Site Environmental Report
for
Calendar Year 2000

QUESTIONNAIRE/READER COMMENT FORM

The 2001 Site Environmental Report, slated for publication in 2002, 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.

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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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STRATEGIC PETROLEUM RESERVE

SITE ENVIRONMENTAL REPORT

FOR

CALENDAR YEAR 2000

Document No. ASE5400.60A0

Prepared for the U. S. 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

DISCLAIMER

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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 Society for Testing and Materials
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
BTU	British Thermal Unit
CAA	Clean Air Act

ABBREVIATIONS AND ACRONYMS (continued)

CAP	corrective action plan
°C	degrees Celsius
CEQ	Council for Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CESQG	conditionally exempt small quantity generator
CFR	Code of Federal Regulations
Ci	curies
cm	centimeter
CMD	Coastal Management Division
CO	carbon monoxide
COD	chemical oxygen demand
COE	United States Army Corps of Engineers
CPG	Comprehensive Procurement Guidelines
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

ABBREVIATIONS AND ACRONYMS (continued)

DOE	United States Department of Energy
DOT	United States Department of Transportation
DPRP	Discharge Prevention and Response Plan
E2	Energy Efficient
EA	environmental assessment
EIQ	emissions inventory questionnaire
EIS	emissions inventory summary
EMS	Environmental Management System
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
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

ABBREVIATIONS AND ACRONYMS (continued)

ft	feet
ft/yr	feet per year
GALCOE	U.S. Army Corps of Engineers, Galveston Division
GLO	General Land Office
GSA	General Services Administration
ha	hectare
HAP	hazardous air pollutant
Hg	mercury
HPPP	high pressure pump pad
HQ	headquarters
HW	hazardous waste
ICW	Intracoastal Waterway
ISM	Integrated Safety Management
ISO	International Organization of Standardization
in	inch
km	kilometers
LA	Louisiana
lab	laboratory
LAC	Louisiana Administrative Code
lbs	pounds
LDEQ	Louisiana Department of Environmental Quality

ABBREVIATIONS AND ACRONYMS (continued)

LPDES	Louisiana Pollutant Discharge Elimination System
LPE	laboratory performance evaluation
LDNR	Louisiana Department of Natural Resources
LDOTD	Louisiana Department of Transportation and Development
LDWF	Louisiana Department of Wildlife and Fisheries
LOOP	Louisiana Offshore Oil Port
LWDPS	Louisiana Water Discharge Permit System
m^3	cubic meters
m/sec	meters per second
maint	maintenance
max	maximum
MBI	methylenebis
mCi	millicuries
mgd	million gallons per day
mg/l	milligrams per liter
mi	miles
M&O	management & operating
mmb	million barrels
MSGP	multi-sector general permit
mt	metric tons
NAAQS	National Ambient Air Quality Standards

ABBREVIATIONS AND ACRONYMS (continued)

NE	northeast
NEPA	National Environmental Policy Act
NEPT	National Environmental Performance Track
NFRAP	No Further Remedial Action Planned
NHPA	National Historic Preservation Act
NIIMS	National Interagency Incident Management System
NOEC	No observed effects concentration
NORM	naturally occurring radioactive material
NO_X	nitrogen oxide
NOV	notice of violation
NPDES	National Pollutant Discharge Elimination System
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
OSPRA	Oil Spill Prevention and Response Act

ABBREVIATIONS AND ACRONYMS (continued)

OVA	organic vapor analyzer
P2	Pollution Prevention
PCB	polychlorinated biphenyl
PE	performance evaluation
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
RECAP	Risk Evaluation Corrective Action Program
ROW	right-of-way
RPX	recovery pump exercise
RWIS	raw water intake structure
SAL	salinity

ABBREVIATIONS AND ACRONYMS (continued)

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
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

ABBREVIATIONS AND ACRONYMS (continued)

TPQ	threshold planning quantity
tpy	tons per year
TRI	Toxic Release Inventory
TSCA	Toxic Substance Control Act
TSS	total suspended solids
TX	Texas
UIC	underground injection control
UST	underground storage tank
USCG	United States Coast Guard
VOC	volatile organic compound
VWS	verification well study
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 for the U. S. Department of Energy (DOE) Strategic Petroleum Reserve (SPR). The SER, provided annually in accordance with DOE Order 5400.1, serves the public by summarizing monitoring data collected to assess how the SPR impacts the environment. The 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 CY 2000.

There was only one reportable oil and zero reportable brine spills during CY 2000. Although the total volume of oil moved (received and transferred internally) was approximately 9.9 million m^3 (62.6 million barrels), the total amount of oil spilled in CY 2000 was 9.4 m^3 (70 barrels contained on site). The longer-term trend for oil and brine spills has declined substantially from 27 in 1990 down to one in CY 2000 The oil spill was reported to the appropriate agencies and immediately cleaned up with no observed environmental impact.

Concern for the environment is integrated into daily activities through environmental management. The SPR's continuing efforts to improve the quality, cost effectiveness, and integration of environmental operations are consistent with the Code of Environmental Management Principles (CEMP). The SPR has incorporated CEMP's five environmental principles into an Integrated Safety Management System.

The SPR management and operating contractor implemented an Environmental Management system in accordance with the ISO 14001 international standard and was certified against the standard on May 19, 2000. In December, the SPR was selected by EPA as a charter member of the National Environmental Performance Track (NEPT) program. This program recognizes and rewards facilities that have environmental management systems and manage beyond regulatory requirements.

The SPR sites were inspected or visited on eight occasions by outside regulatory agencies (Environmental Protection Agency, Louisiana Department of Environmental Quality, and Texas Natural Resource Conservation Commission) during CY 2000. There were no findings associated with these inspections. Seven minor noncompliances were self-reported under state and federal discharge permits for all SPR sites during CY 2000, and no Notice of Violations (NOV) were received. The SPR West Hackberry site continues to adequately contain previous ground water contamination. This contamination resulted from the brine pond that was demolished during life extension activities and also from buried piping.

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 is not a hazardous waste treatment, storage, or disposal (TSD) facility. 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. Due to Exchange 2000 crude oil was placed into commerce, which initiated reporting requirements under the Emergency Planning and Community Right-to-Know Act (EPCRA) Section 313 for the Bayou Choctaw, Bryan Mound, and West Hackberry sites.

The SPR facilities operate under the National Pollutant Discharge Elimination System (NPDES). The Louisiana Department of Environmental Quality (LDEQ) has primacy for the Louisiana NPDES program (LPDES) while the Railroad Commission of Texas

(RCT), which has SPR jurisdiction in Texas, does not. Consequently, at this time, there is a dual federal and state discharge program only at the Texas sites. Also, each SPR site operates in accordance with a Pollution Prevention Plan prepared in accordance with a separately issued general permit for storm water associated with industrial activity.

The air quality programs at the SPR facilities are regulated by LDEQ for the Louisiana sites and the Texas Natural Resource Conservation Commission (TNRCC) for Texas sites. The effluent monitoring of hazardous and non-hazardous air pollutants at the SPR indicated that all the sites operated in accordance with air quality regulatory requirements during CY 2000.

The SPR met its drill and exercise requirements for CY 2000 under the Oil Pollution Act of 1990 through the National Preparedness for Response Exercise Program (PREP).

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 management and operations (M&O) contractor staff. Internal M&O contractor environmental assessments at the SPR sites during 2000 identified no Environmental Category II findings (Administrative) and three Environmental Category III findings (Best Management Practice). No findings indicated that there was any environmental degradation occurring as result of these findings. The DM Environmental Management System (EMS) was audited by a third party Registrar, Advanced Waste Management, Inc., for certification against the ISO 14001 standard. The DM EMS was certified in May 2000. A subsequent surveillance audit in November by the registrar confirmed DM's continued conformance with the ISO standard and DM's EMS. Surveillance audits will continue to be conducted every 6 months.

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. This characterization, discussion, and presentation illustrate the SPR's environmental performance measures program.

The Questionnaire/Reader Comment Form located inside the front cover of this document may be utilized to submit questions or comments to the originator for response.

1. INTRODUCTION

The purpose of this Site Environmental Report (SER) is to present a summary of environmental data gathered at or near SPR sites 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 a significant oil supply interruption.

By the end of 2000, the SPR consisted of four Gulf Coast underground salt dome oil storage facilities (two in Louisiana and two in Texas) and a project management facility (in Louisiana). A fifth site, Weeks Island in Iberia Parish, La, was decommissioned in November 1999, and its inventory was transferred to the Big Hill and Bayou Choctaw sites. Although the Weeks Island site is no longer an active storage facility, environmental surveillance activities are ongoing; therefore, the site is addressed in this report. At year's end, the SPR employed approximately 995 government and contractor personnel, excluding subcontract maintenance and construction personnel. Figure 1-1 is a regional map showing the relative location of SPR facilities.

The pipeline terminals used by the SPR are the Seaway (formerly ARCO) Terminal at Texas City, Texas; Seaway (formerly Phillips) at Jones Creek, Texas; Sunoco Pipeline Terminal at Nederland, Texas; Capline and LOCAP (through Sugarland Terminal) at Saint James, Louisiana; the Louisiana Offshore Oil Port (LOOP) for oil receipts only; the Lake Charles, Louisiana refineries through the Lake Charles Meter Station (LCMS) at the Equillon 22 inch pipeline connection, and the Unocal Terminal, at Nederland, Texas. The sites are also capable of distributing crude oil

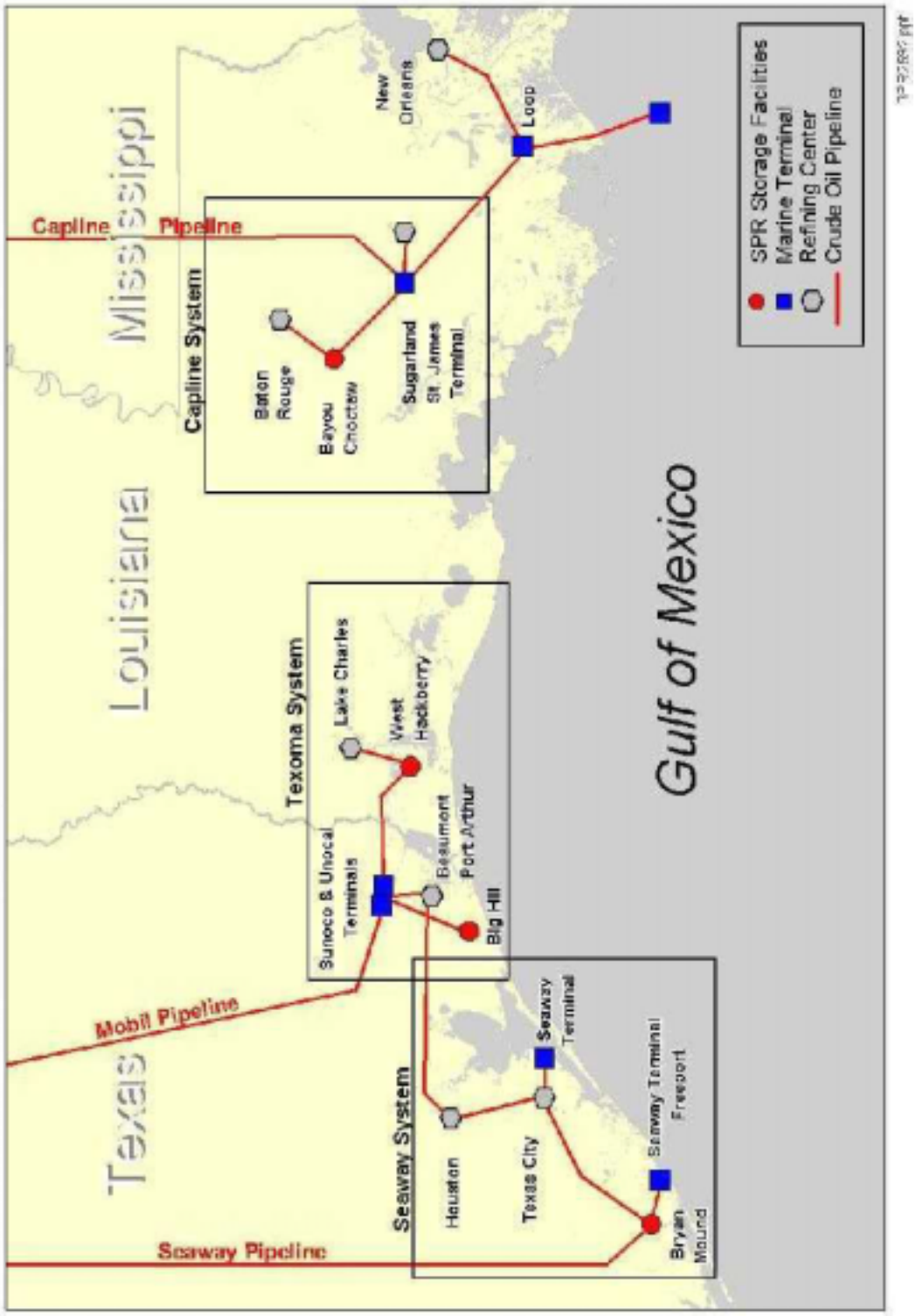


Figure 1-1. SPR Site Locations

through marine facilities at Seaway (Texas City and Freeport), Sunoco, Unocal, and Sugarland Terminals. Descriptions of the individual sites with photographs (Figures 1-2 through 1-6) follow. Section 5, Figures 5-1 through 5-5, provides the site-specific configurations.

Each site's crude oil storage capacity and 2000 year-end inventory is illustrated in Table 1-1.

Table 1-1. Site Storage Capacities/Inventories

Site	Capacity	Inventory (Dec 31, 2000)
BC	12.0 million m^3 (76 mmb)	11.3 million m^3 (71.3 mmb)
BH	27.0 million m^3 (170 mmb)	14.3 million m^3 (89.9 mmb)
BM	36.9 million m^3 (232.0 mmb)	33.6 million m^3 (211.5 mmb)
WH	35.3 million m^3 (222 mmb)	26.4 million m^3 (165.9 mmb)

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 a total of approximately 145 hectares (ha) (358 acres (ac)). The area surrounding the site is rural with a number of people living in small settlements along the nearby highways. The nearest communities are

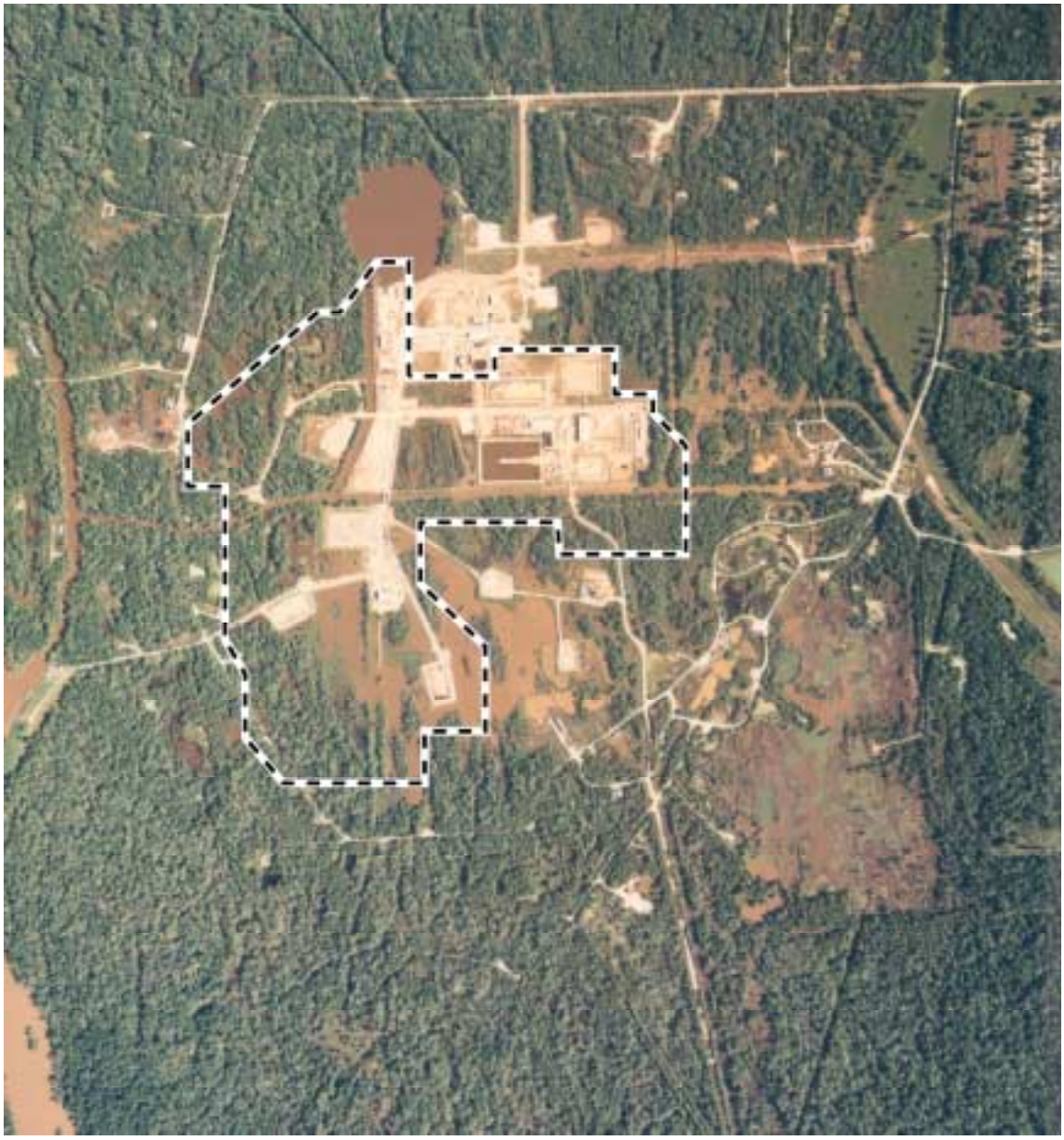


Figure 1-2. Bayou Choctaw SPR Site

Addis to the northeast and Plaquemine to the southeast. Baton Rouge, which is 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 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 in the area. 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 capacity is 12.0 million m^3 (76.0 mmb) of crude oil in six caverns, and the 2000 year-end inventory is 11.3 million m^3 (71.3 mmb). 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.

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 108 ha (266 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. Agricultural and pastureland uses around Big Hill are typical of the region.

Figure 1-3. Big Hill SPR Site

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, 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), 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 includes coyote, pocket gopher, rabbit, raccoon, rodents, snakes, turtle, and numerous upland game birds and passerines. Red-

bellied woodpeckers have excavated nesting cavities in several wooden power poles that lead to the Raw Water Intake Structure (RWIS).

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 27.0 million m^3 (170.0 mmb) of crude oil in 14 caverns, and the 2000 year-end inventory is 14.3 million m^3 (89.9 mmb). Appurtenant facilities include a raw water intake structure 8.4 km (5.2 mi.) south on the Intracoastal Waterway with a 107 cm (48 in) raw water intake 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. A connection on this pipeline links the 91 cm (36 in) line to the Unocal Terminal in Nederland, Texas. The brine pipeline has a series of 74 brine diffuser nozzles, eight of which are operational, dispersing and mixing brine with receiving seawater.

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 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. An 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 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. Tidally influenced 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 forming 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.

Water bodies surrounding Bryan Mound create a diverse range of habitats. 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 36.9 million m^3 (232 mmb) of crude oil in 20 solution-mined caverns. The 2000 year-end inventory is 33.6 million m^3 (211.5 mmb). Appurtenant facilities include a 61 cm (24 in) 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. The brine pipeline has a series of 17 brine diffusers, 12 of which are operational, dispersing and mixing brine with receiving sea water.

Figure 1-4. Bryan Mound SPR Site

1.4 WEEKS ISLAND

Weeks Island began drawing down oil stocks in November 1995 and transferring them to Big Hill and Bayou Choctaw, with final skimming and removal of residual oil, geologic stabilization, and decommissioning completed in November 1999. Post decommissioning environmental monitoring is ongoing. The property is pending disposal through General Services Administration (GSA).

The Weeks Island 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, supplied the greater part of the labor force. The major employment sectors within the parish are mineral production, manufacturing, construction, and agriculture.

The aboveground facility is shown in Figure 1-5. The site occupied approximately 158 ha (390 ac) both surface and sub-surface. 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.

Figure 1-5. Weeks Island SPR Site

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 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 that 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 (F&WS) under authority of the Endangered Species Act (ESA)

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.

