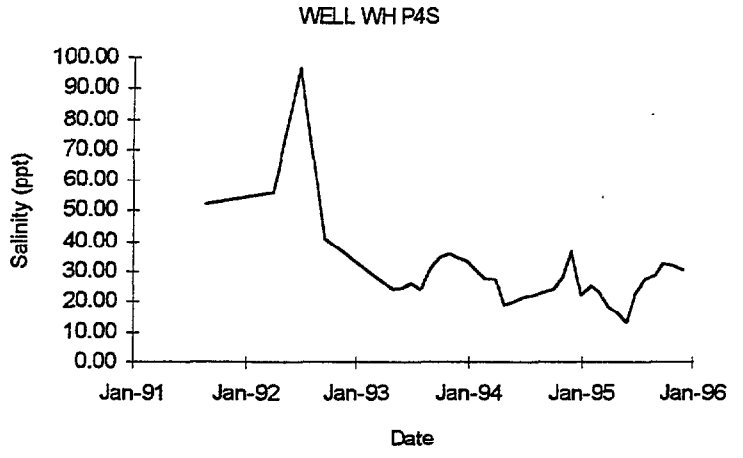
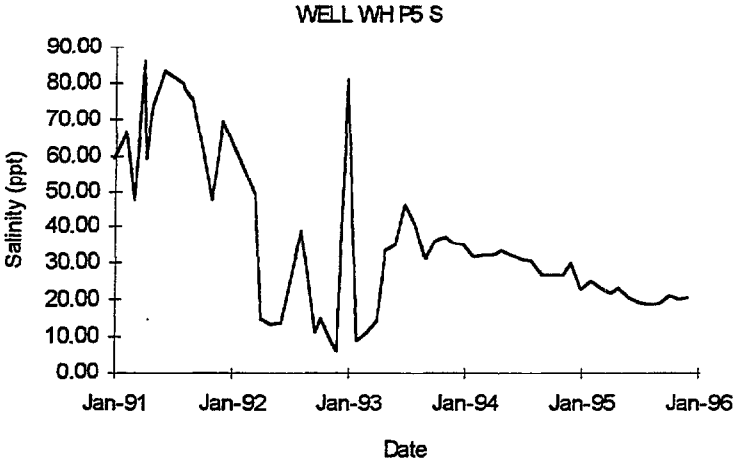


Figure 6-8.

West Hackberry Ground Water Monitoring Well Salinities





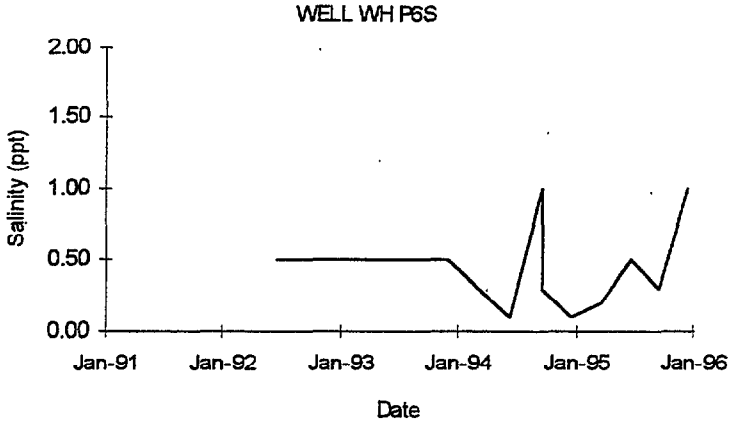
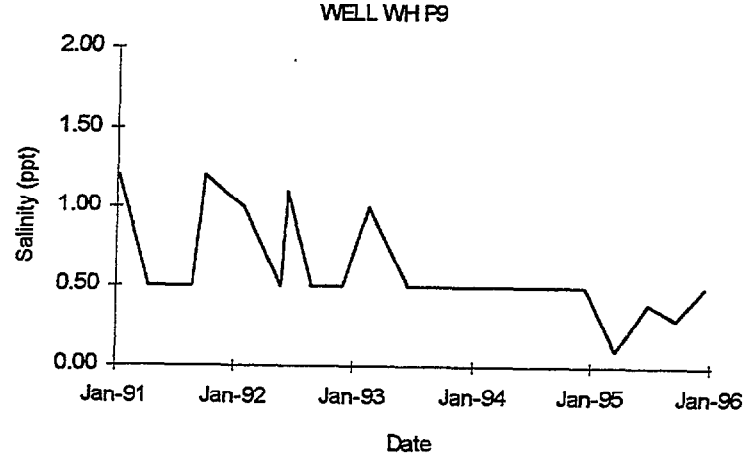