1.5 WEST HACKBERRY

The West Hackberry (WH) site is located in Cameron Parish 40 km (25 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 and Cameron parishes 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 1-6). 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.) 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 which is referred to locally as Kelso Bayou, connect Black Lake to the Alkali Ditch and then to the Intracoastal Waterway. Black Lake Bayou continues wandering in a generally easterly direction from Black Lake, eventually connecting with the Calcasieu Ship Channel northeast of the town of Hackberry.

Figure 1-6. West Hackberry SPR Site

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 that 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. Chinese tallow, willow, various oak species, and numerous species of marsh and upland grasses dominate vegetation found on the site and in the surrounding. The marsh lands surrounding West Hackberry and its appurtenant facilities provide 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 that is currently removed from service. 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, wolf, bobcat, 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 capacity is 35.3 million m^3 (222.0 mmb) of crude oil in 22 solution-mined caverns, and the 2000 year-end inventory is 26.4 million m^3 (165.9 mmb). Brine is currently transported and disposed by injection into nine brine disposal wells. The 91 cm (36 in), 44.7 km (27.8 mi.) brine pipeline that goes to an area 17.4 km (10.8 mi.) south of Holly Beach, Louisiana, in the Gulf of Mexico is currently out of service. Raw water is brought to the site via a 107 cm (42 in), 6.6 km (4.2 mi.) pipeline from the Intracoastal Waterway. Crude oil is transported between the site and the Sunoco Terminal in Nederland, Texas, via a 107 cm (42 in) 69 km (43 mi.) crude oil pipeline or to the Equillon distribution line via a 91 cm (36 in) 22.5 km (14 mi.) crude oil pipeline.

1.6 NEW ORLEANS HEADQUARTERS

The project management 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 nearby warehouse capacity to augment project-wide equipment storage. Office and warehouse space is rented, not owned, by the Department of Energy.

2. COMPLIANCE SUMMARY

General

The 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 environmental federal, state, and many of the DOE standards that, in varying degrees, affect the SPR is found in Appendix A.

The DOE Office of Deputy Assistant Secretary for the Petroleum Reserves has overall programmatic responsibility for establishing the goals and objectives of the SPR. The Project Manager, Strategic Petroleum Reserve Project Management Office (SPRPMO), is responsible for implementing these goals and objectives including articulating an Environmental, Safety, and Health policy that is responsive to Departmental requirements. The DOE policy is applied to SPR operations through the current M&O contractor's Environmental Policy (Appendix B.)

The SPR has had an Environmental Protection Program since its inception and initial operation in 1978. The SPRPMO has assigned contractual responsibilities for implementation of the program to the current Management & Operating (M&O) contractor, DynMcDermott Petroleum Operations Company (DM). Additional responsibilities, as applicable, are assigned to the Architect-Engineering (A&E) contractor, S&B Infrastructure, Ltd., and SPR subcontractors. DM has been under contract to DOE since April 1, 1993.

The SPRPMO Environmental, Safety and Health (ES&H) division is responsible for development and oversight of ES&H programs and provides direction, technical guidance, and independent oversight to its prime contractors in the implementation of environmental programs and assessment of contractor performance.

It is the SPR's policy and practice to conduct operations in compliance with all applicable environmental requirements with the highest regard for the protection and

preservation of the environment. Compliance status in this year's report reflects compliance activities conducted by DOE and DM personnel.

The SPR has incorporated the following five broad Code of Environmental Management Principles (CEMP) into the implementation of its Integrated Safety Management (ISM) system:

1. management commitment;
2. compliance assurance and pollution prevention;
3. enabling systems;
4. performance and accountability; and
5. measurement and improvement.

Also, to further illustrate a commitment to excellence with regard to environmental management, the DynMcDermott Environmental Management System was certified against the ISO 14001 standard by a third party registrar on May 19, 2000. This EMS further reinforces conformance with CEMP and strengthens the environmental leg of the SPR ISM program.

A summary of the programs and procedures that presently make up the SPR environmental protection program are:

a. inspections, appraisals, assessments, and surveillance which provide regular monitoring to ensure compliance with regulatory and policy requirements;
b. a non-routine reporting program directed toward notification of oil, brine, or hazardous substance spills, or noncompliant effluent emissions, to identify the impact of such spills or emissions on property and the environment, and to comply with regulatory requirements;
c. a routine reporting program directed toward fulfilling self-reporting obligations under water, air, and waste permits and regulations;

d. a permit monitoring program to ensure compliance with all permit requirements and limitations, onsite operations and maintenance activities;
e. an environmental monitoring program to detect any possible influence the SPR might have on surface waters and ground waters on or near SPR sites and to provide a baseline in the event of an environmental upset;
f. a discharge procedure used by each site when releasing liquid from any authorized containment or control system;
g. an environmental training program to ensure that applicable personnel are aware of environmental laws and regulations, trained in oil and hazardous material spill prevention, and safe handling of hazardous waste;
h. a pollution prevention program which focuses on source reduction of wastes, recycling, affirmative procurement and proper disposal of all wastes produced on the SPR sites;
i. an underground injection control program mandated by the Safe Drinking Water Act (SDWA) to ensure sound operation of Class II underground wells/caverns for brine disposal or hydrocarbon storage to protect aquifers; and
j. regulatory review program for new environmental requirements.

Regulatory

The principal 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), the Texas Natural Resource Conservation Commission (TNRCC), and the Texas General Land Office (GLO). These agencies issue permits, review compliance reports, inspect site operations, and oversee compliance with regulations.

Executive Orders (E.O.)

The SPR follows and operates in conformance with numerous Executive Orders applicable to its operation. Four of the previously existing major orders are Federal Compliance with Pollution Control Standards (E.O. 12088), Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition (E.O. 13101), Greening the Government Through Efficient Energy Management (E.O. 13123), and Developing and Promoting Bio-based Products and Bio-energy (E. O. 13134). The President placed additional emphasis on pollution prevention and energy efficiency with the addition of two new "Greening the Government" Executive Orders in 2000. These are Greening the Government Through Leadership in Environmental Management (E.O. 13148) and Greening the Government Through Federal Fleet and Transportation Efficiency (E.O. 13149).

The SPR has responded to these and the associated DOE guidance and implementation memoranda through several initiatives in 2000. One of these was the reorganization of the DM Environmental Department to increase efficiency and place added emphasis on key program areas. This was accomplished, without headcount increase while filling three prior-year staff vacancies. By rearranging and consolidating job tasks by function into new job descriptions and titles, a dedicated Pollution Prevention Specialist position and an Environmental Management Systems Management Representative position were established and filled. All remaining tasks were proportioned among the revised water, waste and air specialist positions by function and expertise. This was successful based on the accomplishments described elsewhere in this report.

Another SPR initiative involved the formalization of a joint DOE/DM Pollution Prevention (P2)/Energy Efficiency (E2) Committee to efficiently integrate and coordinate the often overlapping P2 and E2 requirements of the new orders. This committee was deemed successful enough in 2000 to be extended into 2001.

DOE Orders/Directives

The SPR follows and operates in conformance with numerous DOE Orders applicable to its operation. Two of the major orders include General Environmental Protection Program (5400.1) and National Environmental Policy Act (NEPA) Compliance Program (451.1B). The orders establish some of the policies of the SPRPMO.

2.1 COMPLIANCE STATUS (JAN. 1, 2000 THROUGH DEC. 31, 2000)

Much of the SPR's compliance program deals with meeting regulations under the Clean Water Act. At the beginning of the year, the SPR sites had a total of 95 wastewater and storm water discharge monitoring stations that remained unchanged during this period.

The SPR is also required to meet many requirements under the Clean Air Act and the Safe Drinking Water Act and conduct waste management activities in accordance with the Resource Conservation and Recovery Act (RCRA) and state guidelines.

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

Clean Water Act (CWA)

The SPR sites comply with the CWA through permitting under the National Pollution Discharge Elimination System (NPDES) program, following the spill prevention regulations (SPCC), complying with the requirements of the Oil Pollution Act of 1990 (OPA), and complying with the wetlands usage program.

During 2000 the SPR submitted seven minor noncompliances with state and federal water discharge permits to regulatory agencies under

the permit self-reporting provisions. These noncompliances are discussed further in Sections 2.3 and 5.4.

NPDES permit renewal applications were submitted to EPA for all sites in 1993. EPA found these applications administratively complete in 1994 and directed the SPR to continue operating under the existing permits. Bryan Mound received a re-issued permit in 1995 and a renewal application was transmitted in the first quarter of 2000 as required for this permit. In Louisiana, NPDES permits have been replaced with equivalent state permits under LDEQ's recently acquired primacy for the program.

The SPR maintains a Louisiana statewide permit from LDEQ for discharge of hydrostatic test water that minimized permit filing fees and increases flexibility in support of site construction and maintenance activities.

Since 1994, in addition to maintaining federal coverage, the two Texas SPR sites have operated under authority granted with Texas Pollutant Discharge Elimination System (TPDES) permits issued by the RCT, who has not yet received primacy from EPA. This coverage imposes some additional testing, reporting, and other administrative duties beyond the parallel federal NPDES program.

Each SPR site complies with the Federal Spill, Prevention, Control, and Countermeasures (SPCC) regulations and in Louisiana with the state SPCC regulations by following a plan that addresses prevention and containment of petroleum and hazardous substance spills. All of the SPR spill plans are current in accordance with 40CFR112 and corresponding state regulations.

The SPR sites obtain permits from the U.S. Army Corp of Engineers and Coastal Zone Management representatives of the responsible state agencies whenever fill, discharge, or dredging occurs in a wetland. During 2000, five separate SPR projects occurred in jurisdictional wetlands in Louisiana and Texas requiring Corps of Engineers permit actions from the New Orleans and Galveston districts in addition to Coastal Zone Management approval (Department of Natural Resources – Coastal Zone Management in Louisiana and the General Land Office in Texas). Most of these projects resulted from work involving maintenance dredging and spoil placement at the raw water intake structures (RWIS) and pipeline or brine disposal line maintenance at the sites.

Oil Pollution Act (OPA) of 1990

SPR emergency programs, planning, and management are guided by OPA 90 regulatory standards for onshore storage facilities, pipelines, and marine terminal facilities. SPR site facility response plans have been developed to meet or exceed the requirement of OPA 90 and related state acts such as the Oil Spill Prevention and Response Act (OSPRA) in Texas. The plans have been approved by the appropriate federal and state regulatory agencies.

The National Preparedness for Response Exercise Program (PREP) has been adopted and incorporated into the SPR Emergency Management exercise program since 1994. SPR sites conduct emergency drills or hands-on training each quarter. A professional staff of emergency management exercise personnel from DM New Orleans conducts two equipment deployment exercises at each site annually. The annual site

exercises include the participation of public and regulatory/governmental agencies.

The SPR has adopted the National Interagency Incident Management System (NIIMS), the response management system required by the National Oil and Hazardous Substances Pollution Contingency Plan. SPR site and New Orleans response management personnel have been trained in the unified Incident Command System and a team of selected New Orleans personnel is available to support extended site emergency operations when needed.

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 Underground Injection Control (UIC) programs, which regulate underground hydrocarbon storage, related brine disposal, and oil field wastes. The SPR operates 21 saltwater disposal wells for the Louisiana sites. In Texas, brine disposal is done through brine pipelines that extend into the Gulf of Mexico. Some ancillary commercial disposal wells are used occasionally. The 2000 Annual Report Form OR-1 was completed and submitted on schedule to the LDNR. A similar reporting requirement does not exist for the Texas wells.

Historic ground water evaluations have indicated the presence of shallow ground water impacts from salt water at the Bryan Mound and West Hackberry sites. At Bryan Mound, more recently analyzed data suggests that pre-DOE use of unlined brine storage pits may have been a major contributor to the salt impacted ground water located east of the site's closed large brine storage pond. The West Hackberry site

negotiated a corrective action plan (CAP) for the leaking brine ponds with LDNR that was finalized in February 1992. Both of the separately permitted but contiguous brine ponds were replaced with aboveground tanks during 1998, which left only implementation of the approved closure plan, which was completed in November 1999. The CAP requires ground water recovery pumping, ground water monitoring, and submission of quarterly monitoring reports. During 2000, these ground water recovery reports continued and were submitted on time. In 1993, LDNR issued a requirement to continue to monitor certain wells for 30 years after closure of the three adjacent permanent anhydrite disposal pits in place. This requirement is currently met by the quarterly monitoring requirement for the brine pond CAP. In a parallel project, the approved brine storage pond closure plan was also implemented at Bryan Mound in 1999 and submissions of annual SERs as requested by the Pits and Ponds enforcement group of RCT has continued.

A program to establish baseline ground water conditions at Weeks Island prior to making post-decommissioning comparisons was initiated in 1996 and maintained as planned until November 1999 when it was converted to post-decommissioning “detection” monitoring. This activity established background information about the groundwater and then transitioned to long-term ground water monitoring assurance. The original program involving four wells, was expanded to include supplemental measuring points at the former east Fill-Hole location and a well located in the center of the former freezeplug established at the sinkhole No. 1 location. This sampling and testing program is referred to as Weeks Island Long-term (WILT) monitoring. Long-term ground water monitoring activities continued as required through 2000.

Clean Air Act (CAA)

The SPR sites comply with the applicable provisions of the CAA and State Implementation Plans (SIP) through permitting with the state agencies having primacy (LDEQ and TNRCC) and following applicable regulations. All of the SPR sites are located in attainment areas for all National Ambient Air Quality Standards (NAAQS) pollutants with the exception of ozone. West Hackberry is located in an attainment area for ozone; therefore, it is regulated by the Prevention of Significant Deterioration (PSD) permitting program. Big Hill, Bryan Mound, and Bayou Choctaw are located in non-attainment areas for ozone; therefore, the New Source Review (NSR) permitting program applies. None of the SPR sites are considered to be major sources during normal operations under PSD, NSR, Title III hazardous air pollutant, or Title V operating permit regulations. All of the facilities operate in accordance with the provisions of the applicable state air permits.

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 and similar Louisiana requirements. This multimedia document consolidates these regulatory agency requirements with the more general DOE Order 5400.1 required Pollution Prevention Plan, and the related Waste Minimization and Solid Waste Management Plans.

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. The SPR completed DOE Phase I and II reports (similar to CERCLA's Preliminary Assessment and Site Investigation process) 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 Planned (NFRAP) 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.

SPR sites are required to report under EPCRA Section 313, by submitting Toxic Release Inventory (TRI) Form R when reporting thresholds, defined by emissions from crude oil placed in commerce are exceeded. Specifically when crude oil is placed in commerce, it is considered to be repackaging of hazardous substances and must be reported. The SPR will submit EPCRA 313 (Form R) reports for CY 2000 for the Bayou Choctaw, West Hackberry, and Bryan Mound sites. Sufficient volumes of oil (2 million bbls sour crude, 25 million bbls sweet crude, and 3 million bbls sour crude; respectively) were introduced into commerce during Exchange 2000, thereby exceeding the threshold limit for benzene and hexane requiring reporting. An EPCRA (Form R) report for CY 2000 will not be submitted for the Big Hill site because it was not part of Exchange 2000 and did not exceed the threshold limit for reporting.

Resource Conservation and Recovery Act (RCRA)

Hazardous wastes generated on the SPR are managed in strict compliance with state and EPA hazardous waste programs. The EPA has delegated the hazardous waste program to LDEQ in Louisiana. State jurisdiction of SPR Texas sites fall under the RCT in Texas, which has not yet received delegation. Therefore, the SPR complies with both EPA and RCT regulations in Texas.

The SPR sites do not routinely generate large quantities of hazardous waste and therefore, are typically classified 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 on site and therefore, are not RCRA-permitted treatment, storage, and disposal (TSD) facilities. Each site has 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 2000.

SPR non-hazardous wastes which are associated with underground hydrocarbon storage activities are regulated 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, such as office wastes, are managed in accordance with state solid waste programs. The appropriate waste

management strategy is based on the results of waste stream characterization.

In 2000, the SPR manifested hazardous waste from the Bayou Choctaw, Bryan Mound, Big Hill, and West Hackberry sites to an offsite hazardous waste incinerator. The hazardous wastes consisted primarily of paint solvent and solids and laboratory wastes. The SPR submitted notification forms of regulated waste activity to the EPA for all SPR sites. In 2000, all Louisiana sites averaged hazardous waste generation rates well within the Small Quantity Generator (SQG) limits. In Texas, the Conditionally Exempt Small Quantity Generator (CESQG) status was exceeded once at Bryan Mound and not exceeded at Big Hill during CY 2000. The Bryan Mound site exceeded the CESQG status due to the mixing of off specification paint, but resumed CESQG status the remainder of CY 2000.

The DOE and M&O contractor's corporate policies stress the SPR's commitment to waste management and environmental protection (Appendix B).

Toxic Substances Control Act (TSCA)

Friable asbestos is not present at SPR sites. Small amounts of nonfriable asbestos usually in the form of seals or gaskets are disposed of locally as they are taken out of service, in accordance with applicable solid waste regulations.

No liquid-filled electrical equipment or hydraulic equipment currently used on the SPR has been identified as PCB equipment or PCB contaminated under TSCA.

National Environmental Policy Act (NEPA)

Two thousand three hundred and eighty four design reviews, scopes of work, and purchase requests were evaluated for NEPA review in 2000. Out of the 2,384 documents, only 72 required a NEPA review. None of these projects adversely affected any environmental or culturally sensitive resources, such as structures of historic, archeological, or architectural significance or any threatened or endangered species or their habitat. Also, no environmentally sensitive areas or wetlands were adversely impacted as a result of these actions. All of these NEPA reviews resulted in categorical exclusions that did not require further action. No Environmental Impact Statements (EIS) were initiated during CY 2000.

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

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

The SPR encompasses 841 ha (2,078 ac) and used approximately 5,094 kg (11,233 lbs.) of herbicides and pesticides to control weeds, insects, and rodents during 2000. Pesticides were applied on an as needed basis in an integrated management fashion.

Endangered Species Act (ESA)

In a continuing effort to minimize disruption and provide suitable habitat to the existing migratory birds at SPR sites, bird-nesting areas are closed or otherwise protected during critical periods to prevent disturbance as a result of site operations. The F&WS are consulted in regard to appropriate actions taken that may affect migratory birds or threatened and endangered species. For example, repairs to power

poles are scheduled so as not to interfere with nesting and fledging activities.

As part of the conditional coverage obtained through the re-issued Multi Sector General Permit (MSGP), a required signatory on each Notice of Intent (NOI), precipitated a formal review of site specific potential endangered species impacts. This was accomplished prior to affixing signatures to the NOIs and involved an update/comparison step with original Environmental Impact Statements (EISs), with the current ESA lists, and a generalized evaluation or assessment of any potential impacts relating to or resulting from SPR storm water "sheet flow" run-off. No potential impacts were discerned.

National Historic Preservation Act (NHPA)

No site activities performed in 2000 required coordination with State Historical Preservation Offices. This review activity included the required similar NHPA review step for submission of the MSGP Notices of Intent as detailed in the ESA section above. No places on or eligible to the National Register of Historic Places are located on or adjacent to SPR sites, with the exception of the Bryan Mound SPR site which is located on a Texas state Historical Place recognized since 1968 for its significance to the sulfur mining industry and long-term development of the nearby town of Freeport.

Federal Facilities Compliance Act (FFCAct)

During CY 2000 none of the SPR sites generated any waste considered to be hazardous and radioactive (mixed waste) and therefore, this act does not apply to the SPR.

Atomic Energy Act of 1954

In compliance with the Atomic Energy Act of 1954, radioactive source materials (two nuclear density gauges) located at West Hackberry were tested in accordance with the general license under the manufacturer (Texas Nuclear). Leak testing was initiated on these remaining two sources in 1999 and successfully completed in 2000 verifying the structural integrity of the gauges and the containment of these sources. The gauges have been removed from West Hackberry and there are currently no radioactive material sources on site on the SPR.

Migratory Bird Treaty Act

The SPR sites demonstrated compliance with the Migratory Bird Treaty Act by implementing measures to preserve bird nesting areas and train site personnel on wildlife rescue and rehabilitation. In bird nesting areas, maintenance or construction activities were only conducted as necessary and after the nesting periods were completed.

Executive Order (E.O.) 11988 "Floodplain Management"

Since the inception of the SPR; compliance with E. O. 11988 has been maintained by complying with NEPA requirements, identifying potential environmental impacts, and obtaining permits through the COE and state agencies prior to any construction, maintenance, rehabilitation, or installation of structures and facilities.

Executive Order (E.O.) 11990 "Protection of Wetlands"

The measures that illustrate the SPR compliance with E. O. 11988 are also used to comply with E. O. 11990 and ensure that any practicable steps to minimize harm to wetlands are identified and taken.