Figure 6-8 (Continued)
West Hackberry Ground Water Well Salinities



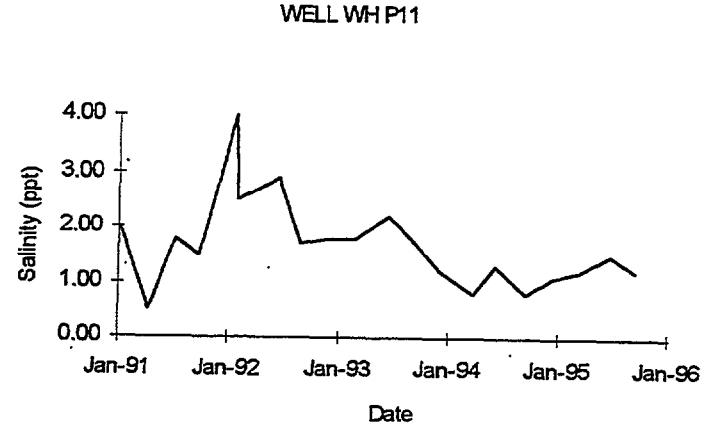
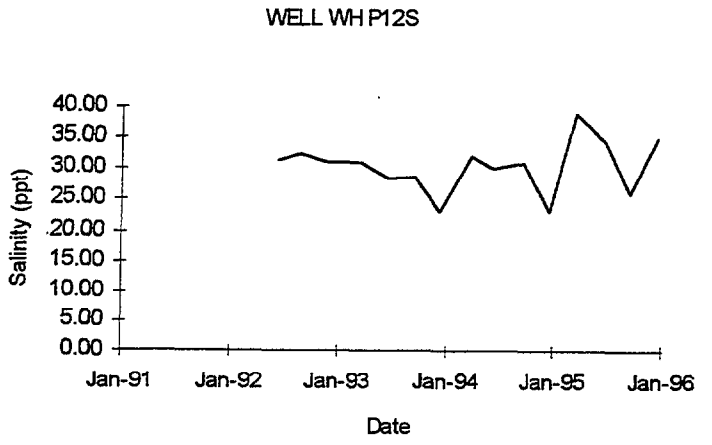
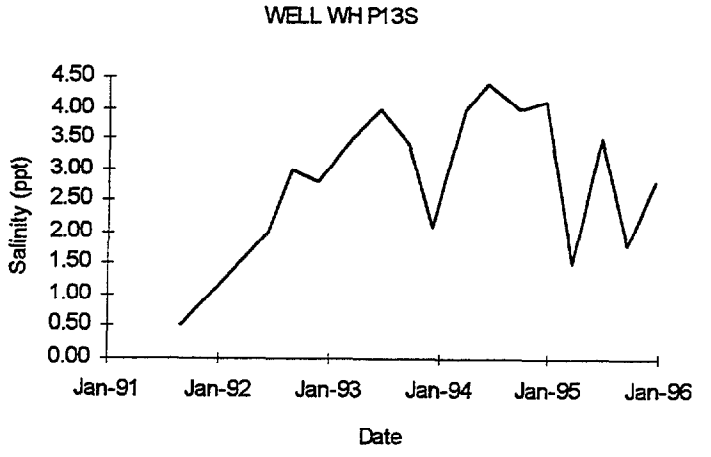


Figure 6-8 (Continued)
West Hackberry Ground Water Well Salinities





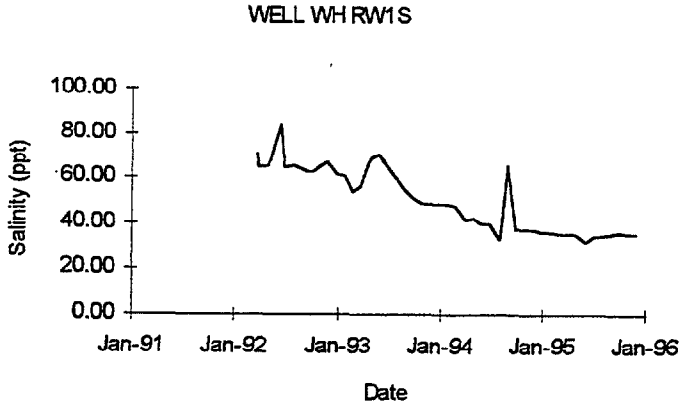
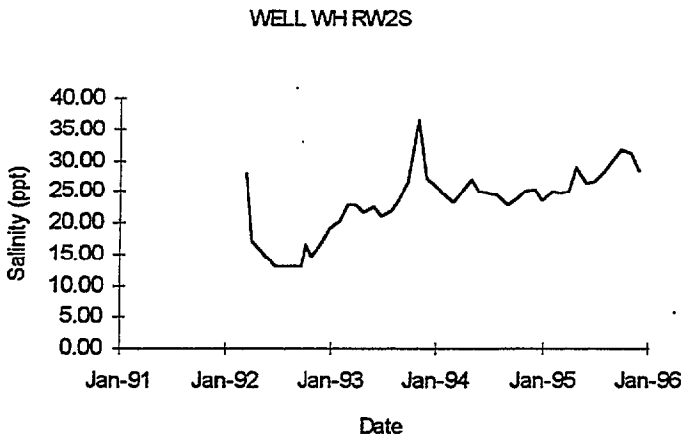
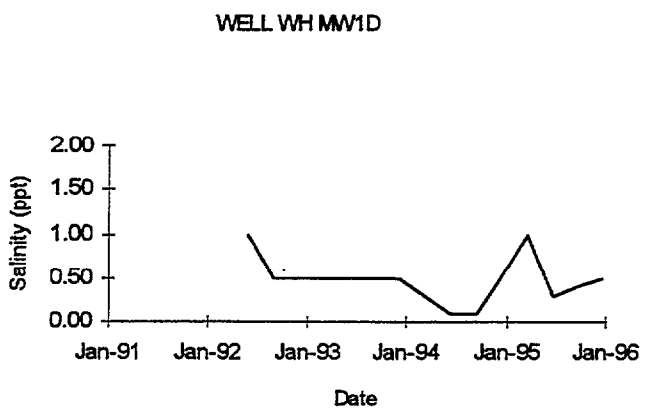


Figure 6-8 (Continued)