Executive Order (E.O.) 13101, Greening the Government Through Waste Prevention, Recycling and Federal Acquisition

E.O. 13101 superceded and replaced EO 12873, but it retained the intent of the latter and strengthened its implementation through enhanced management requirements. One of the key programs in E.O. 13101 is affirmative procurement; the procurement of EPA designated items (36 in all) that contain recovered material. EPA proposed an additional 18 items in 2000 bringing the total to 54. The SPR is committed to meeting the Secretary of Energy's goal of 100 percent and has shown considerable progress during 2000, restricting its procurement and tracking processes for purchase of affirmative procurement materials. Affirmative Procurement success was 95 percent for the last quarter of 2000. This is a significant improvement over the last quarter of 1999 (74 percent).

Executive Order (E.O.) 13148 "Greening the Government through Leadership in Environmental Management"

On April 21, 2000, Executive Order 13148 superseded the pollution control plan requirements of E.O. 12088, "Federal Compliance with Pollution Control Standards. In accordance with all applicable pollution control standards, the SPR complies with E.O. 13148. These requirements were satisfied through implementation of the SPR Pollution Prevention Plan. The plan includes the SPR Pollution Prevention and Energy Efficiency Leadership Goals required by several executive orders and DOE memoranda, which include hazardous and non-hazardous waste reduction.

Between 1994 and 2000 the SPR reduced hazardous waste generation by 82.6 percent, down to 1.3 mt (1.4 tons). This reduction is

continuing into 2001. The reduction is due, in part, to increased awareness and waste minimization efforts on the part of all SPR employees.

The New Orleans site met the 2000 site hazardous waste goal. All sites met their 2000 non-hazardous sanitary waste goals.

The SPR strives to eliminate or reduce all SPR waste streams at the source whenever possible. The SPR identified paint waste and paint-related wastes as primary contributors to hazardous waste generation numbers. These two waste streams also periodically contributed to an SPR facility exceeding minimum regulatory waste generation limits. A continuous quality improvement team of DM maintenance, property, and environmental personnel combined paint product substitution, process modification, and waste minimization procedures to significantly reduce and practically eliminate SPR paint waste and paint-related wastes. The success of these efforts also helps DM meet future P2 goals and consistently achieve DOE Work Authorization Directives.

The amount of office paper recycled during CY 2000 exceeded 125 percent of the amount purchased in 2000. This is a 31 percent increase in recycling over the CY 1999 performance value (94 percent). A decrease in paper purchased (23,239 lbs. less, or an 18 percent decrease in CY 2000) combined with an increase in paper recycled (10,907 lbs. more, or a nine percent increase in CY 2000) indicates progress in increasing source reduction and recycling effort.

For the third consecutive year, the Texas General Land Office presented the SPR Big Hill site with the OSPRA Award for Excellence

in Oil Spill Preparedness, Prevention, and Response. These awards recognize organizations that excel in their preparedness and prevention efforts. Big Hill is the only facility to receive this award three times (1998 - 2000) since the award's inception.

As active members in the Brazoria County Oil Spill Subcommittee of the LEPC, DM and DOE at Bryan Mound shared the OSPRA Award for Environmental Excellence (Category 6) which was awarded during 2000 by the Texas General Land Office.

In CY2000, the SPR received a Certificate of Achievement from the White House for the Closing the Circle competition for it's Model Facility Integrated Pollution Prevention Program. This certificate recognizes the SPR's institutionalized efforts that produced $4 million in savings and avoided 572 tons of hazardous and 12,180 tons of solid waste during 1999. DOE Headquarters selected this application from the pool of pollution prevention award applications to represent DOE nationwide in the Model Facility category. The Closing the Circle is sponsored by the White House with the winner selected from applications representing the entire federal government.

Pollution prevention is integrated into the SPR mission through policies, procedures, performance measures, and standards. This was accomplished by updating the goals and training; computerizing the regulatory tracking; self-assessments; and continual improvement priority planning. Pollution prevention is also integrated into the Behavioral Safety Program in New Orleans by including pollution prevention behaviors in the critical behavior inventory list. To heighten employee pollution prevention awareness and behavioral safety, observers "observe" the work force and note defined pollution

prevention behaviors providing positive reinforcement for beneficial behaviors.

During 2000, DM organized a local SPR sponsorship of the Federal Environmental Executive National Art Contest as part of an initiate to involve children in pollution prevention. SPR-sponsored children won two of the 14 prizes available nationwide to the many thousands of children of all federal employees and contractors. DM arranged local prizes and certificates of participation for all SPR participants in this highly successful outreach initiate, and the two winners have had their art featured in a 2001 calendar.

Of over 2,700 documents that received pollution prevention review during 2000, 2,362 were purchase requests that were screened against the SPR Qualified Products List to assure that products purchased met environmental criteria established by the list. Products and information provided by the list help minimize specific EPA recognized toxic chemicals and potential hazardous waste, and encourage the purchase of materials containing recycled content.

The requirements of E. O. 13148 and SPR consolidated P2/E2 initiatives required by E. O. 13123 “Greening the Government Through Efficient Energy Management” is delineated in Table 2-1.

Table 2-1 SPR P2 and E2 Leadership Goals

	SPR POLLUTION PREVENTION AND ENERGY EFFICIENCY LEADERSHIP GOALS	ACTION TO REACH TARGETED GOALS
1	Reduce Hazardous Waste from routine operations by 90 % by 2005, using a 1993 baseline.	• A CQI team was initiated in Dec. 1999 to review elimination or reduction of paint waste across the SPR. Their work continued throughout 2000. • Follow through on the CQI Activities. • The Pollution Prevention Specialist position was consolidated from various other job descriptions, recruited and filled. • Awareness of Pollution Prevention was increased and integrated with Energy Efficiency through the E2P2 committee. • 1993 baseline = 5390 lbs.
2	Reduce releases of toxic chemicals subject to Toxic Chemical Release Inventory (TRI) reporting by 90% by 2005, using a 1993 baseline.	TRI reporting is not applicable since the reporting occurs only during the SPR crude oil movement as required to meet SPR mission objectives. In the baseline year of 1993, there was no TRI Report
3	Reduce sanitary waste from routine operations by 75% by 2005 and 80% by 2010 using a 1993 baseline.	• A continual effort was made to further reduction through implementation of Goal 4. • Continued to recycle paper and planned expansion of New Orleans program to include cardboard, cans, plastic and other mixed papers. • 1993 baseline = 6,816,508 lbs.
4	Recycle 45% of sanitary waste from all operations by 2005 and 50 percent by 2010.	Continued to evaluate and determine the waste streams to aid in the development of a strategy to implement recycling. Market price is the determining factor. The total amount of sanitary waste generated and recyclable is reported monthly.
5	Reduce waste resulting from cleanup, stabilization, and decommissioning activities by 10 % on an annual basis.	Not Applicable – cleanup, stabilization, decommissioning activities are not ongoing activities at the SPR. Site remediation is only transient.

6	Increase purchases of EPA-designated items with recycle content to 100%, except when not available competitively at reasonable price or that do not meet performance standards.	The Affirmative Procurement (AP) procedure is to ensure the purchase of AP items unless there is written justification that the product is not available competitively, within a reasonable time frame, does not meet appropriate performance standards, or is available only at an unreasonable price. AP items are included on the Qualified Product List that is used for daily purchases.

Table 2-1 SPR P2 and E2 Leadership Goals (continued)

	SPR POLLUTION PREVENTION AND ENERGY EFFICIENCY LEADERSHIP GOALS	ACTION TO REACH TARGETED GOALS
7	Reduce energy consumption through life-cycle cost effective measures by: • 40% by 2005 and 45% by 2010 per gross square foot for buildings, using a 1985 baseline. • 20% by 2005 and 30% by 2010 per gross square foot, or per other unit as applicable, for laboratory and industrial facilities, using a 1990 baseline.	Audits were performed on New Orleans buildings which comprise this measure during FY 2000. Efforts were identified to implement audit recommendations regarding lighting, building envelope, temperature controls, and heating, ventilating, and air conditioning (HVAC) systems and otherwise improve the energy efficiency and employee comfort of the buildings continues. As the New Orleans buildings are all leased, there is a limited performance period which limits life cycle cost analysis and which also may limit achieving a 40% reduction by FY 2005. The electrical power consumption of the field sites (as measured in kilowatt-hours) comprises this measure. The power consumption of the field sites will be far more dependent on the operating mode of the SPR (the requirement to drawdown oil, fill with oil, redistribute oil, or conduct operational tests) than on the effort to improve the efficiency of the equipment and the buildings. Nevertheless, efforts to improve the efficiency of the process and the buildings continues.

8	Increase the purchase of electricity from clean energy sources: a) Increase purchase of electricity from renewable energy sources by including provisions for such purchase as a component of our request for bids in 100% of all future DOE competitive solicitations for electricity. b) Increase the purchase of electricity from less greenhouse gas-intensive sources, including, but not limited to, new advanced technology fossil energy systems, hydroelectric, and other highly efficient generating technologies.	The SPR is served by two commercial electrical power utility companies, Entergy (Bayou Choctaw, West Hackberry, and Big Hill) and Reliant Energy (Bryan Mound). There are currently no other options for purchase of power in the region. The SPR purchases power from these companies in accordance with tariffs which are approved by either the Public Service Commission of Louisiana or the Public Utility Commission of Texas, and neither Entergy nor Reliant has available tariffs for purchase of "Green" power. Future purchases of electrical power will include provisions for Green Power should such power become available.

Table 2-1 SPR P2 and E2 Leadership Goals (continued)

	SPR POLLUTION PREVENTION AND ENERGY EFFICIENCY LEADERSHIP GOALS	**ACTION TO REACH TARGETED GOALS**
9	Retrofit or replace 100% of chillers greater than 150 tons of cooling capacity and manufactured before 1984 that uses class I refrigerants by 2005.	Not applicable as the SPR does not have chillers greater than 150 tons capacity.
10	Eliminate use of class I ozone depleting substances by 2010, to the extent economically practicable, and to the extent that safe alternative chemicals are available for DOE class I applications.	The DM Halon Disposition Report – Update (dated June 1999) details plans to eliminate Halon at the SPR sites as opportunities arise. This will be completed by 2010. There are no other ozone depleting substances on the SPR.

11	Reduce greenhouse gas emissions attributed to facility energy use through life-cycle cost-effective measures by 25% by 2005 and 30% by 2010, using 1990 as a baseline.	Not Applicable. The only greenhouse gas emissions attributed to facility energy use is from emergency equipment (diesel generators, diesel pumps). They are only used for power generation during an emergency, which is considered an upset condition and not applicable.
12	Reduce our entire fleet's annual petroleum consumption by at least 20% by 2005 in comparison to 1999, including improving the fuel economy of new light duty vehicle acquisitions, and by other means.	Presently, GSA provides all light duty vehicles used on the SPR. As new vehicles are needed, efforts will be made to find compact and subcompact vehicles for replacement. This will reduce fuel consumption. Evaluation is underway to reduce the large 4-wheel drive vehicles to ½ ton, increasing fuel economy. In addition, light duty gasoline utility carts are being replaced by electric carts at all sites, further reducing fuel consumption and air emissions.
13	Acquire annually at least 75% of light duty vehicles as alternative fuel vehicles (AFV), in accordance with the requirements of the Energy Policy Act 1992.	An evaluation of potential replacement AFV's has been conducted and those that will use mixed fuel (gasoline and LPG2) is underway. If successful, these will be the standard for all replacements of light duty pick up trucks in the future.
14	Increase usage rate of alternative fuel in departmental alternative fuel vehicles to 75% by 2005 and 90% by 2010 in areas where alternative fuel infrastructure is available.	The use of alternative fuel in vehicles will increase as the alternative fuel infrastructure expands to include the sites and New Orleans areas.

Membership in EPA's Performance Track Program

In mid-2000 EPA implemented the Performance Track Program in response to E.O. 13148. The program promotes and recognizes outstanding environmental management performance in agencies and facilities. The SPR applied for membership soon after the program was announced and was accepted as one of 228 charter members nation-wide. Member facilities are top environmental performers who systematically manage environmental responsibilities, reduce and prevent pollution, and are good corporate neighbors. They have working environmental management systems, are committed to continuous improvement, public outreach, and performance reporting, and have achieved a record of sustained compliance with environmental regulations.

In recognition of their environmental achievements, Performance Track members are rewarded with recognition, access to state of the art information, and regulatory and administrative flexibility.

In its application, the SPR committed to making the following four improvements over the next three years:

1) Reduce hazardous solid waste by 960 lbs.
2) Reduce storage/usage of Halon 1301 by 1356 lbs.
3) Reduce solid waste through increased recycling by 11.6 % (based on CY 2000 generation figures)
4) Reduce emissions of greenhouse gases, VOCs NOX, SOX, PM and CO through elimination/replacement of 16 gasoline fleet vehicles.

These improvements will be tracked as objective and targets in the EMS, beginning in CY 2001.

E.O. 13148 also replaced E.O. 12856, "Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements" This order was revoked and replaced in April of 2000 by Executive Order 13148, Greening the Government Through Leadership in Environmental Management. Tables 2-2 through 2-6 provide a summary of 2000 SARA reporting for each site. Offsite SPR pipelines containing crude oil were reported separately from SPR sites (Tables 2-7 and 2-8). There were no extremely hazardous substances in excess of the Threshold Planning Quantity (TPQ) in 2000, negating the possibility of reportable releases.

EPCRA, Section 313, regulations require applicable facilities to complete an annual TRI Form R Report. These regulations now apply to facilities with Standard Industrial Classification (SIC) Code 5171 that process, or otherwise use any listed toxic chemical in quantities above specific threshold limits in a calendar year. EPCRA section 313 requires SPR sites, SIC code 5171, to report when placing sufficient quantities of product in commerce, effective 1998.

DOE ORDER 435.1, “Radioactive Waste Management”

There are no radioactive processes or radioactive wastes located at any of the SPR sites and therefore this act does not apply.

DOE ORDER 5400.5, “Radiation Protection of the Public and the Environment”

There are no radioactive processes or radioactive wastes located at any of the SPR sites.

Table 2-2. 2000 Louisiana SARA Title III Tier Two Summary at Bayou Choctaw

Chemical Name (Category)	* Max Daily Amt (lbs.)	Location
Bromotrifluoromethane	1,000 - 9,999	Building 401
Crude oil, petroleum	> 1 billion	Site tanks, piping, and underground caverns. Flammable Storage Building
Diesel fuel #2	10,000 - 99,999	Emergency generator fuel tank, Property tank # 2, Workover rig, Flammable storage cabinet, High Pressure Pump Pad
FC-203CE Lightwater Brand AFFF	10,000 - 99,999	Foam storage building
FC-203CF Lightwater Brand AFFF	1,000 – 9,999	Foam deluge building
Flogard POT805	100 – 999	Potable water building
Gasoline	10,000 - 99,999	Property tank # 1, Flammable storage cabinet, High pressure pump pad
Motor Oil	1,000 - 9,999	Workover rig, Benchstock, Flammable storage building, Flammable storage cabinet, High pressure pump pad, Maintenance bay, Property flammable cabinet, Workover rig yard
Monsanto Rodeo Herbicide	100 – 999	Flammable storage building, Property warehouse
Paints, flammable or combustible	100 – 999	Flammable storage building, Workover rig yard
Red River 90 Spray Adjuvant Herbicide	100 – 999	Flammable storage building, Property warehouse
Sanuril 115 Eltech	100 – 999	Foam storage building
Sodium Chloride	1,000 - 9,999	Potable water building
Labbco Sodium Hypochlorite Solution	100 – 999	Potable water building, Building 413

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

Table 2-3. 2000 Texas SARA Title III Tier Two Summary at Big Hill

Chemical Name (Category)	* Max Daily Amt (lbs.)	Location
Ammonium Bisulfite 50% solution	10,000 - 99,000	Brine pad, Tank BHT-2, Raw water injection pad
Crude oil, petroleum	> 1 billion	Site tanks, piping, and underground storage caverns. BHT-6, BHT-7, BHT-10
Diesel fuel #2	10,000 - 99,999	BHT-11, Big Hill Diesel Tank, Raw Water Injection Structure, BHT-4, Tool Trailer and Field stations building 803, BHSE-46-1
FC-600 3M Lightwater ATC/AFFF	10,000 - 99,999	Boat Shed, Crude Oil Pad, Foam Building (BHT-16), Fire Bay Flammable Cabinet, Fire Truck
Gasoline	10,000 - 99,999	Big Hill Diesel Tank
Motor oil	10,000 - 99,999	Equipment Pad, I&C Cal Shop, Laydown Yard, Property Cabinet #2, Drum Storage, Raw Water Intake Structure, Benchstock, Flammable Storage Building 817, Tool Trailer and Field Stations Building 803, Crude Oil Lab, Environmental Lab

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

Table 2-4. 2000 Texas SARA Title III Tier Two Summary at Bryan Mound

Chemical Name (Category)	*Max Daily Amt (lbs.)	Location
Crude oil, petroleum	> 1 billion	Site Tanks, Piping, and Underground Caverns. Building 243, Crude Oil Retain Storage
Diesel fuel #2	10,000 - 99,999	Diked Area, Fuel Tank Area
FC-203CF 3M Light Water Brand AFFF	100,000 - 999,000	AF3 Fixed systems, Storage and Mobil units
Gasoline	10,000 - 99,999	Fuel Tank Area, Diked area

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

Table 2-5. 2000 Louisiana SARA Title III Tier Two Summary at New Orleans Warehouse

Chemical Name (Category)	*Max Daily Amt (lbs.)	Location
Antifreeze compound	1,000 – 9,999	West Wall of Warehouse
Diesel fuel #2	10,000 – 99,999	Test pad
Motor Oil	10,000 – 99,999	Fire Cabinet, West Wall of Warehouse

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

Table 2-6. 2000 Louisiana SARA Title III Tier Two Summary at West Hackberry

Chemical Name (Category)	*Max Daily Amt (lbs.)	Location
Ansulite 3% AFFF AFC-3-A	10,000 – 99,999	Foam Storage Building, Site Fire System
Bromotrifluoromethane	1,000 - 9,999	Building 301
Crude oil, petroleum	> 1 billion	Warehouse E, Site tanks, piping, underground caverns, Lake Charles meter station
Diesel fuel #2	10,000 - 99,999	Fuel Pump Tank, Workover Rig, River Valley Electric Laydown Yard, Emergency Generator Diesel Tank, Fire Pump Tank, Maintenance Laydown Yard
FC-600 3M Lightwater Brand ATC/AFFF	10,000 - 99,999	Foam Storage Building, Site Fire System
Gasoline	10,000 - 99,999	Fuel Pump Tank, Maintenance Laydown Yard
Monsanto Rodeo Herbicide	100 – 999	Flammable Storage Building
Motor Oil	10,000 - 99,999	Workover Rig, Flammable Storage Building, Slop Oil Pad, Flammable Storage Cabinet, Environmental Lab, Warehouse D, Workover Rig Yard, OCB 5KB Substation
Paints, flammable or combustible	1,000 – 9,999	Flammable Storage Building, Workover Rig Yard
Purple K Dry Extinguishing Agent	1,000 – 9,999	Building 303
Silica, crystalline-quartz	1,000 - 9,999	Paint Laydown Yard

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

Table 2-7. 2000 Louisiana SARA Title III Tier Two Summary in Offsite Pipelines

Chemical Name (Category)	*Max Daily Amt (lbs.)	Location
Crude oil, petroleum	50,000,000 - 99,999,999	Off-site pipelines in Calcasieu Parish, LA (West Hackberry)
Crude oil, petroleum	10,000,000 - 49,999,999	Off-site pipelines in Cameron Parish, LA (West Hackberry)

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

Table 2-8. 2000 Texas SARA Title III Tier Two Summary in Offsite Pipelines

Chemical Name (Category)	*Max Daily Amount (lbs.)	Location
Crude oil, petroleum	50,000,000 – 99,999,999	Off-site pipelines in Brazoria County, TX (Bryan Mound)
Crude oil, petroleum	10,000,000 – 49,999,999	Off-site pipeline in Galveston County, TX (Bryan Mound)
Crude oil, petroleum	50,000,000 – 99,999,999	Off-site pipeline in Jefferson County, TX (Big Hill)
Crude oil, petroleum	10,000,000 – 49,999,999	Off-site pipeline in Orange County, TX (West Hackberry)

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

2.2 MAJOR ENVIRONMENTAL ISSUES AND ACTIONS

Gassy Oil

When SPR crude oil goes to surface facilities, the methane gas (non-regulated) that has migrated from the salt in the salt dome can strip and release regulated pollutants (VOC) into the atmosphere. Also, the methane and high crude oil temperature can elevate the true vapor pressure (TVP) to a point where it is above the regulatory limits for storage in floating roof tanks potentially affecting some of the SPR sites and the receiving private terminals. The SPR first confirmed this phenomenon in 1993. 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. The SPR procured, installed, and began operating equipment to separate and

collect the gas. This operation was started during 1995 and completed during 1997. Due to the amount of gas regained, the DOE and DM began readdressing the gassy oil phenomenon during 1999, planning for a second degas cycle of the next several years. A conceptual design of the new degas units was developed in 2000. A performance specification to solicit a contractor for the final design, construction, and installation of the new degas units was also developed in 2000.