West Hackberry Ground Water Monitoring Well Salinities





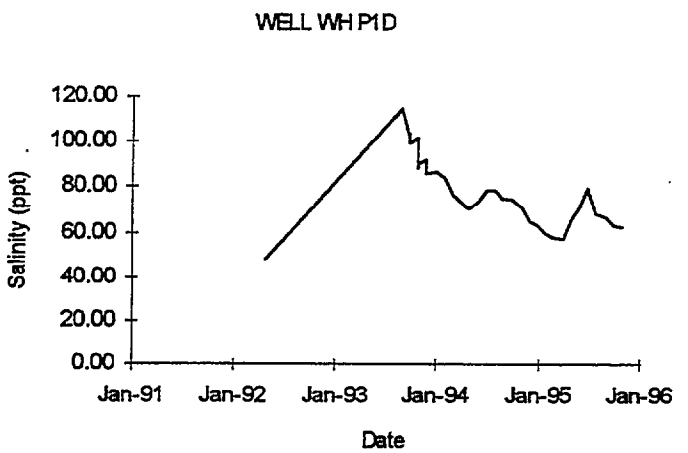
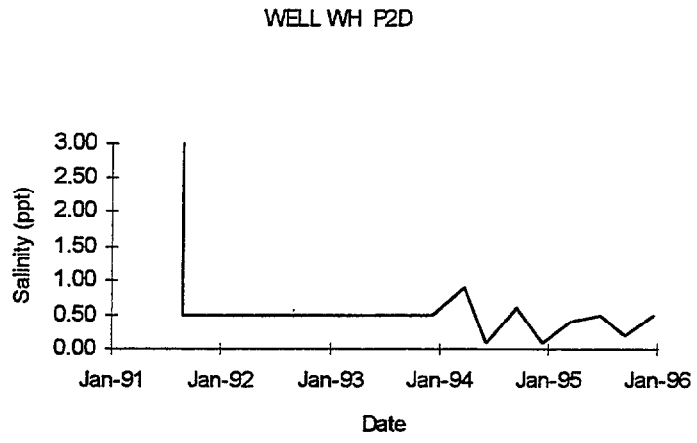
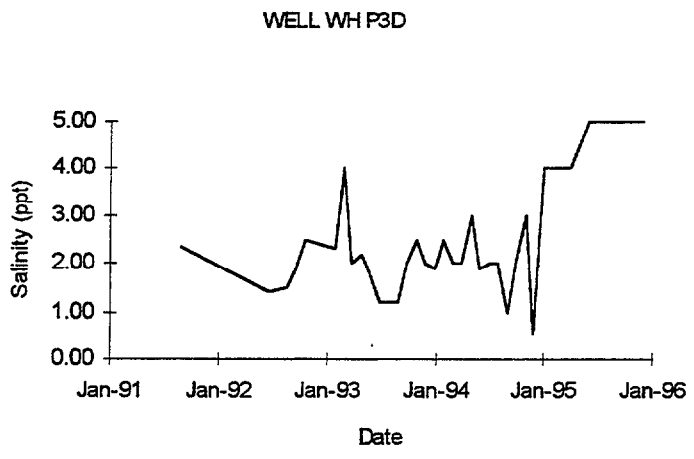


Figure 6-8 (Continued)

West Hackberry Ground Water Monitoring Well Salinities





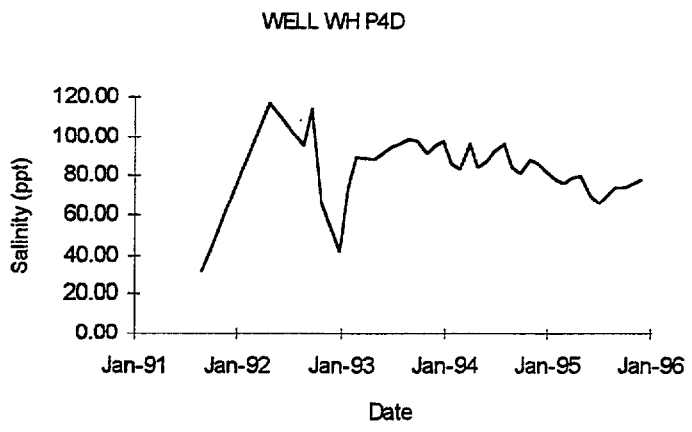
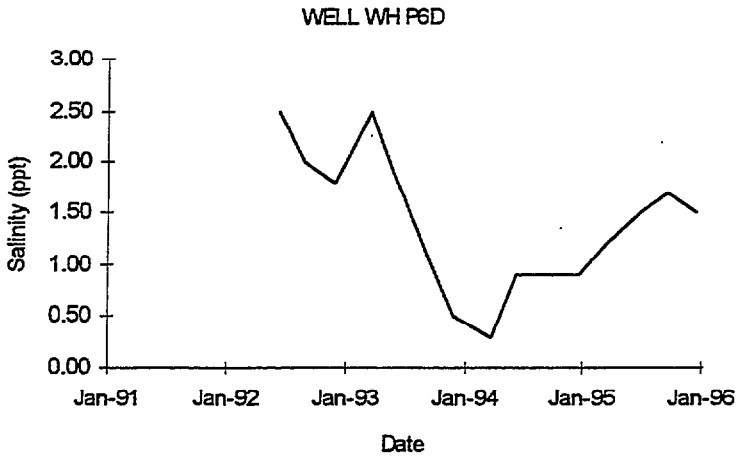
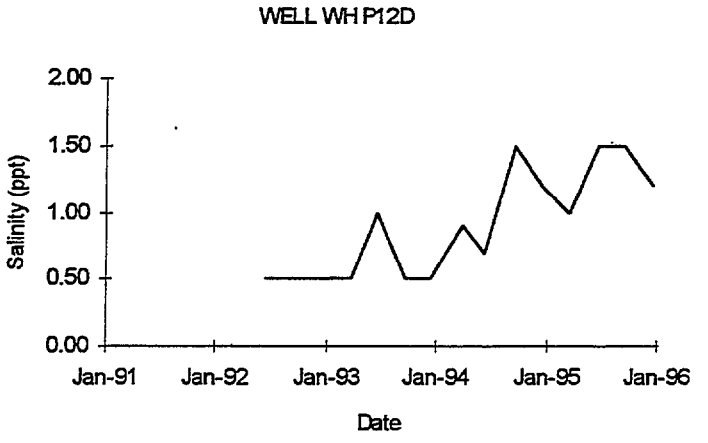


Figure 6-8 (Continued)