St. James Soil Clean-Up

A due diligence inspection was conducted at St. James Terminal in February 1997 as part of the Shell Pipeline activities for leasing the site. Two small (<1 acre) areas contained within the main site's property boundary exhibited indications of free-phase petroleum product in the shallow subsurface. Each of the two affected areas were associated with routine bulk crude oil handling facilities (a booster pump station and an on site pipeline pig trap) that had previously produced minor releases. The area of contamination at the booster pump area is approximately 342 square feet and the pig trap area was approximately 100 square feet.

Soil at the pig trap area was removed, and DOE received LDEQ's approval for closure of the area. Mechanical bailing at the booster pump station area, via three geotechnical boreholes, was implemented due to the impracticability of excavation

Product recovery operations began in July 1997 and approximately 25 gallons of an oil and water mixture was removed from all three boreholes over a two-month period. As of the end of 2000 a total of an additional 3.78 gal of oil was removed. Oil volumes removed per bailing event are usually between 0.05 to 0.1 gal indicating that almost all of the free phase oil has been removed.

In September 1999 LDEQ verbally agreed to a proposed bioremediation program allowing DOE to apply a bioremediation agent to the contaminated area. Application began in early 2000, followed by confirmation sampling. RECAP parameters exceeded the RECAP standards and subsequently additional bioremediation material was applied to the contaminated site followed by confirmation sampling. Results indicated lower numbers, some below RECAP standards.

Exchange 2000

In response to the direction from the President, the DOE agreed to exchange 30 mmbs of crude oil from Bryan Mound, West Hackberry, and Bayou Choctaw with nine companies who submitted the best offers. The companies agreed to return 31.56 mmbs of crude oil to the reserve during the latter part of 2001. The purpose of this action was not only to help stabilize the volatile domestic oil prices with a secondary benefit of increasing the inventory of the reserves.

Heating Oil Exchange

The President established the Heating Oil Reserve as an interim measure to ensure that heating oil supplies in the Northeast U.S. will be available through the winter months. As part of the exchange, the SPR delivered 2.8 mmbs of West Hackberry crude oil to the heating oil supply and storage contractors.

International Organization for Standardization (ISO 14001 Certification)

On May 19, 2000 the DM environmental management system was evaluated by an independent registrar and found in conformance with

the International Organization for Standardization 14001 standard. The SPR is the only wholesale petroleum facility so recognized.

National Environmental Achievement Track (NEAT)

The U.S. Environmental Protection Agency recognized the DM and SPR Environmental program as one of the premier programs in the nation. No other Fossil Energy facility and only four other DOE facilities were recognized among 288 facilities nationwide. Recognition was in the form of charter membership in the National Environmental Achievement Track program for all five SPR facilities.

DOE On-Site Appraisal

DOE SPRPMO On-Site Management Appraisal teams conduct formal visits to every SPR site annually. The teams meet with site contractor management staff and audit environmental practices, survey performance indicators, and review the audit findings with the contractor staff during exit briefings. Of the 13 environmental issues identified during 2000, all were resolved within 45 days of notification and none of these were associated with significant environmental impacts.

M&O Contractor Self-Assessment

All site and New Orleans environmental groups conducted annual compliance self-assessments in accordance with the self-assessment plan for 2000. Self-assessments are reviewed annually for adequacy through the DM Independent Assessment (DA) program. The DA program was also employed to conduct an ISO 14001 certification pre-assessment of the DM environmental management system (EMS). Independent Assessment findings (compliance and EMS related) are

tracked to completion in the Consolidated Corrective Action Plan (PMO) and the Action Tracking System (contractor).

There were three compliance and 32 EMS pre-assessment findings during 2000. The compliance findings were classified as Category III, minor deviations from environmental policies and regulations. The EMS pre-assessment findings (called "non-conformances") were all classified as Category II and were corrected prior to the certification audit. Table 2-9 is a tabulation of 2000 findings by site.

Table 2-9. 2000 M&O Contractor Independent Assessment Environmental Findings

Site	Category I (compliance)	Category II (compliance)	Category III (compliance	Category II (EMS)
Bayou Choctaw	0	0	0	5
Big Hill	0	0	1	4
Bryan Mound	0	0	2	4
New Orleans	0	0	0	14
West Hackberry	0	0	0	5

Regulatory Inspections/Visits

There were eight inspections or visits by regulatory agencies to SPR facilities in 2000. There were no findings associated with any of these inspections. Table 2-10 is a summary of the inspections/ visits.

Table 2-10 Summary of Regulatory Inspections/Visits During 2000

Site	Regulatory Agency	Remarks
BC	LDEQ	Agency inspected permitted stormwater and wastewater outfalls and recordkeeping. No findings.
	EPA	Received notice of completion of SPR Environmental Management Review based on inspection of 6/14-18/00. No findings.
	LDEQ	Agency Quality Assessment Division unannounced inspection of permits, lead paint use and asbestos.
BH	TNRCC	Agency inspected air quality with no findings.
BM	EPA	Received notice of completion of SPR Environmental Management Review based on inspection of 6/14-18/00. No findings
	TNRCC	Agency inspected air quality with no findings.
WH	LDEQ	Agency inspected air quality with no findings.
NO	EPA	Received notice of completion of SPR Environmental Management Review based on inspection of 6/14-18/00. No findings

Non-Routine Releases

In 2000, the SPR sites reported only one oil spill and zero brine spills in quantities of one barrel (42 gallons) or greater or as otherwise required by regulation.

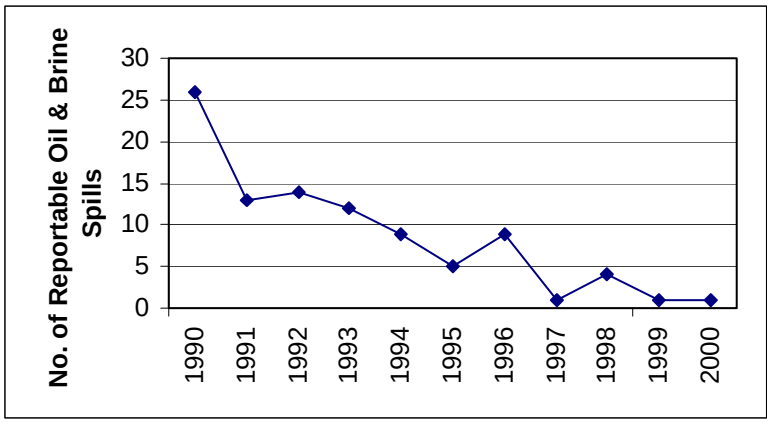
State and federal agencies require notification if an oil spill meets or exceeds the reportable criteria. This reportable criteria is established by each agency and may vary greatly in the amount to be considered a reportable spill. This is illustrated by the following examples: one barrel for the LDNR, five barrels for the RCT, or a sheen on a

navigable waterway for the NRC. There was only one reportable oil spill at West Hackberry during 2000 with a volume totaling 70 bbls shown in Table 5-16. This spill was fully contained on site and did not result in any environmental damage. For further spill incident information, see Sections 5.4.1 and 5.4.2.

During CY 2000, the SPR moved (received and transferred internally) 9.9 million m^3 (62.6 mmb) of oil and disposed of 2.85 million m^3 (17.9 mmb) of brine.

The long-term trend for spills and releases has declined substantially from 26 in 1990 to one in 2000 as depicted below in Figure 2-1.

Figure 2-1. Number of Reportable Spills 1990-00



2.3 SUMMARY OF PERMITS (JAN. 1, 2000 THROUGH DEC. 31, 2000)

General

Permits in effect during 2000 include 11 state and federal NPDES permits, four CAA permits, 42 COE wetlands permits and associated modifications and amendments (Section 404 of CWA), and over 100

oil field pit, underground injection well, and mining permits. In addition, a number of other minor permits were in effect during the year. Many of these major permits are presented in tabular form in Section 3, Tables 3-2 through 3-7.

Permit Compliance

Compliance with environmental permits is assured by meeting the conditions detailed within the permit. These conditions can be monitoring of components or processes, monitoring of pollutant effluents to ensure they meet permit limits, maintaining structures in their original condition, and inspecting facilities.

Air quality operating permits require that piping components such as valves, flanges, pressure relief valves, and pump seals be inspected for leaks of VOC on a regular basis (quarterly in Texas and annually in Louisiana) using organic vapor analyzers (OVA). In addition, the Texas permits require that the flanges be inspected visually, audibly, and or by olfactory methods to identify any possible leaks on a weekly basis. All SPR air permits contain permit limitations based on pollutant discharge rate in lbs. per hour and annual totals in tons per year.

The SPR ensures compliance with these permit limits by monitoring the processes that emit the pollutants. This includes monitoring usage of generators, volumes of crude oil, diesel, and gasoline movements through tanks, volume of painting, and others. The results of this effluent monitoring are reported to the agencies annually at Bryan Mound and Big Hill through an Emissions Inventory Questionnaire (EIQ) Bayou Choctaw and West Hackberry do not require reporting because they are below the required emission limit to report. If a

Louisiana facility is going to exceed its permitted limit during a year, LDEQ allows facilities to submit permit variance requests. All air reports were submitted to the appropriate agencies on time.

Water discharge permits require visual monitoring of the effluents to ensure that they have no visible sheen or foaming. Other permit conditions relate to ensuring that analytical permit limits are met and reported. All SPR sites require periodic (monthly and/or quarterly) reporting of permit limit compliance through the NPDES, LPDES, and TPDES Discharge Monitoring Reports (DMRs). All of these were submitted to the appropriate agencies.

Noncompliances

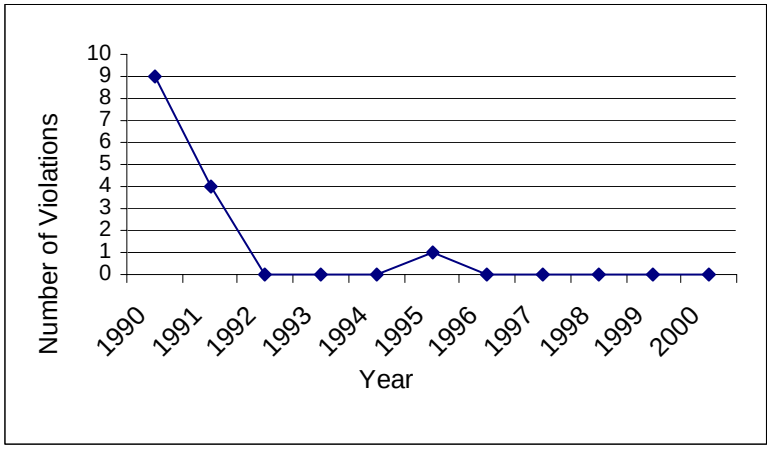
Seven discharge permit noncompliances occurred out of a total of 4,503 permit-related analyses performed in 2000. Five of the seven were the result of a sample being outside of the permit parameter limits with the remaining two resulting from operator oversight errors. All noncompliances were of short duration and immediately resolved, causing no observable adverse environmental impact.

The seven noncompliances produced an overall project-wide 99.8 percent compliance rate for 2000. Summary information of NPDES exceedances and noncompliances is contained in Section 5.2, Tables 5.6 and 5.8

Notice of Violation (NOV)

During 2000, the SPR continued to maintain a status of low risk to the environment. NOVs have declined significantly from 9 (all administrative) in 1990 to zero since 1996 as depicted below in Figure 2-2.

Figure 2-2. Number of Violations 1990-00



2.4 SUCCESS IN MEETING PERFORMANCE MEASURES

General

Performance measures, identified as work authorization directives (WADs), are jointly developed for each fiscal year by DOE and DM and tracked for success. In FY 2000, twelve measures were tasked to Environmental. Six of these are included in the environmental management system, as they are related to significant environmental aspects of SPR activities. Five other performance measures tasked to other departments were also included in the EMS. Performance measures that are part of the EMS are identified as "objectives" and are based on significant environmental aspects of SPR activities. Two metrics are used to determine success in meeting each measure – a "minimum" (level all DOE contractors should meet as a minimum) and a more challenging "target".

Success in Meeting Performance Measures

The measures and targets, and success in meeting them are delineated in Table 2-11. Data are provided for performance measures developed for FY 2000 only.

Only one of the performance measures; purchasing products with recycled content (affirmative procurement) did not meet at least the minimum target. Greater emphasis will be placed on improving this performance measure in FY2001 through increased awareness of affirmative procurement requirements and working with purchasers to assure products identified by EPA as affirmative procurement are purchased instead of virgin equivalents where reasonable.

All targets were met for the eleven performance measures identified as objectives in the EMS. Four performance measures met or surpassed the minimum metric, and seven met or surpassed the target metric.

Table 2-11. Performance Measures and Success FY2000

Performance Measure Objective	Minimum	Target	Success
*1.J.1.a: Environmental Permit Exceedances – Number of permit exceedances reported on Discharge Monitoring Reports	15/yr	6/yr	Surpassed target (4)
*1.J.1.b: Number of cited environmental violations received under the Clean Water or Clean Air Acts	4/yr	0/yr	Met target (0)
*1.J.1.c: Number of reportable occurrences of releases to the environment from operational facilities	310 days (85%) without occurrence	355 days (97%) without occurrence	Surpassed target (99.4%)
*1.J.2.a: Total amount of hazardous waste generated	4,000 lbs.	2,000 lbs.	Surpassed minimum (3801.9 lbs.)
*1.J.2.b: Total amount of sanitary waste generated	3.7 million lbs.	1 million lbs.	Surpassed target (0.653 million lbs.)
1.J.2.c: Percent of SPR paper recycled	70%	95%	Surpassed minimum (87.6%)
1.J.2.d: Number of cited waste management violations received	2/yr	0/yr	Met target (0/yr)

Table 2-11. Performance Measures and Success FY2000 (continued)

Performance Measure Objective	Minimum	Target	Success
1.J.2.e: Paper purchased made with post-consumer material	60% with 30% post consumer material	100% with 30% post consumer material	Met target (100%)
1.J.2.f: Purchase of EPA-designated recycled content products	95%	100%	Did not meet minimum (76.0%)
*1.J.3.a: Number of documents that are not delinquent in submission to DOE or regulatory agencies due to timeliness and quality	80% on time	95% on time	Surpassed target (100%)
1.J.3.b: Perform annual environmental independent assessments at each site	80%	100%	Met target (100%)
1.J.4.a: Environmental actions met on or before the milestone (level 3) date	80%	95%	Surpassed minimum and approached target (92%)
*1.L.B.2.a: Level 3 milestones completed associated with performance, accurate, and timely reporting of cavern integrity tests	95%	100%	Met target (100%)
*1.M.1.a.2: Weighted average (MPAR) of quality of maintenance, preventive maintenance completion, maintenance support, scheduling effectiveness, productivity, corrective maintenance backlog, and readiness of critical must-operate equipment.	90% MPAR (all sites) each month	98%+ MPAR (all sites) each month	Surpassed minimum and almost met target (97.3%)
*1.M.3: Scheduled oil samples completed	90% of quarterly samples	100% of all samples	Surpassed minimum (95.6%)
*1.T.4.a: Publications reviewed by due date, tabulated bimonthly	95% by due date	100% by due date	Surpassed minimum (97.6%)
*1.T(ATSM-HR)4.b: Completed community outreach activities, using annual plan as a	90%	100%	Met target (100%)

baseline			

*Measure is included in the environmental management system as an objective.

3. ENVIRONMENTAL PROGRAM INFORMATION

The environmental program is implemented by the prime M&O contractor for the SPR on behalf of DOE (permittee) and 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 to 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 2000 are discussed in sections 5 and 6.

3.1 ASSOCIATED PLANS AND PROCEDURES

Associated plans that support the SPR environmental program include site specific Facility Response Plans with spill reporting procedures; the site-specific Spill Prevention, Control, and Countermeasures Plans (SPCC); Environmental Monitoring Plan (EMP) and the Ground Water Protection Management Program (GWPMP). This document was incorporated into the EMP; and the Pollution Prevention Plan (PPP). The GWPMP document and the EMP were revised during 1996, published in 1997, and reviewed during 1998, 1999, and 2000. The GWPMP has now been incorporated into the EMP, which was revised and published early in CY 2001. The PPP is reviewed

annually and updated every three years. The next scheduled update is during CY 2001.

Associated procedures that support the SPR environmental program are located in the DM Environmental Instructions Manual. These procedures identify requirements, responsible personnel, deadlines, and governing standards. Each site has developed instructions that implement the environmental program specific to their facility.

The ISO 14001 Environmental Management System Plan describes the management system. This document is reviewed and revised annually.

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 Facility Response 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). All spills of hazardous substances are first verbally reported to site management and then to the SPR contractor management in New Orleans and the onsite DOE representative. Verbal notification and associated written reports to the appropriate regulatory agencies occur as required, if the spill meets the reportable criteria. 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 and stormwater discharges from SPR sites are authorized by EPA through the NPDES Program; through the LDEQ by the Louisiana Pollutant Discharge Elimination System (LPDES); and through the Railroad Commission of Texas (RCT) by the Texas Pollutant Discharge Elimination System (TPDES) Program. Depending upon site-specific permit requirements, discharge sample analyses are reported monthly to EPA for Big Hill and Bryan Mound, and quarterly for the remaining SPR sites. All state permits issued to the SPR require quarterly reporting to the appropriate state agency (LDEQ or 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.

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 Air Act	Control of hydrocarbon emissions from tanks, valves, and piping	TNRCC	Air Emissions Permit	Annual Emissions Inventory Questionnaires
		TNRCC	Air Emissions Permit Special Requirement	Monthly Tank Emissions
Clean Water Act as amended (FWPCA)	Wastewater discharges	U.S. EPA, Region VI	NPDES Permit	Monthly monitoring reports
		LA Dept. of Env. 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, LDEQ	SPCC Plan	Submit existing plan when spills on navigable waters exceed 1000 gals or occur >=2x in 1 year
	Discharge notification	LDEQ, TNRCC, RCT, U.S. DOT, EPA	Verbal and written notification	Non-permitted discharges over RQ
	Dredging maintenance, and any construction in wetlands for structures. (Sections 404 & 10)	U.S. Army 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 (US FWS)	Right-of-way for Construction and Maintenance	None
Coastal Zone Management Act	Wetlands construction within state coastal management zones	Louisiana Dept. of Natural Resources (LDNR), General Land Office (GLO)	Federal project consistency determinations	None

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

Regulation, Statute or Directive	Regulated Area	Enforcement Agency	Types of Required Permits, Applications, or Documentation	Routine Reporting Requirements
DOE Order 5400.1	Environmental Planning and Monitoring	DOE	Environmental Protection and Implementation Plan	Annual revision
			Ground Water Protection Management Program Plan	Annual review (revision every 3 yr.)
			Environmental Monitoring Plan	Annual review (revision every 3 yr.)
			Site Environmental Report	Annual report
			Performance Indicators	Quarterly report
	Waste Management	DOE	Annual Report on Waste Generation and Pollution Prevention Progress	Annual summary of all wastes
EO 13101	Affirmative Procurement	DOE	Affirmative Procurement Report	Annual report
Federal Migratory Bird Act	Disturbance of bird nests	US FWS	Special Purpose Permit	As requested by USFWS
Miscellaneous State Environmental Regulations	Use of salt domes	LDNR	Permit for Use of Salt Domes for Hydro-carbon Storage	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
	Operation of brine ponds	LDNR, RCT	Operate and Maintain Permit	None

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

Regulation, Statute or Directive	Regulated Area	Enforcement Agency	Types of Required Permits, Applications, or Documentation	Routine Reporting Requirements
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.
Oil Pollution Act of 1990 (amendment of FWPCA)	Oil spill response	U.S. EPA, LDEQ, USCG, TNRCC	Facility Response Plan, Oil Spill Response Cert.	None
		U.S. Dept. of Transportation(DOT)	Pipeline Response Plan	None
Oil Spill Prev-ention & Response Act of 1991	Oil spill response in Texas coastal zone	GLO	Discharge Prevention and Response Plan	Report spills of oil as required
			Discharge Prevention and Response Facility Cert.	Annual review by agency.
Pollution Prevention Act of 1990	Strategy to incorporate pollution prevention into ES&H goals	EPA, DOE	Pollution Prevention Plan, Waste Min Plan, Waste Mgmt Plan, Stormwater Pollution Prevention Plan	None
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
		RCT	TX Uniform HW Manifest	Complete and submit form with disposal
	Used oil burned for recovery	LDEQ, RCT	Uniform Hw Manifest (Recycling)	Complete and submit form with disposal

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

Regulation, Statute or Directive	Regulated Area	Enforcement Agency	Types of Required Permits, Applications, or Documentation	Routine Reporting Requirements
Resource Conservation and Recovery Act (continued)	Non-hazardous oilfield waste disposal (exploration and production)	LDNR	Non-Haz Oilfield Waste Shipping Control Ticket (UIC-28)	Complete and submit form with disposal
		RCT	Minor Permit	Complete and submit for non-RCT permitted disposal facilities
	Non-hazardous special	LDEQ, TNRCC	Shipping Paper	Complete and submit form with disposal
	Waste Management	LDEQ, TNRCC	Monthly waste inventory form	Complete for documentation
			Weekly waste inspection form	Complete for documentation
Safe Drinking Water Act	Cavern formation, well workovers, and salt-water disposal wells	LDNR, Office of Conservation, Under-ground 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
		RCT	Brine Injection Permit (H-10)	Annual Disposal/ Injection Wells Reports
	Potable water	LA Dept. of Health & Hospitals (LDHH)	Monthly Chlorine Concentration	Retain on site
	Storage of oil in underground salt domes	LDNR, RCT	Storage permit	None

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

Regulation, Statute or Directive	Regulated Area	Enforcement Agency	Types of Required Permits, Applications, or Documentation	Routine Reporting Requirements
Superfund Amendment Reauthorization Act	Reporting of inventories of hazard-ous substances and materials stored on site	Louisiana Dept. of Public Safety and Corrections, Texas Dept. of Health	Title III, Tier II	Annual Inventory Report
	Reporting of discharges of all listed hazardous materials	EPA	Toxic Release Inventory, Form R	Complete and submit form when threshold exceeded
Work Authorization Directive 2000-1.J	Budget/Planning	DOE	ES&H Budget Formulation 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.

The SPR holds a general permit to discharge hydrostatic test water in the state of Louisiana that applies to all Louisiana SPR sites, including offsite pipelines. This permit requires quarterly reporting.

On August 27, 1996, Region VI EPA granted LDEQ primacy for the NPDES program in Louisiana that includes responsibility for all compliance and enforcement actions relating to the discharge of water in Louisiana.

The administratively extended coverage received from the US EPA at the close of 1998 for Storm Water Discharges Associated with Industrial Activity expired on the last day of September 2000. Signed and properly completed Notices of Intent (NOI) have been forwarded to the appropriate agency; Region 6 US EPA for the Texas sites and

LDEQ for the Louisiana sites. As part of the reissuance, permit coverage was automatically granted commencing 48 hours after the postmark of the NOIs.

The air permits for the SPR facilities are administered by the LDEQ in Louisiana and the TNRCC in Texas. During CY 2000 there were no air permit changes associated with any of the SPR facilities.

3.3.1 Bayou Choctaw

Table 3-2 lists the 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 periodically visit the site to observe SPR operations. On October 21,1999, Bayou Choctaw received its LPDES permit. This permit replaces previously effective NPDES and State Permits.

Table 3-2. Permits at Bayou Choctaw

PERMIT NUMBER	ISSUING* AGENCY	PERMIT TYPE	EFFECTIVE DATE	EXPIRATION DATE	COMMENTS
LA0053040	LDEQ	LPDES	11/1/99	10/31/2004	(1)
NOI	LDEQ	NPDES*	01/24/01	09/2005	(2)
1280-00015- 02	LDEQ	Air	12/2/99	Open	(3)
None	LDNR	Injection	01/11/83	Open	(4)
SDS-1	LDNR	Injection	09/09/77	Open	(5)
LMNOD-SP (Bull Bay) 3	COE	Constr. & Maintain	01/30/79	-	(6)
LMNOD-SP(Iberville Parish Wetlands) 7	COE	Constr. & Maintain	09/26/77	-	(7)

Table 3-2. Permits at Bayou Choctaw
(continued)

PERMIT NUMBER	ISSUING* AGENCY	PERMIT TYPE	EFFECTIVE DATE	EXPIRATION DATE	COMMENTS
LMNOD-SP(Iberville Parish Wetlands) 10	COE	Constr. & Maintain	06/12/78	-	(8)
LMNOD-SP(Iberville Parish Wetlands) 17	COE	Constr. & Maintain	11/06/78	-	(9)
LMNOD-SP(Iberville Parish Wetlands) 31	COE	Constr. & Maintain	05/27/80	-	(10)
LMNOD-SP(Iberville Parish Wetlands) 102	COE	Constr. & Maintain	09/26/77	-	(11)

(1) LDEQ obtained primacy and issued and LPDES permit with former NPDES number this year.
(2) NPDES* Multi-Sector General Permit (MSGP) coverage for Storm Water Associated with Industrial Activity obtained as a renewal with a NOI dated 1/22/01; coverage was automatic 48 hours after postmark.
(3) Site air operating permit modified 12/99
(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 Bull Bay 24" brine disposal pipeline recorded with applicable Registrar of Deeds.
(7) Construct and maintain well pads (brine disposal wells).
(8) Enlarge existing well pads and construct access roads (brine disposal wells 1, 2, & 3.)
(9) 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. Major maintenance performed in 1996.
(10) Construct and maintain well pad, levees, access road & appurtenances to Cavern 102 and additional bank stabilization, warehouse pad and culvert per additions of 1983.
(11) Construct and maintain ring levee, drill site and appurtenances, Well 101.

3.3.2 Big Hill

Table 3-3 lists the permits at Big Hill. In 2000, the site appropriated 147,968.m^3 (120 acre-feet) of water from the Intracoastal Waterway exclusive of water for fire protection. This represents only 0.4 percent of the recently revised total allowable withdrawal for a year. The certified affidavit and annual report of water usage was forwarded as required in 2000.

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 2000. A letter was sent to Region 6 as a reminder of the fifth anniversary of this outstanding renewal action.

The Railroad Commission of Texas renewed the state TPDES water discharge permit for the Big Hill on August 17, 1999, effective October 1, 1999.

Table 3-3. Permits at Big Hill

PERMIT NUMBER	ISSUING AGENCY	PERMIT TYPE	EFFECTIVE DATE	EXPIRATION DATE	COMMENTS
TX0092827	EPA	NPDES	12/22/93		(1)
NOI	EPA	NPDES*	01/24/01	09/2005	(2)
SWGCO-RP 16536 (01,02,03,04, 05)	COE	Constr. & Maintain	01/11/84		(3)
P-7	F&WS	Constr. Operate	07/31/86 07/31/86	07/31/88 06/30/36	(4) (5)
9256	TNRCC	Air	04/22/98	04/22/08	
02939	RCT	Operate	11/28/83	Open	(6)
P000226A & P000226B	RCT	Operate/ Maintain	09/19/84	Open	(7)
0048295, 0048320, 004816, 004817	RCT	Operate	05/09/83 06/23/83	Open Open	(8)
UHS-006	RCT	Water Disch.	10/01/99	09/30/04	(9)
4045A	TNRCC	Water Use	11/14/83	Open	(10)

(1) Renewal submitted 11/24/93 - accepted as administratively complete 12/22/93.
(2) NPDES* Multi-Sector General Permit (MSGP) coverage for Storm Water Associated with Industrial Activity obtained as a renewal with a NOI dated 1/22/01; coverage was automatic 48 hours after postmark.
(3) Permits and modifications to construct and maintain RWIS, raw water 48" pipeline, brine disposal 48" pipeline, crude oil 36" pipeline. Maintenance dredging clause renewed until 12/31/08. Modified in 1996 for new integrity test method.
(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) Pipeline distribution system registration to operate crude oil lines. Renewed annually.
(7) Permits to operate and maintain anhydrite and brine/oil pits.
(8) Permits to create, operate, and maintain an underground hydrocarbon storage facility consisting of 14 caverns.
(9) Corresponds to TX0092827 (EPA-NPDES). Permit renewed by RCT with an effective date of 10/01/99.
(10) 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. Modified in 1996 to reduce water set aside down to 30,000 ac/ft per year.

The Big Hill site continues to mix slightly higher pH raw water with the intermittent low pH brines in the onsite brine pond, sufficiently buffering the low pH prior to discharge in order to meet permitted

effluent limitations as required. This approach appears satisfactory to avoid future noncompliant discharges of brines. Two maintenance notifications were made to the U. S. Army Corps of Engineers Galveston District (GALCOE) during 2000; one was sent for the repair and replacement of a traveling screen on the permitted RWIS and the other for work performed on the offshore diffuser nozzles of the permitted brine disposal pipeline.

The forms T-4C were forwarded to the appropriate branch of the Railroad Commission of Texas (RCT) in October 2000, for the Big Hill crude oil distribution system.

Brineline integrity test results were provided EPA Region 6; and a required industrial water conservation plan was submitted to the TNRCC in 2000.

3.3.3 Bryan Mound

Table 3-4 lists the permits for the Bryan Mound site. The Bryan Mound site has the 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 2000, the site used a total of 1,399,925 m^3 (1135 acre-feet) of water from the Brazos River Diversion Channel. A total of 155 million m^3 (125,734 acre-feet) of water has been appropriated to date for site activities which represents 34 percent of the total volume originally permitted for the life of the project. The certified affidavit and annual report of water usage was forwarded as required in 2000.

A maintenance notification for traveling screen removal and repair was made for COE permit 12347 (as amended in 1995). A renewal

application for the expiring NPDES permit TX0074012 was forwarded as required 180 days in advance; receiving a letter of administrative completeness dated 5/22/00. Required reporting for 2000 involved requirements for semi-annual brineline integrity tests to Region 6 EPA; wastewater operators reports to TNRCC; and crude oil pipeline system operations renewal.

The branch of the RCT responsible for the issuance of the permit to operate our crude oil pipeline system in Texas issued a revised permit to DOE reflecting the changes in operator status due to the SPRPMO leasing out of portions of the permitted system at Bryan Mound.

Table 3-4. Permits at Bryan Mound

PERMIT NUMBER	ISSUING AGENCY	PERMIT TYPE	EFFECTIVE DATE	EXPIRATION DATE	COMMENTS
TX0074012	EPA	NPDES	05/22/00		(1)
NOI	EPA	NPDES*	01/24/01	09/2005	(2)
SWGCO-RP-12347 (03)	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)
3681A	TNRCC	Water Use	07/20/81	Open	(6)
UHS-004	RCT	Water Disch	04/01/99	03/31/04	(7)
6176B	TNRCC	Air	01/11/95	02/23/02	
82-8475	TDH&PT	Constr.	01/01/83	Open	(8)
SWGCO-RP-11666	COE	Constr. & Maintain	10/15/77	-	(9)
SWGCO-RP-12112	COE	Constr. & Maintain	07/25/77	-	(10)
SWGCO-RP-12062 (03)	COE	Constr. & Maintain	10/10/78	-	(11)
SWGCO-RP-14114 (01)	COE	Constr. & Maintain	05/18/85	-	(12)
SWGCO-RP-16177	COE	Constr. & Maintain	09/07/82	-	(13)
SWGCO-RP-13435 (01)	COE	Constr. & Maintain	05/21/79	-	(14)
04994	RCT	Operate	08/01/00	-	(15)

(1) Renewal submitted 03/03/00. Accepted as administratively complete 05/22/00.
(2) NPDES* Multi-Sector General Permit (MSGP) coverage for Storm Water Associated with Industrial Activity obtained as a renewal with a NOI dated 1/22/01; coverage was automatic 48 hours after postmark.
(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) Permit expires after consumption of 367,088 acre-feet of water or project ends.
(7) Corresponds with TX0074012 (EPA-NPDES). (Renewal submitted 1/30/89, RCT acted on permit in August, 1993; effective 10/1/93)
(8) Corresponds with SWGCO-RP-16177.
(9) for 30-inch crude oil pipeline to 3 miles SW from Freeport
(10) for 30-inch crude oil pipeline to 2 miles S from Freeport
(11) 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. (03) added the offshore additions the new integrity test method.
(12) general permit for pipeline crossings by directional drilling in navigable waters
(13) place an 8-inch water line (PVC, potable)
(14) for construction of cavern pads 101, 102, 103, 111, and 113 in wetlands. Mod.01 added access road and fill placement for DCS-2.
(15) Pipeline distribution system registration to operate crude oil lines. Renewed annually with T-4C.

The forms T-4C were forwarded to the appropriate branch of the RCT in October 2000, for the Bryan Mound crude oil distribution system.

Bryan Mound continued to operate under the 1995 revised TNRCC air emission permit. This permit recognizes the standby status of the site and the concept that a presidential-mandated drawdown and refill would be treated as a variance from the permitted emission limitations. Modification of the TNRCC permit was made in accordance with permit provisions in support of exchange 2000.

3.3.4 St. James

The SPRMO successfully completed a long-term leasing arrangement for use of the St. James site by the private corporation Shell Oil Pipeline in 1997. Shell Oil Pipeline retains all responsibility for maintaining necessary permits at St. James.

3.3.5 Weeks Island

The permits for Weeks Island are listed in Table 3-5.

Long-term ground water monitoring implemented for the SDS-8 supplement continued on a self-imposed quarterly basis in 2000. No findings or anomalies were discovered or encountered.

Table 3-5. Permits at Weeks Island

PERMIT NUMBER	ISSUING AGENCY	PERMIT TYPE	EFFECTIVE DATE	EXPIRATION DATE	COMMENTS
SDS-8	LDNR	Injection	02/16/79 revised for post closure 9/99	Terminated	(1)
SDS-8 Supplement	LDNR	Decommission Supplement	9/1/99	Open	(2)

(1) Approval for use of salt dome cavities for storage of liquid hydrocarbons.
(2) Supplement for the decommissioning activities

Long term ground water and geotechnical monitoring will continue on a quarterly basis through 2004.

3.3.6 West Hackberry

Permits for West Hackberry are listed in Table 3-6.

Table 3-6. Permits at West Hackberry

PERMIT NUMBER	ISSUING AGENCY	PERMIT TYPE	EFFECTIVE DATE	EXPIRATION DATE	COMMENTS
LA0053031	LDEQ	LPDES	02/01/99	02/01/2004	(1)
NOI	LDEQ	NPDES	01/24/01	09/2005	(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)

Table 3-6. Permits at West Hackberry
(continued)

PERMIT NUMBER	ISSUING AGENCY	PERMIT TYPE	EFFECTIVE DATE	EXPIRATION DATE	COMMENTS
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)
None	LDNR	Injection	01/11/83	Open	(10)
971198-9	LDNR	Injection	09/27/83	Open	(11)
0560-00019-02	LDEQ	Air	11/24/97	Open	
SWGCO-RP-12342	COE	Constr. & Maintain	03/28/78		(12)
LMNOD-SP (Cameron Parish Wetlands) 152	COE	Constr. & Maintain	03/16/78		(13)
LMNOD-SP (Cameron Parish Wetlands) 276	COE	Constr. & Maintain	02/11/80		(14, 15)

(1) LDEQ obtained primacy and issued and LPDES permit with former NPDES number this year.
(2) NPDES *Multi-Sector General Permit (MSGP) coverage for Storm Water Associated with Industrial Activity obtained as a renewal with a NOI dated 1/22/01; coverage was automatic 48 hours after postmark
(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) Letter of financial responsibility to close all injection wells on this site
(11) Approval to construct and operate wells 117A and B.
(12) 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. Renewal for LPDES permit sent 9/97
(13) For 42" crude oil pipeline crossings of waters & waterways in Texas
(14) For brine disposal wells, well pads, and brine disposal pipelines, (12", 20", & 24")
(15) For well pads, levees, and access roads (Wells 110, 111, 112, 113, 114, & 115)

A closure-complete report was prepared and filed with LDNR in February 2000 for the decommissioning work and in petition for revocation of the permits. The report documented completion of the closure actions and provided the post-clean testing for review. In addition, a year long ground water evaluation period was proposed

prior to resumption of routine sitewide ground water monitoring. The report and accompanying proposal were not acted upon in 2000.

3.4 WASTE MINIMIZATION PROGRAM

The waste minimization program reduces the generation of all wastes including hazardous and non-hazardous sanitary wastes.

The SPR generated RCRA hazardous and sanitary (non-hazardous municipal and non-hazardous oil field) wastes during 2000. The SPR sent 1.2 metric tons (mt) (2,598 lbs.) of hazardous waste off site for disposal during 2000. The SPR also sent 277.8 mt (612,426 lbs.) of sanitary waste off site for disposal during 2000. The SPR met their hazardous and non-hazardous sanitary waste generation goals.

The SPR paper recycling goals are based on a fiscal year reporting period. The amount of office paper recycled exceeded 125 percent of the amount purchased in 2000. This value exceeds the 1999 recycled amount of 94 percent. Other materials and respective amounts recycled or reclaimed during FY 2000 are delineated in Table 3-7:

Table 3-7. 2000 Recycled/Reclaimed Materials

Material	Amount Recycled/ Reclaimed
Antifreeze	0.27 mt (600 lbs.)
Batteries	4.4 mt (9,645 lbs.)
Cardboard	3.5 mt (7,731 lbs.)
Concrete	80.0 mt (176,000 lbs.)
Crude Oil	0.13 mt (286 lbs.)
Dirt	177.3 mt (390,000 lbs.)
Fluorescent lamps	0.6 mt (1,271 lbs.)
Mercury	0.005 mt (11.1 lbs.)
Newspaper/magazines	3.5 mt (7,731 lbs.)
Office and mixed paper	57.4 mt (126,315 lbs.)
Oil filters	0.1 mt (280 lbs.)
Scrap metal	47.7 mt (105,000 lbs.)
Telephone books	0.4 mt (873 lbs.)
Toner cartridges	0.9 mt (2,037 lbs.)
Used oil burned for energy	25.1 mt (55248 lbs.)

3.5 POLLUTION PREVENTION (P2)

The DM project manager and his staff, in support of the DOE Project Management Office (PMO), administer and implement the SPR P2 Program. The program's purpose is to unite SPR P2 activities into one program, integrate these activities into all SPR operations, support technology development programs aimed at minimizing multimedia waste generation, and coordinate P2 efforts with SPR sites. The P2 Team is composed of all SPR employees. The P2 Advocates Team, composed of staff from each site, several departments in New Orleans, and a DOE representative, disseminate awareness throughout the SPR. P2 announcements and suggestions are communicated via monthly conference calls. Minutes are published on the intranet available to all SPR employees.

All SPR employees generate waste and are responsible for properly managing their waste according to regulatory requirements, completing

corresponding training, and complying with procedural and contractual requirements to minimize the generation of waste from spills or mixing of different waste streams. To promote waste minimization/reduction and P2, the SPR promotes the use of non-hazardous substitutes for hazardous materials in all activities. P2 activities are incorporated in the design, development, construction, operation, and maintenance of all projects and activities.

SPR employees have a general awareness of buying recycled items in accordance with the Comprehensive Procurement Guidelines (CPG), which is EPA's continuing effort to promote the use of materials recovered from solid waste. Buying recycled-content products ensures that the materials collected in recycling programs will be used again in the manufacture of new products.

All of these efforts contribute to the SPR meeting the Pollution Prevention/Energy Efficient (P2E2) Goal # 4: Recycle 45% of sanitary waste by year 2005. P2E2 Goal # 6: Increase purchases of EPA-designated items with recycle content to 100% except when not available competitively at reasonable price or that do not meet performance, is being addressed by all employees at the SPR through the affirmative procurement process. A P2E2 committee was established with the purpose of developing and coordinating energy efficiency and pollution prevention projects for the SPR. The committee meets on a monthly basis to incorporate activities designated by the DOE Energy Policy Act (EP Act) of 1992, which calls for programs designed to accelerate the introduction of alternative fuel vehicles to reduce the nation’s dependence on imported oil. The committee also convenes to incorporate energy heating/cooling initiatives.