West Hackberry Ground Water Monitoring Well Salinities





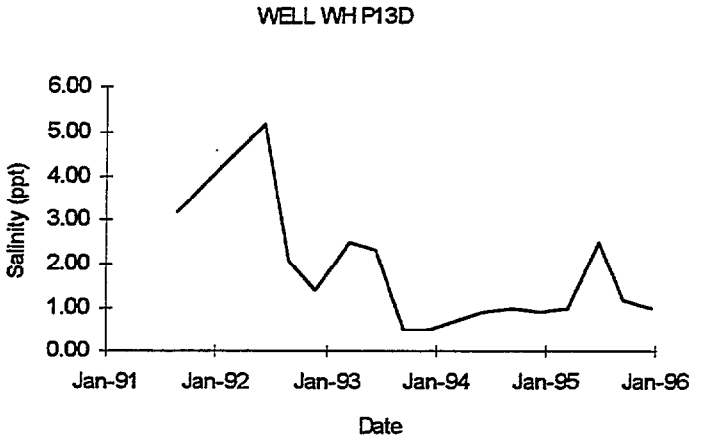
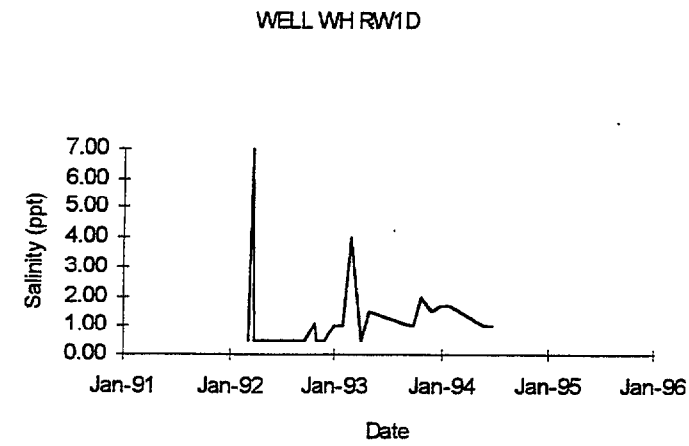
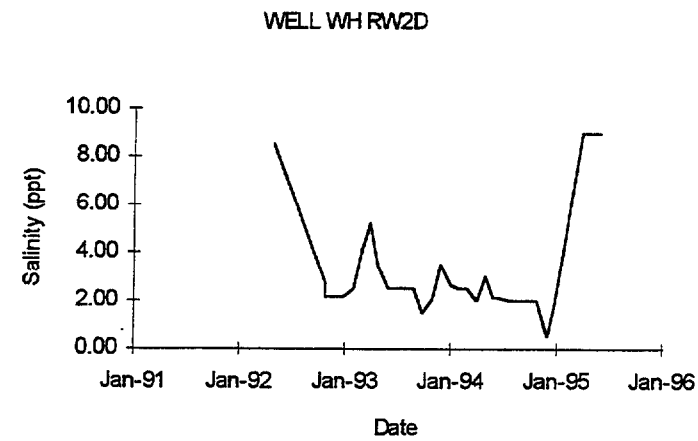


Figure 6-8 (Continued)

West Hackberry Ground Water Monitoring Well Salinities





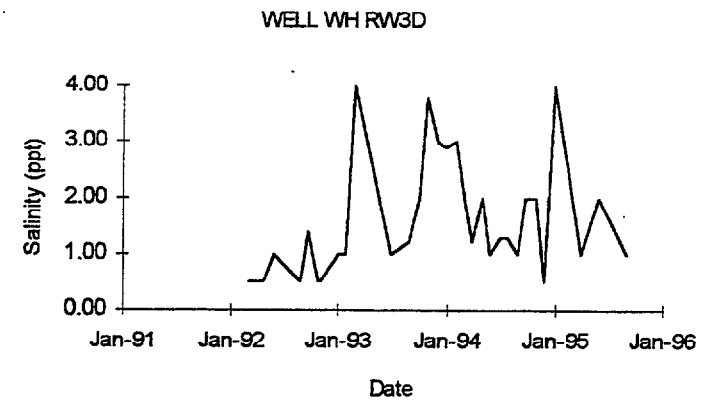
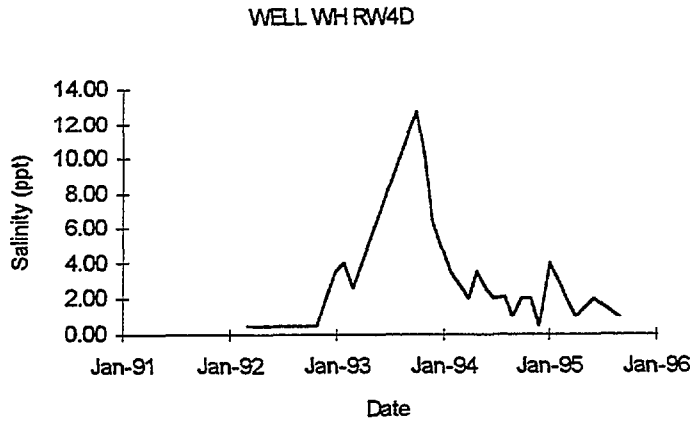


Figure 6-8 (Continued)

West Hackberry Ground Water Monitoring Well Salinities



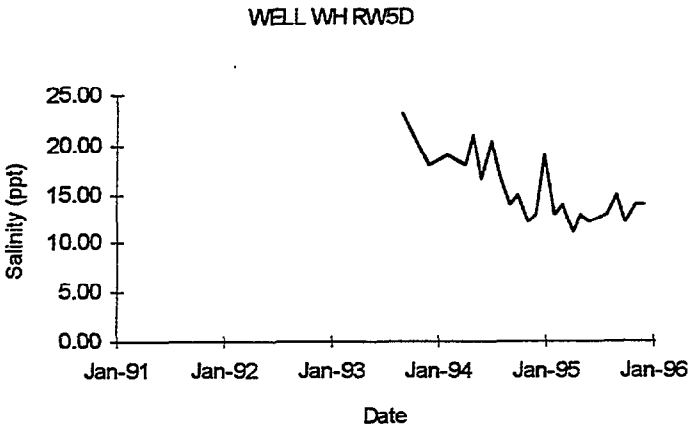


Figure 6-8 (Continued)

West Hackberry Ground Water Monitoring Well Salinities

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7. QUALITY ASSURANCE

The SPR sites undergo periodic evaluation throughout the year in the form of yearly internal audits as well as audits by outside federal and state agencies. The structured laboratory quality assurance program has continued through the systematic application of acceptable accuracy and precision criteria at SPR laboratories. Compliance with this and other environmental program requirements was reviewed and evaluated at each site by means of the M&O contractor's Quality Assurance Assessments, Independent Internal Assessments, and audits at selected sites by state and federal environmental agencies.