3.6 INTEGRATED SAFETY MANAGEMENT (ISM)

Through ISM and the Environmental Management System (EMS), several SPR programs and departmental functions oversee activities that are related to and contribute to the SPR P2 Program. The SPR P2 Program supports these activities and the associated responsible departments by providing them with information and expertise. However, the departments managing these programs maintain primary responsibility for their activities. SPR management has recognized that P2 implementation is a component of ISMS. It is key to ensuring the safety of human health and the environment. Pollution Prevention minimizes potential health effects on workers using toxic or hazardous substances or handling wastes, protects the health and safety of the public, reduces compliance vulnerabilities, and saves money otherwise spent on waste management. The benefits of P2 are typically the greatest when integrated into the beginning of a project or activity. Therefore, SPR personnel integrate P2 concepts into projects and processes as part of the five ISMS safety management functions.

3.7 ENVIRONMENTAL MANAGEMENT SYSTEM (EMS)

An EMS is the environmental component of ISMS. Environmental considerations are interwoven into management and work programs and practices at all levels so as to achieve DOE's pollution prevention mission while protecting the public, SPR personnel, and the environment. By employing an EMS, SPR enhances protection of the environment and manages its environmental obligations in a safe and effective manner.

The SPR elected to develop its EMS in accordance with the ISO 14001 EMS standard. The SPR P2 Program fully supports the management

approach of the ISO 14001 standard. There is a top-down commitment to preventing pollution. "Preventing pollution" is one of the three commitments that are included and required by ISO 14001 in the DM "Environmental Policy ," Appendix B. The other two commitments – compliance and continual improvement – are reflected in this P2 program plan as well as the policy. The DM EMS establishes the necessary organizational structure, planning activities, responsibilities, practices, procedures, processes, and resources for developing, implementing, achieving, and maintaining the environmental policy.

3.8 TRAINING

Site personnel with environmental responsibilities 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 site-specific Spill Prevention Control and Countermeasures (SPCC) Plans, Facility Response Plans, and compliance awareness. ERT personnel from all sites participate in annual spill response refresher and hazardous materials technician training currently provided at the Texas A&M University, Engineering Extension Service facilities. Onsite 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. New Orleans personnel, who will be expected to provide site support during an incident response, have been trained to the hazardous materials technician level.

All site personnel and unescorted site visitors receive compliance awareness training via "The Active Force of Protection" videotape. SPCC and Hazardous Waste Handling training is mandatory and provided to applicable site personnel annually.

M&O contractor New Orleans environmental staff are trained to the National Registry of Environmental Professionals, Registered Environmental Manager, level and have been independently certified as such through examination.

4. ENVIRONMENTAL RADIOLOGICAL PROGRAM INFORMATION

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

4.1 SEALED SOURCES

A total of two nuclear density gauges were located on the metering skid at the West Hackberry site. Each gauge unit, used for monitoring fluid density changes (oil versus brine) in pipelines, contained between 2000 and 4000 millicuries (mCi) of cesium 137. Gauge wipe tests are performed every three years as required by the general license. The DOE is a general licensee under the manufacturer, Texas Nuclear. No radiation leakage was ever detected from any of the gauges

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 additional monitoring is required due to the negative results of this 1991 NORM survey.

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 that the environmental integrity of the SPR sites and their respective surroundings is maintained.

The two types of monitoring conducted at the SPR sites to assess the impact of SPR activity on air, surface water, and groundwater are effluent and surveillance monitoring. Effluent monitoring consists of measuring the pollutants of concern in airborne and liquid effluents at all the sites while surveillance monitoring consists of sampling the environmental media at or around the sites.

5.1 ENVIRONMENTAL MANAGEMENT SYSTEM (EMS)

DM continued to demonstrate its commitment to excellence in environmental management by completing the process of having its Environmental Management System certified against the ISO 14001 environmental management standard in May of 2000. The DM EMS establishes the necessary organizational structure, planning activities, responsibilities, practices, procedures, processes, and resources for developing, implementing, achieving and maintaining DM ASP5400.2, Environmental Policy (Appendix B). The EMS is defined through the ISO 14001 Environmental Management System Manual which provides a description of DM policies, plans, and procedures that are the foundation of the EMS and illustrates conformance with the ISO 14001 Standard.

5.2 PROTECTION OF BIOTA

In accordance with the DM Environmental Policy (Appendix B) and standards established by DOE, actions were taken by the SPR sites to ensure that the indigenous wildlife population was not disturbed or

harmed whenever possible. These actions were predominately illustrated in the preservation of bird nesting areas by performing maintenance or construction only when the nesting period was completed and by providing protection to nesting areas if the maintenance or construction activities were an absolute priority.

In addition, SPR site personnel received training on wildlife rescue and rehabilitation techniques.

5.3 AIR QUALITY EFFLUENT MONITORING

The air pollutants of concern that are emitted by the SPR sites are either hazardous or have an impact on the ambient air quality. The hazardous air pollutants (HAP) are benzene, toluene, ethylbenzene, and xylene. The non-hazardous pollutants that have an impact on air quality are non-methane/non-ethane volatile organic compounds (VOC), nitrogen oxides (NO_x), sulfur dioxides (SO_2), carbon monoxide (CO), and particulate matter (PM_{10}).

Effluent monitoring for air pollutants consists of monitoring processes and calculating the effluent volume through the use of acceptable industry practices. These results are compared to the permitted limits to ensure that they are in compliance.

Effluent monitoring at the SPR consists of measuring the following in order to quantify emissions:

- run-time of diesel generators;
- volume and type of crude oil flowed through frac tanks, floating roof tanks, diesel tanks, gasoline tanks, and oil-water separators;
- volume of paint and solvent used on site;
- volume of brine placed into the brine pond;

- number of piping components that emit over the acceptable regulatory limits (leakers) by monitoring all components with an organic vapor analyzer (OVA.)

Effluent monitoring for air pollutants is conducted at both Texas sites (Big Hill and Bryan Mound) and two Louisiana sites (Bayou Choctaw and West Hackberry). The results are reported to state agencies through EIQs except for Bayou Choctaw and West Hackberry. These sites are exempt from reporting because their emissions are below the regulatory threshold for reporting in their respective ozone attainment areas. Even though the results of the monitoring for Bayou Choctaw and West Hackberry are not reported, they are used to determine compliance with the permit.

Another type of monitoring conducted at the SPR sites is air pollution control equipment monitoring. The air regulations require that the seals on internal and external floating roof tanks are inspected at frequent intervals for visible tears, holes, or cumulative gaps exceeding regulatory limits and to ensure they are operating accordingly. Big Hill has an external floating roof tank that requires inspection of the primary (every five years) and secondary (semi-annual) seals. The three internal floating roof tanks at Bryan Mound require seal inspections every year because the roofs only have a mechanical shoe seal.

5.3.1 Bayou Choctaw

Bayou Choctaw, located in a serious nonattainment area for ozone, is permitted to emit 7.4 metric tpy (8.14 tpy) of VOC. Since the site emits less than nine metric tpy (10 tpy), it does not require an EIS to report its annual emissions. Although Bayou Choctaw is exempt from reporting emissions, effluent monitoring was conducted in 2000 on all permitted

sources. These sources include the volume of crude oil in slop tanks and frac tanks, volume of brine into the brine pond, monitoring piping components to determine if there are leakers, and monitoring the run-time of the emergency generators. Bayou Choctaw operated in accordance with all air quality regulatory requirements in 2000. Table 5-1 is a summary of the permitted limit requirements for Bayou Choctaw.

Table 5-1. Parameters for the Bayou Choctaw Emission Points

Emission Point Description	Parameter	Permit Limits Metric tpy (tpy)
Crude & Slop Oil Tanks	VOC	2.43(2.67)
Gasoline Fuel Tank	VOC	0.52 (0.57)
Frac Tanks	VOC	1.42 (1.56)
Brine Pond	VOC	1.14 (1.26)
Fugitive Emissions	VOC	1.66 (1.83)
Air Eliminator	VOC	0.04 (0.04)
Emergency Generators/Pumps	VOC PM_{10} SO_2 NO_x CO	0.19 (0.21) 0.18 (0.20) 0.72 (0.79) 5.54 (6.09) 1.26 (1.39)

5.3.2 Big Hill

The Big Hill site, located in a moderate nonattainment area for ozone, is permitted to emit 13.7 metric tpy (15.1 tpy) of VOC. Since it emits more than nine metric tpy (10 tpy), it requires an EIQ to report its annual emissions. Effluent monitoring was conducted in 2000 on all permitted sources such as the volume of crude oil in slop tanks, frac tanks, and surge tank; volume of brine into the brine pond; monitoring piping components to determine number of leakers; and monitoring the run-time of the emergency generators. Big Hill operated in accordance with all air quality regulatory requirements in 2000. Table 5-2 is a summary of the permitted limit requirements for Big Hill.

Table 5-2. Parameters for the Big Hill Emission Points

Emission Point Description	Parameter	Permit Limits, Metric tpy (tpy)
Crude & Slop Oil Tanks	VOC	0.59 (0.65)
Gasoline & Diesel Fuel Tanks	VOC	0.25 (0.28)
Brine Pond	VOC	2.86 (3.15)
Fugitive Emissions	VOC	8.47 (9.34)
Air Eliminator	VOC	1.36 (1.50)
Solvent Recycler	VOC Acetone	0.05 (0.06) 0.01 (0.01)
Emergency Generators/Pumps	VOC PM_{10} SO_2 NO_x CO	0.11 (0.12) 0.07 (0.08) 0.64 (0.71) 2.38 (2.62) 0.52 (0.57)

5.3.3 Bryan Mound

The Bryan Mound site, located in a severe nonattainment area for ozone, is permitted to emit 17.2 metric tpy (19 tpy) of VOC. Since it emits more than nine metric tpy (10 tpy), it requires an EIQ to report its annual emissions. Effluent monitoring was conducted in 2000 on all permitted sources. These sources include the volume of crude oil in slop tanks, frac tanks, and three internal floating roof tanks; volume of brine into the brine tank; monitoring piping components to determine number of leakers; and monitoring the run-time of the emergency generators. Bryan Mound operated in accordance with all air quality regulatory requirements in 2000. Table 5-3 is a summary of the permitted limit requirements for Bryan Mound.

Table 5-3. Parameters for the Bryan Mound Emission Points

Emission Point Description	Parameter	Permit Limits, Metric tpy (tpy)
Crude Oil Tanks	VOC	12.34 (13.60)
Gasoline & Diesel Fuel Tanks	VOC	0.20 (0.22)
Brine Tank	VOC	1.05 (1.16)
Fugitive Emissions	VOC	2.95 (3.25)
Paints & Solvents	VOC	0.63 (0.69)
Emergency Generators/Pumps	VOC PM_{10} SO_2 NO_x CO	0.05 (0.06) 0.15 (0.17) 0.19 (0.21) 1.63 (1.80) 0.46 (0.51)

5.3.4 West Hackberry

West Hackberry, located in an ozone attainment area, is permitted to emit 37 metric tpy (40.8 tpy) of VOC. Since the site emits less than 45.4 metric tpy (50 tpy), it does not require an EIS to report its annual emissions. Although West Hackberry is exempt from reporting emissions, effluent monitoring was conducted in 2000 on all permitted sources. These sources include the volume of crude oil in slop tanks and frac tanks, volume of brine into the brine tank, monitoring piping components to determine number of leakers, and monitoring the run-time of the emergency generators. West Hackberry operated in accordance with all air quality regulatory requirements in 2000. Table 5-4 is a summary of the permitted limit requirements for West Hackberry.

Table 5-4. Parameters for the West Hackberry Emission Points

Emission Point Description	Parameter	Permit Limits, Metric tpy (tpy)
Slop Oil Tanks	VOC	1.81 (1.99)
Gasoline Fuel Tank	VOC	0.25 (0.28)
Frac Tanks	VOC	23.86 (26.30)
Brine Tank	VOC	0.95 (1.05)
Fugitive Emissions	VOC	9.71 (10.70)
Air Eliminator	VOC	0.06 (0.07)
Emergency Generators/Pumps	VOC PM_{10} SO_2 NO_x CO	0.41 (0.45) 0.20 (0.22) 0.02 (0.02) 12.59 (13.88) 2.75 (3.03)

5.4 WATER DISCHARGE EFFLUENT MONITORING

The water discharge permit-monitoring program fulfills the requirements of the EPA NPDES, and corresponding state TPDES, LWDPS, and the new LPDES 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 2000. These discharges are grouped as:

a. brine discharge to the Gulf of Mexico;
b. storm water runoff from tank, well, and pump pads;
c. rinse water from vehicles at specific locations draining to permitted outfalls;
d. effluent from package sewage treatment plants; and
e. hydrostatic test water for piping or tanks (LA only).

The SPR disposed of 2.864 million m^3 (17.9 mmb) of brine (mostly saturated sodium chloride solution with some infrequent discharges of a lower salinity than normally attributed to brine) during 2000. Approximately 66.2 percent of the brine was disposed in the Gulf of Mexico via the Bryan Mound (33.2 percent of the total) and the Big

Hill (33.0 percent of the total) brine disposal pipelines. The remainder was disposed in saline aquifers via injection wells at the Bayou Choctaw (4.2 percent of the total) and West Hackberry (29.6 percent of the total) sites.

During 2000, 4,503 measurements and 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 99.8 percent of the analyses performed. A total of seven permit noncompliances were reported during CY 2000 (Tables 5-6, 5-8, and 5.10). Five of the seven were the result of a sample being outside of the permit parameter limits with the remaining two resulting from operator errors. All noncompliances were of short duration and immediately resolved, causing no observable adverse environmental impact.

Parameters monitored varied by site and discharge. Separate tables provide specific parameters and the most frequent sampling interval (based on permit limitations). More frequent measurements are often made of certain parameters that assist with unit operations; these additional data are reported as required by law. The data measurement variations observed during CY 2000 are discussed in separate sections by site.

5.4.1 Bayou Choctaw

Bayou Choctaw personnel performed a total of 98 measurements on permitted outfalls and reporting stations to monitor NPDES and state permit compliance during 2000. Table 5-5 provides the permit required monitoring parameters and limits for the Bayou Choctaw outfalls.

There were two noncompliances in 2000 (Table 5-6) resulting in a site compliance performance of 98.0 percent.

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 up to March 1999. Beginning November 1999, the LPDES superceded the NPDES permit issued by the EPA. Discharges are from two package sewage treatment plants (STP), and storm water runoff from well pads, pump pads (containment areas), and the site vehicle rinsing station.

Table 5-5. Parameters for the Bayou Choctaw Outfalls

Location/Discharge	Parameter	Frequency*	Compliance Range
Sewage Treatment Plants	Flow BOD_5 TSS pH Fecal Coliform	1/6 months 1/6 months 1/6 months 1/6 months 1/6 months	(Report only) <45 mg/l Avg. <45 mg/l max 6.0 – 9.0 s.u. <400 co./100 ml
Raw Water System Test Water, Raw Water System Maintenance Diversion Water, Fire System Test Water, Facility Wash Water	pH TOC Oil & Grease	Annually if discharged	6.0 to 9.0 s.u. <50 mg/l <15 mg/l
Piping (50:50 Clorox/ Wash Water	pH TOC	Annually if discharged	6.0 to 9.0 s.u. < 50 mg/l
Storm Water	Flow Oil and Grease pH TOC Visible Sheen	1/quarter 1/quarter 1/quarter 1/quarter 1/discharge	(report only) <15 mg/l max 6.0 – 9.0 s.u. <50 mg/l no presence
Vehicle Rinsing	TOC Oil and grease pH	Annually if discharged	<50 mg/l <15 mg/l 6.0-9.0 s.u.

* Permit requires an increase in the sampling frequency when an exceedance occurs.

Table 5-6 2000 Permit Noncompliances at Bayou Choctaw

Date	Outfall Location	Permit Parameter	Value (Limit)	Cause
7/18/00	001 and 002 (Sewage treatment plants)	BOD_5	60 mg/l (45 mg/l wkly avg.) @ 001 86 mg/l (45 mg/l wkly avg.) @ 002	Routine semi-annual samples taken at 001 & 002 indicated BOD_5 levels of 60 mg/l (001) and 86 mg/l (002), which exceeded weekly average permit limit of 45 mg/l and resulted in two non-compliances. Normal flow was noted and other permit effluent limits were within acceptable ranges at time of sampling both plants. Investigation revealed the main air supply line immediately above normal waste water level at 001 had rusted through and was not allowing air to reach the downstream diffusers resulting in inadequate dispersion of air. Surface skimmer, which also relies on adequate air dispersion, was not functioning properly. Additional samples were collected at both units on monthly basis until they became compliant with permit.

5.4.2 Big Hill

During 2000, 1,774 measurements were performed to monitor NPDES and state discharge permit compliance. Table 5-7 provides the permit required monitoring parameters and limits for the Big Hill outfalls. There were two noncompliances during 2000 (Table 5-8) resulting in a 99.9 percent 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). The discharges at the site involve brine to the Gulf of Mexico, hydroclone blowdown into the Intracoastal Waterway, effluent from the sewage treatment plant and storm water from well

pads and pump pads. There were no discharges during 2000 from the hydroclone blowdown system. Although the state permit renewed during 1999 revised sampling frequencies for various outfalls sitewide, the older expired but administratively extended, federal permit (which remains enforceable until Region 6 re-issues) now controls all of the "Daily" testing requirements found below, with the exception of DO on outfall 001 when oxygen scavenger may be used.

Table 5-7. Parameters for the Big Hill Outfalls

Location/Discharge	Parameter	Frequency*	Compliance Range
Brine to Gulf	Flow	Continuously	0.27 million m^3/day
	Velocity	Per flow	>6.1 m/sec (20 ft/sec)
	Oil & Grease	Daily	<15 mg/l max, <10 mg/l avg.
	TDS	1/wk	(report only)
	TSS	1/wk	(report only)
	pH	1/mo	6.0 - 9.0 s.u.
	DO	Daily	detectable (when using O_2 scavenger)
	Integrity Tests	1/6 mo	within 4%
Storm Water Outfalls	Oil and Grease	Daily	<15 mg/l
	TOC	Daily	< 50 mg/l
	pH	Daily	6.0 - 9.0 s.u.
	Salinity	1/mo	<8 ppt (RWIS report only)
Sewage Treatment Plant (TPDES only)	Flow	5 days/wk	(report only)
	BOD_5	1/mo	<45 mg/l max <20 mg/l avg.
	COD	1/mo	<250 mg/l max <150 mg/l avg.
	TSS	1/mo	<45 mg/l max <20 mg/l avg.
	pH	1/mo	6.0 - 9.0 s.u.
Hydroclone Blowdown (not used)	Flow	1/wk	report
	TSS	1/wk	report
	pH	1/wk	6.0 - 9.0 s.u.

* Permit requires an increase in the sampling frequency when an exceedance occurs.

Table 5-8. 2000 Permit Noncompliances at Big Hill

Date	Outfall Location	Permit Parameter	Value (Limit)	Cause
2/4/00	004 (Sewage treatment plant)	BOD_5	54 mg/l (45 mg/l maximum)	On 3/7/00 the test result received from the contract lab indicated 54 mg/l for BOD5 sample taken from outfall 004 on 2/4/00. This exceeds the maximum permit limit of 45 mg/l. The high result was due to high ammonia content and the site worked to resolve the problem.
3/3/00	001 (Brine to Gulf)	pH	5.6 s.u. (6.0 s.u. minimum)	On 3/3/00 there was a noncompliant discharge for brine to the Gulf when the monthly pH sample was 5.6 s.u. This is below the minimum permit allowance of 6.0 s.u. The brine disposal process was evaluated for the potential for testing access at a point upstream of the 001 outfall's permitted sampling point to preclude recurrence in the future.

5.4.3 Bryan Mound

Bryan Mound personnel made 1,897 measurements on permitted outfalls for the purpose of monitoring NPDES and state discharge permit compliance during 2000. Table 5-9 provides the permit-required parameters and limits for the Bryan Mound outfalls. There were three noncompliances during 2000 (Table 5.10) resulting in a 99.8 percent site compliance performance level.

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). Under provisions of the new federal permit, Bryan Mound was able to reduce the frequency of its biomonitoring to annual based on the lethal No Observed Effect Concentration (NOEC) being below the permitted limit. The requirement for Oil and Grease testing was reduced to weekly when flowing as part of the TPDES renewal last year. The four categories of

permitted discharges are brine to the Gulf of Mexico; storm water from the tank farm, well pads, and pump pads; recirculated water from the intake pumps; and package sewage treatment plant effluent.