7.1 INTERNAL ASSESSMENTS

Annual site self-assessments conducted during 1995 by site personnel were examined by NOLA environmental personnel through internal assessments. Internal assessments are conducted to evaluate the accuracy and scope of site self-assessments. Environmental discrepancies that were not captured by site self-assessments were identified as findings in the internal assessments.

Findings fall under Categories I, II, and III. The Category I classification addresses situations that present an immediate danger to the environment and must receive immediate attention. The Category II classification addresses deviation from federal, state, or local regulations, permits, or a major deviation from a DOE Order. These situations do not present a clear and present danger to the environment. The Category III classification addresses minor deviation from a DOE order, policy or procedure, and best management practice.

All 1995 findings from internal assessments fell under Categories II and III. Category II findings were primarily administrative in nature and disclosed no significant environmental impact. Category III findings addressed needed improvements as best management

practices. Table 7-1 is a tabulation of findings during 1995. Appropriate corrective actions have been scheduled.

Table 7-1. SPR 1995 Internal Assessment Findings

Site	Category I	Category II	Category III
Bayou Choctaw	0	5	0
Big Hill	0	4	3
Bryan Mound	0	4	5
St. James	0	4	0
Weeks Island	0	4	0
West Hackberry	0	2	0

7.2 FIELD QUALITY CONTROL

All field environmental monitoring and surveillance activities are performed in accordance with standard procedures which are maintained in the contractor's Laboratory Programs and Procedures Manual and the Environmental Monitoring Plan. The former was completed in 1995. These procedures include maintenance of chain-of-custody, collection of quality control (QC) samples, and field documentation.

7.3 DATA MANAGEMENT

SPR data is generated by SPR and contractor laboratories. All data generated by SPR laboratories is recorded and maintained in bound, numbered, and signed laboratory notebooks. Contractor laboratory data and accompanying QC data is received by the site laboratory or Environmental department and retained on site as part of the original data file.

Water quality data is added to the Water Quality Database for retention, manipulation, and interpretation. This data is compiled and appears in various reports such as the Site Environmental Report, in support of assessments, evaluations, and development of appropriate responses.

7.4 EPA DISCHARGE MONITORING REPORT QUALITY ASSURANCE STUDY

The EPA entered the 15th year of its Discharge Monitoring Report Quality Assurance Laboratory Performance Evaluation program (DMR-QA LPE). Through this program EPA ensures verifiable and consistent data generation by providing analytical laboratories of major NPDES dischargers blind samples for analysis of permit parameters. The Big Hill, Bryan Mound, and West Hackberry sites, classified as major dischargers, participated in the study in 1995. Resultant data was provided to EPA, via their contractor, on a standard report form.

7.5 SPR LABORATORY ACCURACY AND PRECISION PROGRAM

The SPR laboratory quality assurance program is based on the *U.S. EPA Handbook for Analytical Quality Control in Water and Wastewater Laboratories.* This program focuses on the use of solvent or standard and method blanks, check standards, and for instrumental methods, final calibration blanks and final calibration verification standards with each analytical batch to verify quality control. Additionally, replicate and spiked samples are analyzed at a 10% frequency to determine precision and accuracy, respectively. Analytical methodology is based on the procedures listed in Table 7-2. Several hundred of these quality assurance analyses were performed in addition to the 1995 discharge compliance and water quality analyses to verify the continuing high quality of SPR laboratory data.

The EPA quality control document advocates use of quality control charts to maintain and evaluate accuracy and precision data. The SPR uses a computer program to allow rapid and exact determinations of accuracy and precision without the necessity of manual quality control chart preparation.

7.6 CONTROL OF SUBCONTRACTOR LABORATORY QUALITY ASSURANCE

The M&O Contractor subcontracts some of the required analytical work the SPR laboratories perform. The Laboratories Programs and Procedures Manual contains mandatory guidelines by which such contracts must be prepared. In addition, procurement documents are reviewed by the respective laboratory staff and M&O Contractor Quality Assurance, Operations and Maintenance, and Environmental staff. Subcontractor laboratory service vendors are selected from an approved vendors list maintained by the M&O Contractor Quality Assurance organization. The successful bidder must be on the approved vendors list prior to the start of the laboratory contract. Vendors on the approved list are periodically reassessed by the M&O Contractor Quality Assurance and Operations and Maintenance organizations.

Table 7-2. SPR Wastewater Analytical Methodology

Parameter	Method	Source*	Description
Biochemical Oxygen Demand	5210(B)	APHA	5 Day, 20°C
	405.1	EPA-1	5 Day, 20°C
Chemical Oxygen Demand	D1252-88(B)	ASTM	Micro Spectrophotometric Proc.
	410.4	EPA-1	Colorimetric, Manual
	5220(D)	APHA	Closed Reflux, Colorimetric
Fecal Coliform	Part III-C-2	EPA-2	Direct Membrane Filter Method
	9222(D)	APHA	Membrane Filter Procedure
Residual Chlorine	4500-Cl(G)	APHA	DPD Colorimetric
	330.5	EPA-1	Spectrophotometric, DPD
	8021	Hach	DPD Method
Oil & Grease (Total, Recoverable)	413.1	EPA-1	Gravimetric, Separatory Funnel Extraction
Total Organic Carbon	415.1	EPA-1	Combustion or Oxidation
	D4839-88	ASTM	Persulfate - UV Oxidation, IR
	5310(C)	APHA	
	D2579(A)	ASTM	Combustion - IR
	5310 (B)	APHA	
Dissolved Oxygen	D888-87(D)	ASTM	Membrane Electrode
	360.1	EPA-1	Membrane Electrode
	360.2	EPA-1	Winkler Method with Azide Mod.
	4500-O(C)	APHA	Winkler Method with Azide Mod.
	4500-O(G)	APHA	Membrane Electrode
Hydrogen Ion Conc. (pH)	D1293-84(A&B)	ASTM	Electrometric
	150.1	EPA-1	Electrometric
	4500-H^+(B)	APHA	Electrometric
Total Dissolved Solids (Residual, Filterable)	160.1	EPA-1	Gravimetric, Dried at 180°C
	2540(C)	APHA	Gravimetric, Dried at 180°C
Total Suspended Solids (Residual, Non-Filterable)	160.2	EPA-1	Gravimetric, Dried at 103-105°C
	2540(D)	APHA	Gravimetric, Dried at 103-105°C
Salinity	D4542-85 (Sect. 7)	ASTM	Refractometric
	2520(B) & 2510	APHA	Electrical Conductivity
	210B	APHA (16th Ed.)	Hydrometric

EPA-1 = U.S. Environmental Protection Agency, Methods for Chemical Analysis of Water and Wastes, Document No. EPA - 600/4-79-020, March 1983.

APHA = American Public Health Association, et al., Standard Methods for the Examination of Water and Wastewater, 17th Ed., 1989.

EPA-2 = U.S. EPA, Microbiological Methods for Monitoring the Environment: Water and Wastes, Document No. EPA-600/8-78-017, December 1978.

ASTM = American Society for Testing and Materials, Annual Book of Standards, Section 11 - Water, Volumes 11.01 and 11.02, 1990.

Hach = Hach Company, Hach Water Analysis Handbook, 2nd Ed., 1992

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Appendix A
SPR Environmental Standards

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SPR Environmental Standards

STANDARD	AREA	DESCRIPTION
10 CFR 1021	MR	Compliance with the National Environmental Policy Act
10 CFR 1022	MR	Compliance with flood plain/wetlands environmental review
29 CFR 1910.120	MR	Hazardous waste operations and emergency response
33 CFR 66	CW	Private aid to navigation
33 CFR 64	CW	Markings of structures, sunken vessels and other obstructions
33 CFR 67	CW	Aids to navigation on artificial islands and fixed structures
33 CFR 153	CW	Control of pollution by oil and hazardous substances, discharged removed
33 CFR 154	CW	Facilities transferring oil or hazardous material in bulk
33 CFR 156	CW	Oil and hazardous material transfer operations
33 CFR 158	HW	Reception facilities for oil, noxious liquid substances, and garbage (MARPOL)
33 CFR 322	CW	Permits for structures or work in or affecting navigable waters of the U.S.
33 CFR 323	CW	Permits for discharges of dredged or fill material into waters of the U.S.
33 CFR 325	CW	Process of Department of Army permits
33 CFR 326	CW	Enforcement
33 CFR 328	CW	Definition of waters of the United States
33 CFR 329	CW	Definition of navigable waters of the United States
33 CFR 330	CW	Nationwide permits
36 CFR 800	MR	Advisory council on historical preservation
40 CFR 52	CA	Approval & promulgation of implementation plans
40 CFR 53	CA	Ambient air monitoring
40 CFR 60	CA	Standards of performance for new stationary sources
40 CFR 61	CA	National emission standards for hazardous air pollutants
40 CFR 63	CA	National emission standards for hazardous air pollutant for source categories
40 CFR 66	CA	Assessment and collection of noncompliance penalties
40 CFR 70	CA	State operating permit programs
40 CFR 80	CA	Regulations of fuels and fuel additives
40 CFR 81	CA	Designation of areas for air quality planning purposes
40 CFR 82	CA	Protection of stratospheric ozone
40 CFR 109	CW	Criteria for state, local, and regional oil removal contingency plans
40 CFR 110	CW	Discharge of oil
40 CFR 112	CW	Oil pollution prevention
40 CFR 116	CW	Designation of hazardous substances
40 CFR 117	CW	Determination of reportable quantities for hazardous substances
40 CFR 121	CW	State certification of activities requiring a federal license or permit
40 CFR 122	CW	EPA administrated permit programs: NPDES
40 CFR 124	CW	Procedures for decision making
40 CFR 125	CW	Criteria and standards for NPDES
40 CFR 129	CW	Toxic pollutant effluent standards
40 CFR 131	CW	Water quality planning and management, water quality standards
40 CFR 133	CW	Secondary treatment regulation

SPR Environmental Standards

STANDARD	AREA	DESCRIPTION
40 CFR 136	CW	Guidelines establishing test procedures for the analysis of pollutants
40 CFR 141	CW	National primary drinking water regulations
40 CFR 142	CW	National primary drinking water implementation regulations
40 CFR 143	CW	National secondary drinking water regulations
40 CFR 144	CW	Underground injection control program
40 CFR 146	CW	Underground injection control programs: criteria and standards
40 CFR 147	CW	State UIC programs
40 CFR 149	CW	Sole source aquifers
40 CFR 152	CS	Pesticide registration and classification procedures
40 CFR 156	CS	Labeling requirements for pesticides and devices
40 CFR 170	CS	Worker protection standards (pesticides)
40 CFR 171	CS	Certification of pesticide applicators
40 CFR 220	CW	General
40 CFR 228	CW	Ocean dumping
40 CFR 243	HW	Guidelines for storage and collection of residential, commercial, and institutional solid wastes
40 CFR 247	HW	Comprehensive procurement guideline for products containing recovered materials
40 CFR 260	HW	Hazardous waste management system: general
40 CFR 261	HW	Identification and listing of hazardous waste
40 CFR 262	HW	Standards applicable to generators of hazardous wastes
40 CFR 263	HW	Standards applicable to transporters of hazardous wastes
40 CFR 264	HW	Standards for owners and operators of hazardous waste, treatment, storage, and disposal facilities
40 CFR 266	HW	Standards for management of specific hazardous wastes
40 CFR 268	HW	Land disposal restrictions
40 CFR 272	HW	Approved state hazardous waste management programs
40 CFR 273	HW	Standard for universal waste management
40 CFR 279	HW	Standards for management of used oil
40 CFR 280	HW	Technical standards and corrective action requirements for owners and operators of UST
40 CFR 282	HW	Approved underground storage tank programs
40 CFR 300	CS	National Oil and Hazardous Substances Pollution Contingency Plans
40 CFR 302	CS	Designation of reportable quantities and notification
40 CFR 355	CS	Emergency planning and notification
40 CFR 370	CS	Hazardous chemical reporting: community right-to-know
40 CFR 372	CS	Toxic chemical release reporting: community right-to-know
40 CFR 373	CS	Reporting hazardous substance activity when selling or transferring federal real property
40 CFR 401	CW	General Provisions
40 CFR 403	CW	General pretreatment regulations for existing and new sources of pollution