Table 5-9. Parameters for the Bryan Mound Outfalls

Location/Discharge	Parameter	Frequency*	Compliance Range
Brine to Gulf	Flow	Continuously	report only
	Velocity	Per flow	>6.1 m/sec (20 ft/sec)
	Oil & Grease	1/wk	<15 mg/l max <10 mg/l avg.
	TDS	1/mo	(report only)
	TSS	1/mo	(report only)
	pH	1/mo	6.0 - 9.0 s.u.
	Copper	1/mo	<0.21 mg/l
	Biomonitoring	1/yr if no exceedance	Lethal NOEC 1.53%
	Integrity test	1/6 mo when flow	Offshore within 4% of onshore
Storm Water	Flow	1/wk	(report only)
	Oil and Grease	1/mo	<15 mg/l
	TOC	1/mo 1/mo	< 50 mg/l (RCT) <75 mg/l (EPA)
	pH	1/mo	6.0 - 9.0 s.u.
	Salinity	1/mo	< 8 ppt
Recirculated Raw Water	Flow	1/mo	Report only
Sewage Treatment Plant	Flow	5/wk	(RCT only) <0.006 mgd max <0.004 mgd avg.
	BOD_5	every 2 wk	<45 mg/l max <20 mg/l avg.
	COD	every 2 wk	<250 mg/l max (RCT only) <150 mg/l avg.
	Chlorine	2/mo	1.0 mg/l
	pH	every 2 wk	6.0 - 9.0 s.u.
	TSS	every 2 wk	<45 mg/l max <20 mg/l avg.

* Permit requires an increase in the sampling frequency when an exceedance occurs.

Table 5-10. 2000 Permit Noncompliances at Bryan Mound

Date	Outfall Location	Permit Parameter	Value (Limit)	Cause
3/27/00	002 (Sewage Treatment Plant)	BOD_5	Invalid Sample	Technical noncompliance reported for BOD_5 sample taken at outfall 002. Contaminated container caused sample to be invalidated therefore resulting in failure to comply with permitted sampling frequency. Only contractor provided containers will be used for BOD_5 collection and will be visually inspected prior to use.
5/2/00	001 Brine disposal	Oil and Grease	29 days (28 days holding time)	Technical noncompliance reported for O&G sample caught at outfall 001. Sample was caught on 5/2/00, but analysis was not performed until 6/1/00 exceeding permitted 28 day holding time. Oversight issue was discussed with lab personnel. Chemist developed corrective action plan to prevent recurrence.
5/30/00	002 (Sewage treatment plant)	TSS	21.2 mg/l (20.0 mg/l monthly average)	Sample taken from outfall 002 on 5/30/00 with a TSS value of 45.0 mg/l caused the monthly average to reach 2.2 mg/l which exceeds the permitted 20.0 limit. Plant operators added sodium bicarbonate to raise pH level in aeration basin. This prevents reduction in other bacteria and improves the plant's ability to process the wastes. Aeration times were reduced to limit amount of dissolved oxygen, which helps reduce the N-bacteria.

5.4.4 West Hackberry

West Hackberry personnel performed 738 measurements on permitted outfalls to monitor NPDES compliance during 2000. Table 5-11 provides the permit-required parameters and limits for the West Hackberry outfalls. There were no noncompliances during 2000; therefore, the site compliance level was 100 percent.

The water discharges at the West Hackberry site were regulated under the EPA (NPDES) permit and a corresponding permit issued by the

During CY 2000 the West Hackberry water discharges were regulated by the state of Louisiana under the LPDES permit program.

Table 5-11. Parameters for the West Hackberry Outfalls

Location/Discharge	Parameter	Frequency**	Compliance Range
*Brine to Gulf	Flow Exit velocity Oil & Grease TSS TDS pH DO	Continuous Continuous 1/day 1/day 1/day 1/mo 5 days/wk.	≤0.17 million m^3/day ≥7.6 m/sec (25 ft/sec) ≤15 mg/l (report only) (report only) 6.0 - 9.0 s.u. >0.0 mg/l
Brine	Pressure Flow	Continuous 1/day	report report
Fire Water, Air Conditioner Condensate, Inspection Pit Discharges, Ground Water Discharges, Raw Water Test Discharges (incl. Non-contact Once-through Cooling Water and Diversion Water)	TOC Oil & Grease pH Visible sheen	None None None None	≤50 mg/l ≤15 mg/l 6.0 to 9.0 s.u. no presence
Storm Water (Wellpads & Containments at Slop Oil Tank battery, slop oil tank booster pump pad, vehicle rinse station, brine storage tank area, High Pressure Pump Pad, Fuel Storage Area, Emergency Generator, Lake Charles Meter Station, and RWIS Transformer Area)	Flow Oil and Grease TOC pH Visible Sheen	1/quarter 1/quarter 1/quarter 1/quarter 1/day	(report only) ≤15 mg/l ≤ 50 mg/l 6.0 - 9.0 s.u. no presence
Regulated Hydrocarbons	VOC	1/year	10,000 PPM
Treated Sanitary Wastewater	Flow BOD_5 TSS pH fecal coliform	1/6 months 1/6 months 1/6 months 1/6 months 1/6 months	Report < 45 mg/l < 45 mg/l 6.0 to 9.0 s.u. 400 col./100 ml

- removed from service
- ** Permit requires an increase in the sampling frequency when an exceedance occurs

5.5 SURFACE WATER QUALITY SURVEILLANCE MONITORING

During 2000, 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 which is required by DOE Order 5400.1. 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

Data and statistics are presented in tabular form by site in Tables 5-12 through Table 5-15. 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 summary statistical methods, the coefficient of variation (CV) treatment was incorporated to evaluate the data. The coefficient of variation is 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. This method draws attention to highly variable data sets for further evaluation. Extremely low values of CV (approaching or equal 0.0) indicate little or no variation that may be caused by a preponderance of measurements below the method limit of detectability.

5.5.1 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 (SAL), temperature, dissolved oxygen (DO), oil and grease (O&G), and total organic carbon (TOC) (Table 5-12). A discussion of each parameter follows.

5.5.1.1 Hydrogen Ion Activity (pH)

The annual median values of pH for all the monitored stations ranged from 7.2 to 7.9 s.u. which is consistent with the ambient conditions of surrounding waters. Fluctuations observed are attributed to environmental and seasonal factors such as variations in rainfall, temperature, and aquatic system flushing.

5.5.1.2 Temperature

Observed temperature ranged from 8.3° C to 32.6° C. Temperature fluctuations were consistent among all stations and are attributed solely to meteorological conditions since the Bayou Choctaw site produces no thermal discharges.

5.5.1.3 Salinity (SAL)

In 2000, average annual salinities ranged from 0.5 ppt (indicating below detectable limits) to 4.2 ppt (Station F). Both wetland stations E and F revealed some salinity spikes in their respective databases for 2000. It is believed these values may be related to the persistent drought experienced this summer producing low water conditions and high run-off when the infrequent rains came during the hot summer months. No explicable activities relating to salinity occurred near the adjoining caverns during the year. None of the measured values are expected to produce any discernible physical impacts.

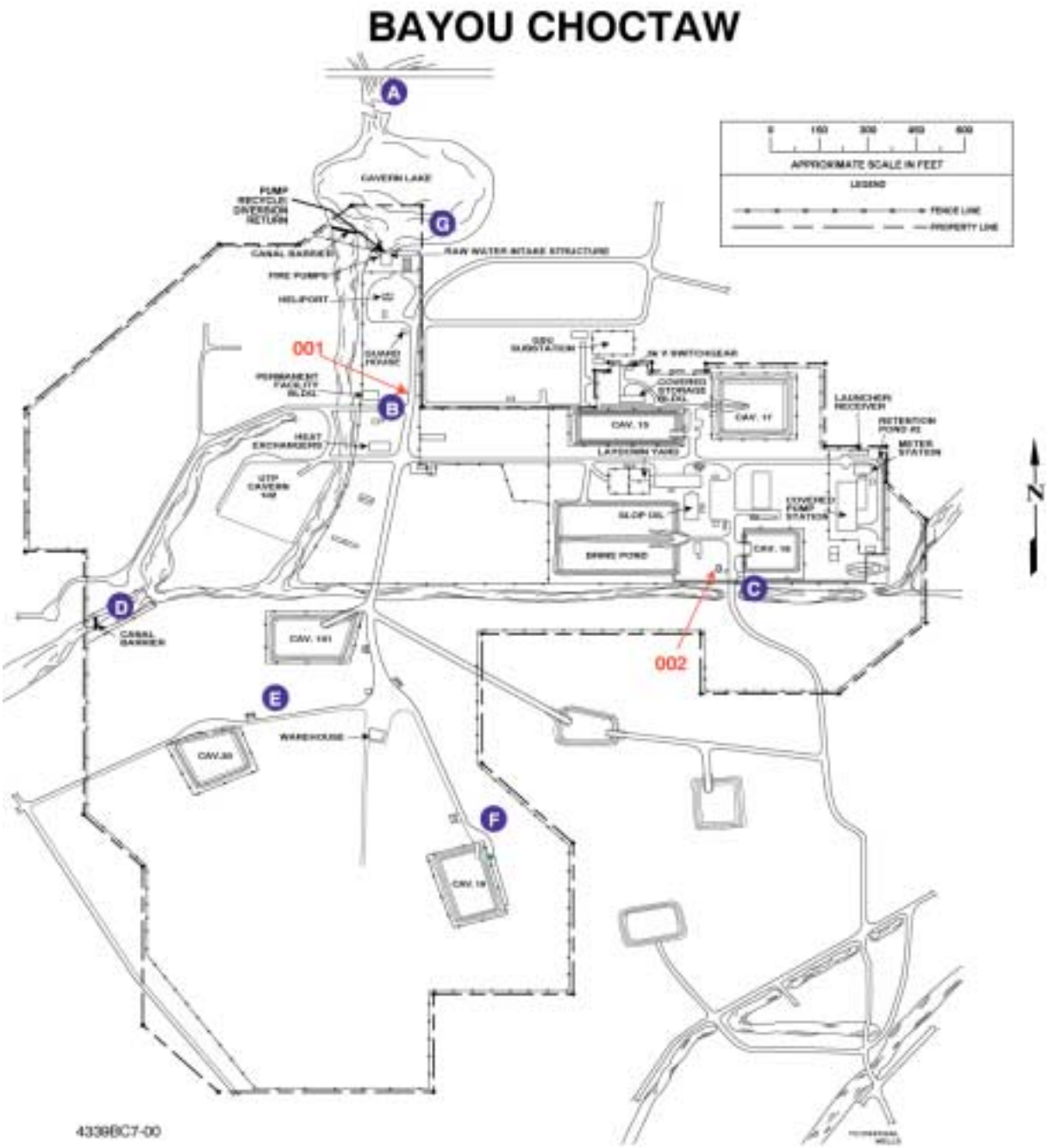


Figure 5-1
(Sheet 1 of 2) Bayou Choctaw Environmental Monitoring Stations

Federal Discharge Monitoring Stations

001	Discharge from sewage treatment plant (administration building)
002	Discharge from sewage treatment plant (control building)

Storm Water Discharges

Storm water and pump flush from pump pads

Storm water runoff from well pads 15, 17-20, and 101

Storm water runoff from brine disposal well pads

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 5-12. 2000 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	0	NV	11	4	0	0
	Maximum	8.8	29.1	2	2.5	8.8	9.6
	Minimum	7	10.1	0.5	2.5	2	4.1
	Mean	NV	20.0	0.6	2.5	5.3	6.3
	Median	7.7	18	0.5	2.5	5.1	5.7
	Standard Deviation	NV	6.7	0.4	0	1.7	1.8
	Coefficient of Variation	NV	33.5	69.3	0	32.7	28.8
B	Sample Size	10	10	10	4	10	10
	Number of BDL	0	NV	4	4	0	0
	Maximum	7.8	28.1	4.3	2.5	5.3	13.8
	Minimum	7.1	11.2	0.5	2.5	2.2	1.6
	Mean	NV	19.9	2.0	2.5	4.5	6.9
	Median	7.5	18.2	1.9	2.5	5.1	5.5
	Standard Deviation	NV	5.8	1.5	0	1.1	4.6
	Coefficient of Variation	NV	29.1	74.1	0	23.9	65.4
C	Sample Size	11	11	11	4	11	11
	Number of BDL	0	NV	3	4	0	0
	Maximum	8.5	32.1	3.9	2.5	8.3	23.9
	Minimum	7.1	11.7	0.5	2.5	1.5	2.9
	Mean	NV	21.1	1.9	2.5	4.9	11.2
	Median	7.3	18.7	1.7	2.5	5.2	10.4
	Standard Deviation	NV	6.5	1.2	0	1.7	7.0
	Coefficient of Variation	NV	30.8	62.9	0	34.4	62.7
D	Sample Size	11	11	11	4	11	11
	Number of BDL	0	NV	10	4	0	0
	Maximum	8.6	29.7	1.1	2.5	9.2	101.0
	Minimum	7	10.8	0.5	2.5	2.3	2.7
	Mean	NV	21.1	0.6	2.5	5.3	19.8
	Median	7.6	18.9	0.5	2.5	4.8	7.2
	Standard Deviation	NV	6.6	0.2	0	1.8	31.2
	Coefficient of Variation	NV	31.4	32.6	0	34.8	157.6
E	Sample Size	11	11	11	4	11	11
	Number of BDL	0	NV	3	4	0	0
	Maximum	8.8	32.6	2.7	2.5	9.2	65.0
	Minimum	7	9.6	0.5	2.5	1.4	6.8
	Mean	NV	19.5	1.6	2.5	4.2	23.1
	Median	7.2	18.4	2	2.5	4.2	17.4
	Standard Deviation	NV	6.9	0.8	0	2.0	19.7
	Coefficient of Variation	NV	35.1	49.8	0	48.2	84.9

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

Table 5-12 (Continued).
2000 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	11	11	11	4	11	11
	Number of BDL	0	NV	2	4	0	0
	Maximum	8.9	31.7	8.5	2.5	10.4	66.5
	Minimum	7	10.3	0.5	2.5	3.3	2.6
	Mean	NV	19.7	4.2	2.5	5.6	27.3
	Median	7.5	18	3.6	2.5	5.6	21.4
	Standard Deviation	NV	6.8	2.8	0	2.0	21.7
	Coefficient of Variation	NV	34.6	66.4	0	35.9	79.7
G	Sample Size	12	12	12	4	12	12
	Number of BDL	0	NV	12	4	0	0
	Maximum	9.1	30	0.5	2.5	11.3	14.2
	Minimum	7.4	8.3	0.5	2.5	3.2	2.4
	Mean	NV	18.7	0.5	2.5	7.2	4.9
	Median	7.9	17.3	0.5	2.5	7.1	4.4
	Standard Deviation	NV	7.3	0	0	2.1	3.1
	Coefficient of Variation	NV	39.1	0	0	28.7	63.4

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

5.5.1.4 Oil and Grease (O&G)

Oil and grease levels were below detectable levels (<5 mg/l) at all stations throughout 2000 which favorably reflects continued good site housekeeping and effective site spill prevention, control, and response efforts.

5.5.1.5 Dissolved Oxygen (DO)

The consistency in DO observations suggests that SPR runoff and discharges do not significantly reduce the DO of receiving waters. The lower levels observed at 1.4 and 1.5 mg/l at various times are attributed to high temperature and high natural organic loading combined with low flow and minimal flushing typically observed in a wetland environment. Peak levels approaching 11.3 mg/l are attributed to high

primary productivity. All of the CV percentages were very low and very similar at all of the stations throughout the year indicating consistent measurements with low variability.

5.5.1.6 Total Organic Carbon (TOC)

Average annual TOC concentrations ranged from 4.9 to 27.3 mg/l. This range of TOC is indicative of biologically stable surface waters. 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. Stations D and E both produced CV percentages indicating wide variability during the year. The highest value measured (101.0 mg/l) occurred at Station D and is believed to be related to the erratic and intermittent flows occurring in this site stormwater canal and may be related to episodes of stagnation and flushing as infrequent storms produced intermittent and episodic run-off. The relatively low values observed as well as the peaks produced no discernible physical impacts and are not out of line with the natural setting or system.

5.5.1.7 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. Observed salinities remained generally low and within the historical range. Those observations of slightly elevated salinity were quite fleeting during the year and may have been related to the deepening drought conditions experienced this year.

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

d. Occasionally low DO levels are attributed to high temperatures and organic loading resulting from low flow and minimal flushing typically observed in backwater swamp areas.

e. The non detectable oil and grease levels observed throughout the year indicate that site oil inventories are effectively managed, minimizing any impact on the Bayou Choctaw environs.

5.5.2 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 (SAL), oil and grease (O&G), dissolved oxygen (DO), and total organic carbon (TOC) were monitored (Table 5-13).

5.5.2.1 Hydrogen Ion Activity (pH)

The 2000 data show the pH of site and surrounding surface waters remained between 6.8 and 8.3 s.u. The annual median values of pH for each of the monitored stations ranged from 6.9 to 7.9 s.u.

5.5.2.2 Temperature

Temperatures observed in 2000 ranged from 11ºC to 36ºC exhibiting the characteristics expected from seasonal meteorological changes. Temperature fluctuations were very similar among all stations.