SPR Environmental Standards

STANDARD	AREA	DESCRIPTION
40 CFR 700	CS	General
40 CFR 761	CS	PCB manufacturing, processing, distribution in commerce, and use prohibitions
40 CFR 763	CS	Asbestos
40 CFR 1500	MR	Purpose, policy and mandate
40 CFR 1501	MR	NEPA and agency planning
40 CFR 1502	MR	Environmental impact statement
40 CFR 1503	MR	Commenting
40 CFR 1504	MR	Predecision referrals to the council of proposed federal actions determined to be environmentally unsatisfactory
40 CFR 1505	MR	NEPA and agency decision making
40 CFR 1506	MR	Other requirements of NEPA
40 CFR 1507	MR	Agency compliance
40 CFR 1508	MR	Terminology and index
40 CFR 1515	MR	Freedom of information act procedures
40 CFR 1516	MR	Privacy act implementation
49 CFR 130	CW	Oil spill prevention and response plans
49 CFR 171	TS	General information, regulations, and definitions
49 CFR 172	TS	Hazardous materials tables and hazardous materials communications regulations
49 CFR 173	TS	Shippers - general requirements for shipments and packaging
49 CFR 177	TS	Carriage by public highway
49 CFR 194	TS	DOT response plans for onshore pipelines
49 CFR 195	TS	Transportation of hazardous liquids by pipeline
49 CFR 199	TS	Drug testing
50 CFR 10	MR	General provisions
50 CFR 17	MR	Endangered and threatened wildlife and plants
EO 11991	MR	Protection/enhancement of Environmental Quality
EO 11988	CW	Floodplain management
EO 11990	CW	Protection of wetland
EO 12873	PP	Federal acquisition, recycling, and waste prevention
EO 12856	PP	Right-to-know and PPA compliance
EO 12898	MR	Environmental Justice
33:LAC I.3	MR	Adjudications
33:LAC I.15	MR	Permit review
33:LAC I.39	CW	Notification regulations and procedures for unauthorized discharge
33:LAC III.1	CA	General provisions
33:LAC III.2	CA	Rules and regulations for the fee system of the air quality control programs
33:LAC III.5	CA	Permit procedures
33:LAC III.7	CA	Ambient air quality
33:LAC III.9	CA	General regulations on control of emissions and emission standards
33:LAC III.11	CA	Control of emissions of smoke

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STANDARD	AREA	DESCRIPTION
33:LAC III.13	CA	Emission standards for particulate matter (including standards for some specific facilities)
33:LAC III.14	CA	Conformity
33:LAC III.15	CA	Emission standards for sulphur dioxide
33:LAC III.17	CA	Control of emission of carbon monoxide (new sources)
33:LAC III.21	CA	Control of emission of organic compounds
33:LAC III.25	CA	Miscellaneous incineration rules
33:LAC III.29	CA	Odor regulations
33:LAC III.31	CA	Standards of performance for new stationary sources
33:LAC III.51	CA	Comprehensive toxic air pollutant emission control program
33:LAC III.53	CA	Minor sources of toxic air pollutants
33:LAC III.56	CA	Prevention of air pollution emergency episodes
33:LAC III.60	CA	Division's source test manual
33:LAC V.1	HW	General provisions and definitions
33:LAC V.9	HW	Manifest system for TSD facilities
33:LAC V.11	HW	Generators
33:LAC V.13	HW	Transporters
33:LAC V.15	HW	Treatment, storage and disposal facilities
33:LAC V.18	HW	Containment buildings
33:LAC V.19	HW	Tanks
33:LAC V.21	HW	Containers
33:LAC V.22	HW	Prohibitions on land disposal
33:LAC V.26	HW	Corrective action management units and temporary units
33:LAC V.37	HW	Financial Requirements
33:LAC V.39	HW	Small quantity generators
33:LAC V.40	PP	Used oil
33:LAC V.41	PP	Recyclable materials
33:LAC V.49	HW	Lists of hazardous wastes
33:LAC VI.51	HW	Fee schedules
33:LAC VI.1	HW	General provisions and definitions (solid waste regulations)
33:LAC VII.3	HW	Scope and mandatory provisions of the program
33:LAC VII.5	HW	Solid waste management system
33:LAC VII.7	HW	Solid waste standards
33:LAC VII.9	HW	Enforcement
33:LAC VII.103	PP	Recycling and waste reduction rules
33:LAC VII.105	PP	Waste tires
33:LAC IX.1	CW	General provisions
33 LAC IX.3	CW	Permits
33:LAC IX.5	CW	Enforcement
33:LAC IX.7	CW	Effluent standards
33:LAC IX.9	CW	Spill prevention and control

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STANDARD	AREA	DESCRIPTION
33:LAC IX.11	CW	Surface water quality standards
33:LAC IX.13	CW	Louisiana water pollution control fee system regulation
33:LAC IX.15	CW	Water quality certification procedures
33:LAC IX.17	CW	Rules governing disposal of waste oil, oil field brine, and all other materials resulting from the drilling for, production of, or transportation of oil, gas or sulphur (as amended January 27, 1953)
33:LAC IX.19	CW	State of Louisiana Control Commission
33:LAC IX.23	CW	The LPDES program definitions and general program requirements
33:LAC XI.1	HW	Program applicability and definitions
33:LAC XI.3	HW	Registration requirements, standards and fee schedule
33:LAC XI.5	HW	Spill and overfill control
33:LAC XI.7	HW	Methods release detection and release reporting, investigation, confirmation and response
33:LAC XI.9	HW	Out of service UST systems and closure
43:LAC I.1	CW	General rules and regulations
43:LAC I.5	CW	State lands
43:LAC I.7	CW	Coastal management
43:LAC XI.3	TS	Underwater obstructions
43:LAC XI.5	TS	Pipeline safety
43:LAC XVII.1	CW	Class I, III, IV, and V injection wells (Statewide Order 29-N-1)
43 LAC XVII.3	CW	Hydrocarbon storage wells in salt dome cavities (Statewide Order 29-M)
43:LAC XIX1	CW	General provisions (Statewide Order 29-B)
43:LAC XIX2	CW	Fees
48:LAC V.75	CW	Sewerage program
48:LAC V.77	CW	Drinking water program
70:LAC XIII.1	CW	Water wells
70 LAC XIII.3	CW	Water well construction
70 LAC XIII.5	CW	Plugging and sealing abandoned water wells and holes
70 LAC XIII.7	CW	Reporting abandoned wells and holes
16:TAC I.3	CW	Oil and gas division
25:TAC I.301	CW	Wastewater surveillance and technology
25:TAC I.325	HW	Solid waste management
25:TAC I.337	CW	Water Hygiene
30:TAC I.101	CA	General provisions
30:TAC I.103	CA	Procedural rules
30:TAC I.105	CA	Enforcement rules
30:TAC I.111	CA	Control of air pollution from visible emissions and particulate matter
30:TAC I.112	CA	Sulfur compounds control of sulfur dioxide
30:TAC I.113	CA	Toxic materials
30:TAC I.114	CA	Control of air pollution from motor vehicles
30:TAC I.115	CA	Control of air pollution from volatile organic compounds

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STANDARD	AREA	DESCRIPTION
30:TAC I.116	CA	Control of air pollution by permits for new construction or modification
30:TAC I.117	CA	Nitrogen compounds
30:TAC I.118	CA	Episode control procedures
30:TAC I.119	CA	Carbon monoxide
30:TAC I.122	CA	Federal operating permits
30:TAC I.279	CW	Water quality certification
30:TAC I.281	CW	Applications processing
30:TAC I.285	CW	On-site wastewater treatment
30:TAC I.290	CW	Water hygiene
30:TAC I.295	CW	Water rights, procedural
30:TAC I.297	CW	Water rights, substantive
30:TAC I.307	CW	Surface water quality standards
30:TAC I.312	HW	Sludge use, disposal, and transportation
30:TAC I.325	CW	Certificates of competency
30:TAC I.327	CW	Spill prevention and control
30:TAC I.330	PP	Municipal solid waste
30:TAC I.334	HW	Underground and aboveground storage tanks
30:TAC I.335	HW	Industrial solid waste and municipal hazardous waste
30:TAC I.337	CW	Enforcement
30:TAC I.338	CW	Water well drillers rules general provisions
30:TAC I.343	CW	Oil and hazardous substances general provisions
31:TAC I.15	CW	Planning division
31:TAC I.19	CW	Oil spill prevention and response
31:TAC I.20	CW	Natural resource damage assessment
31:TAC I.21	CW	Oil spill prevention and response hearings procedures
31:TAC II.57	MR	Fisheries
31:TAC II.65	MR	Wildlife
31:TAC II.67	MR	Resource protection
31:TAC XVI.503	CW	Coastal management program
O 151.1	CW	Comprehensive Emergency Management System
O 210.1	MR	Performance Indicators and Analysis of Operations Information
O 225.1	CS	Accident Investigations
O 231.1	MR	Environmental, Safety, and Health Reporting
O 232.1	MR	Occurrence Reporting and Processing of Operations Information
O 451.1	MR	National Environmental Policy Act Compliance Program
O 460.1	TS	Packaging and Transportation Safety
O 1700.1	MR	Freedom of Information Act
5400.1	MR	General Environmental Protection Program
5480.4	MR	Environmental Protection, Safety, and Health Protection Standards
5482.1B	MR	Environmental, Safety, and Health Appraisal Program
5700.6C	MR	Quality Assurance

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STANDARD	AREA	DESCRIPTION
M 231.1-1	MR	Environment, Safety, and Health Reporting Manual
M 232.1-1	MR	Occurrence Reporting and Processing of Operations Information
P 450.2	MR	Identification, Implementation, and Compliance with Environment, Safety and Health Requirements
P 450.3	MR	Sufficient Process for Standards-based Environment, Safety and Health Management
SEN-15-90	MR	National Environmental Policy Act
SEN-22-90	HW	DOE Policy on Signatures of RCRA Permit Applications
SEN-37-92	PP	Waste Minimization Crosscut Plan Implementation

KEY TO ACRONYMS:

LAC Louisiana Administrative Code
TAC Texas Administrative Code
CFR Code of Federal Regulations
EO Executive Order
O Order (DOE)
M Manual (DOE)
P Policy (DOE)
SEN Secretary of Energy Notice

CW Protection of Water Quality
CS Control of Toxic Substances
CA Protection of Air Quality
HW Solid and Hazardous Waste Generation and Control
PP Pollution Prevention and Waste Minimization
MR Management, Oversight , and Reporting
TS Transportation Safety

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