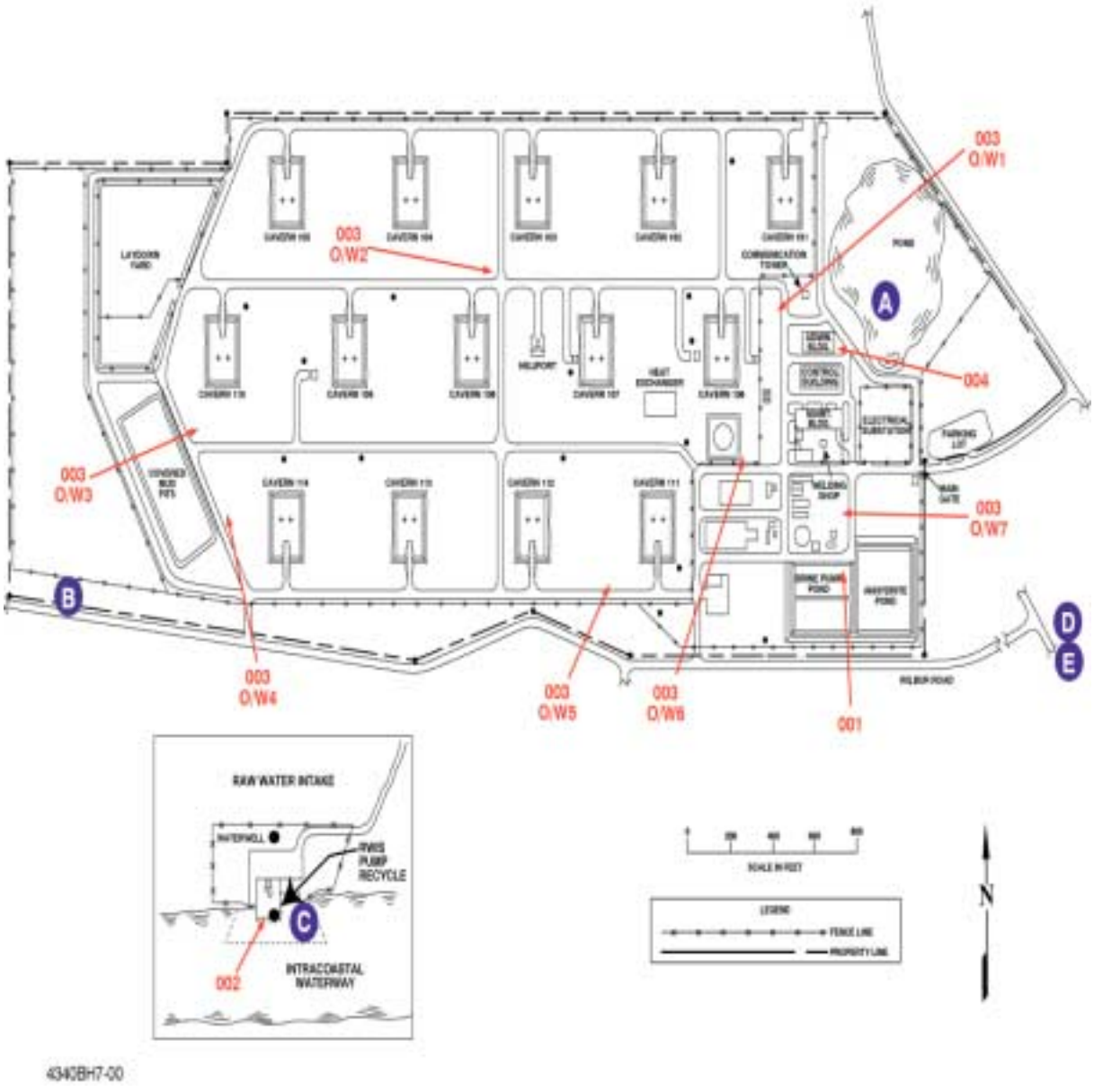


Figure 5-2
(Sheet 1 of 2). Big Hill Environmental Monitoring Stations

Federal Discharge Monitoring Stations

001 Brine disposal to Gulf of Mexico

002 Hydroclone and blowdown at raw water intake structure

003 Storm water discharges

O/W1 Storm water from well pads 101, 102, 106, 107

O/W2 Storm water from well pads 103, 104, 105

O/W3 Storm water from well pads 108, 109, 110

O/W4 Storm water from well pads 113, 114

O/W5 Storm water from well pads 111, 112

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

O/W7 Storm water 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 5-13. 2000 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)
A	Sample Size	8	8	8	8	7	8
	Number of BDL	0	NV	8	8	0	1
	Maximum	8.3	36.0	0.5	2.5	8.6	13.6
	Minimum	7.0	11.0	0.5	2.5	0.9	0.5
	Mean	NV	22.9	0.5	2.5	4.3	8.2
	Median	7.9	23	0.5	2.5	4.6	8.7
	Standard Deviation	NV	7.8	0	0	2. 8	3.8
	Coefficient of Variation	NV	34.1	0	0	65.8	46.8
B	Sample Size	12	12	12	12	11	12
	Number of BDL	0	NV	4	12	0	1
	Maximum	8.1	29.0	23.0	2.5	6.1	22.0
	Minimum	6.9	12.0	0.5	2.5	1.3	0.5
	Mean	NV	22.5	3.3	2.5	3.7	10.9
	Median	7.5	24.5	1.2	2.5	3.5	9.6
	Standard Deviation	NV	5.3	6.3	0	1.5	5.9
	Coefficient of Variation	NV	23.6	194.0	0	41.5	54.3
C	Sample Size	12	12	12	12	11	12
	Number of BDL	0	NV	0	11	0	1
	Maximum	8.2	30.0	27.2	6.7	10.1	8.1
	Minimum	7.2	12.0	3.9	2.5	4.2	0.5
	Mean	NV	23.1	15.6	2.9	7.3	4.5
	Median	7.7	24.5	18.1	2.5	7.8	4.8
	Standard Deviation	NV	5.8	7.2	1.2	2.1	2.3
	Coefficient of Variation	NV	24.9	46.4	42.5	28.9	49.8
D	Sample Size	12	12	12	12	11	12
	Number of BDL	0	NV	0	12	0	1
	Maximum	8.3	33.0	23.5	2.5	12.6	37.5
	Minimum	6.9	12.0	1.8	2.5	1.5	0.5
	Mean	NV	23.8	9.4	2.5	6.3	22.6
	Median	7.8	24.5	7.3	2.5	6.7	23.6
	Standard Deviation	NV	6.3	6.7	0	3.5	9.8
	Coefficient of Variation	NV	26.5	70.7	0	56.1	43.1
E	Sample Size	12	12	12	12	11	12
	Number of BDL	0	NV	0	12	0	1
	Maximum	8.1	30.0	26.5	2.5	7.6	31.9
	Minimum	6.8	11.0	4.0	2.5	1.6	0.5
	Mean	NV	22.6	14.6	2.5	3.8	10.9
	Median	7.4	24.0	17.0	2.5	3.7	8.8
	Standard Deviation	NV	6.0	7.6	0	1.5	8.3
	Coefficient of Variation	NV	26.5	52.2	0	40.1	75.6

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

5.5.2.3 Salinity (SAL)

Annual average salinities were generally low, ranging from fresh on the site throughout the year to a maximum of 27.2 ppt at the RWIS in the ICW in October which is not anomalous or unusual for this location so close to the Gulf. Station B experienced the largest CV again this year, with measurements ranging from BDL to 23.0 ppt. This station has a history of wide variability due to its location and its relationship to rainfall events and flushing. No brine releases or chronic impacts are indicated.

5.5.2.4 Oil and Grease (O&G)

With the exception of one O&G reading of 6.7 mg/l at Station C, the results for all stations were below the detectable limit. Although the duplicate sample for this measurement produced a below detectable limit value, the spike for the batch returned 94 percent recovery and therefore the measurement was accepted. No indication of crude oil impacts from SPR activities was found or observed at any of these stations during the sampling episodes.

5.5.2.5 Dissolved Oxygen (DO)

Dissolved oxygen generally is greatest in the winter and spring and lowest from summer through fall. DO peaks in the summer months at two locations (C and D) may have been related to low water conditions being flushed with oxygenated rainfall at the time of sampling. The lowest variability was at the RWIS where the greater flow and depth of the ICW provided a more constant dissolved oxygen level. The station with the most DO variability during the year was the shallow onsite pond (Station A). Overall the range in DO was found to be 0.9 to 12.6 mg/l with a range of 3.7 to 7.3 mg/l in mean values during the year.

5.5.2.6 Total Organic Carbon (TOC)

Average annual TOC concentrations varied from 4.5 to 22.6 mg/l over the year at the five monitoring stations, ranging from below detectable limits of <1.0 to 37.5 mg/l. The higher TOC levels observed are indicative of potential biological decomposition events.

5.5.2.7 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

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 meteorological and biological influences for such a setting and range of environments.

5.5.3 Bryan Mound

Surface waters surrounding the Bryan Mound site were monitored during 2000. Blue Lake has seven sampling stations and Mud Lake has three established stations.

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 Mud Lake, serves as a control.

Parameters monitored in the Bryan Mound surface waters include pH, temperature, salinity (SAL), oil and grease (O&G), Dissolved Oxygen (DO), and total organic carbon (TOC) (Table 5-14).

Area-wide drought conditions affected the annual sampling routine by lowering lake levels beyond the established sample points. Proper samples could only be obtained once for Blue Lake Stations and twice for Mud Lake. The data sets are correspondingly sparse for this year's annual review.

5.5.3.1 Hydrogen Ion Activity (pH)

In 2000 the pH of Blue Lake and Mud Lake was slightly basic, ranging from 7.8 to 9.4 su for the dataset and from 7.8 to 9.8 su for the control points in both waters. These data are 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.

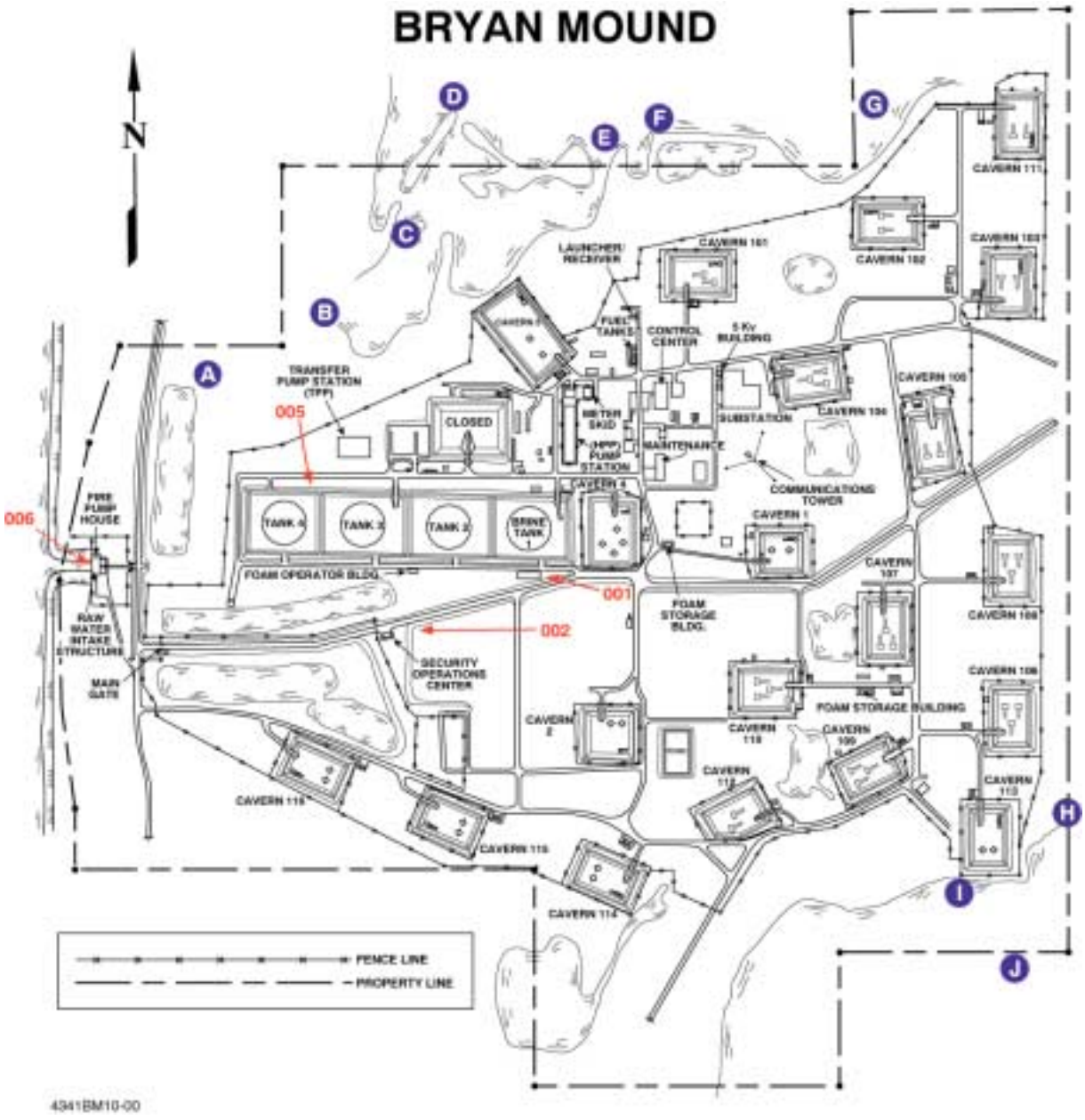


Figure 5-3
(Sheet 1 of 2) Bryan Mound Environmental Monitoring Stations

Federal Discharge Monitoring Stations

001	Brine disposal
002	Discharge from the sewage treatment plant
003	All cavern pads
	Stormwater discharges
	Runoff from well pads 1, 2, 4, 5, and 101-116
004	Runoff from the high-pressure pump pad
	Runoff from transfer pump pad
	Transfer pump pad and pump station
005	Runoff from surge tank area
006	RWIS Pump Recycle

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 5-14. 2000 Data Summary for Bryan Mound 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	1	1	1	1	0	1
	Number of BDL	0	NV	0	1	-	0
	Sample Result	9.4	26.4	6.7	2.5	-	12.6
B	Sample Size	1	1	1	1	0	1
	Number of BDL	0	NV	0	1	-	0
	Sample Result	8.8	28.2	6.1	2.5	-	12.9
C	Sample Size	1	1	1	1	0	1
	Number of BDL	0	NV	0	1	-	0
	Sample Result	9.6	27.7	7.0	2.5	-	10.4
D	Sample Size	1	1	1	1	0	1
	Number of BDL	0	NV	0	1	-	0
	Sample Result	9.8	33.0	6.0	2.5	-	12.9
E	Sample Size	1	1	1	1	0	1
	Number of BDL	0	NV	0	1	-	0
	Sample Result	8.8	30.9	5.7	2.5	-	11.3
F	Sample Size	1	1	1	1	0	1
	Number of BDL	0	NV	0	1	-	0
	Sample Result	8.7	30.4	5.8	2.5	-	11.0
G	Sample Size	1	1	1	1	0	1
	Number of BDL	0	NV	0	1	-	0
	Sample Result	9.3	31.1	5.7	2.5	-	10.5
H	Sample Size	2	2	2	2	1	2
	Number of BDL	0	NV	0	2	-	0
	Maximum	8.3	30.3	30.6	2.5	3.0	6.9
	Minimum	7.8	26.9	15.8	2.5	-	4.0
	Mean	NV	28.6	23.2	2.5	-	5.5
	Standard Deviation	NV	2.4	10.5	0	-	2.1
	Coefficient of Variation	NV	8.4	45.1	0	-	37.6
I	Sample Size	2	2	2	2	1	2
	Number of BDL	0	NV	0	2	-	0
	Maximum	8.3	29.8	30.1	2.5	3.2	8.0
	Minimum	7.8	26.9	15.6	2.5	-	5.1
	Mean	NV	28.4	22.9	2.5	-	6.6
	Standard Deviation	NV	2.1	10.3	0	-	2.1
	Coefficient of Variation	NV	7.3	44.9	0	-	31.3

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

Table 5-14 (Continued).
2000 Data Summary for Bryan Mound 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)
J	Sample Size	2	2	2	2	1	2
	Number of BDL	0	NV	0	2	-	0
	Maximum	8.3	30.5	27.6	2.5	4.7	8.7
	Minimum	7.8	26.1	17.1	2.5	-	7.9
	Mean	NV	28.3	22.4	2.5	-	8.3
	Standard Deviation	NV	3.1	7.4	0	-	0.6
	Coefficient of Variation	NV	10.9	33.2	0	-	6.8

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

The pH fluctuations as measured in these drought-affected Bryan Mound surface waters were quite small and comparable to the normal range of variability seen historically.

5.5.3.2 Temperature

Temperatures observed in 2000 ranged from 26.1º C to 33.0º C and reflect only summer temperatures when water was available for sampling.

5.5.3.3 Salinity (SAL)

Observed salinity fluctuations ranged from 5.7 to 7.0 in Blue Lake and 15.6 to 30.6 ppt in Mud Lake. Salinity fluctuations are attributed to meteorological and tidal conditions rather than site operations, since salinity observed at control sample stations D (6.0) ppt and J (27.6 ppt) were consistent with those found along the site shorelines. The higher salinity values in Mud Lake are primarily caused by the strong tidal and wind influence on the lake, and its more direct link with the nearby Gulf of Mexico through the Intracoastal Waterway. This year's dataset is obviously skewed by the summer-only sampling season.

5.5.3.4 Oil and Grease (O&G)

All of the O&G measurements made during the course of the 2000 calendar year that samples could be obtained were found below the method detectable limit of 5 mg/l. These data are reflective of effective spill prevention and good housekeeping practices being maintained.

5.5.3.5 Dissolved Oxygen (DO)

In Mud Lake, the only test stations tested on one occasion this year, DO ranged from 3.0 to 3.2 mg/l versus their control point which had a reading of 4.7 mg/l. These measurements reflect "no apparent impact" from SPR operations.

5.5.3.6 Total Organic Carbon (TOC)

In 2000 the observed TOC values in Blue Lake ranged from 10.4 to 12.9 mg/l. Observed TOC in Mud Lake was lower (range: 4.0 to 8.7 mg/l) than Blue Lake. Higher TOC measured in Blue Lake is attributed to primary productivity and low volumetric flushing. The TOC levels observed in both lakes, however, are indicative of healthy unaffected ambient conditions.

5.5.3.7 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 for the period tested and slightly basic in both Blue Lake and Mud Lake, but typical of brackish waters.

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

c. Higher TOC levels observed in Blue Lake are attributed to higher primary productivity and low flushing of this surface water body.

d. The dissolved oxygen level measurable in Mud Lake was within typical ranges indicative of seasonal meteorological and biological influences for such a setting and environment.

5.5.4 West Hackberry

In 2000, six surface water quality stations (Figure 5-4) were monitored monthly (where practicable) at West Hackberry. Parameters monitored include pH, temperature, salinity (SAL), dissolved oxygen (DO), oil and grease (O&G), and total organic carbon (TOC) (Table 5-15).

5.5.4.1 Hydrogen Ion Activity (pH)

The pH of site and surrounding waters ranged between 6.2 and 8.6 s.u., and median values ranged from 7.0 to 7.7 s.u.

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

5.5.4.2 Temperature

Observed temperatures in 2000 were consistent with observations at other sites and were indicative of regional climatic effects. No off-normal measurements were observed. Recorded temperatures ranged from 7.3º C to 36º C and were generally consistent among stations.

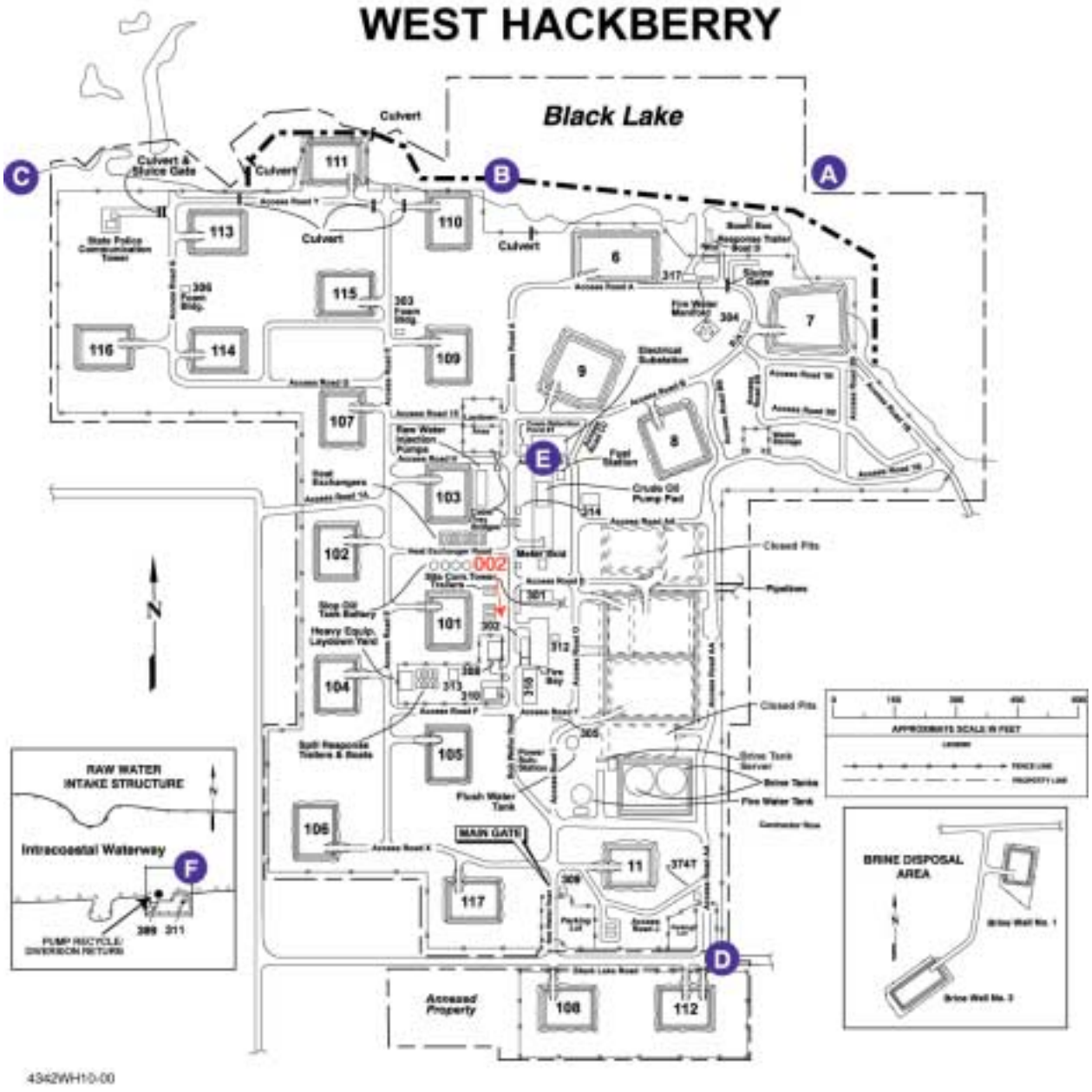


Figure 5-4
(Sheet 1 of 2) West Hackberry Environmental Monitoring Stations

Federal Discharge Monitoring Stations

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 (not shown)

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 5-4
(Sheet 2 of 2). West Hackberry Environmental Monitoring Stations

Table 5-15. 2000 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	0	NV	0	4	0	0
	Maximum	8.1	35.0	22.3	2.5	9.2	25.0
	Minimum	7.0	7.3	8.3	2.5	4.4	6.4
	Mean	NV	22.0	15.3	2.5	7.3	10.2
	Median	7.5	22.0	14.6	2.5	7.7	8.3
	Standard Deviation	NV	7.6	4.2	0	1.6	5.0
	Coefficient of Variation	NV	34.6	27.6	0	21.3	49.2
B	Sample Size	12	12	12	4	12	12
	Number of BDL	0	NV	0	4	0	0
	Maximum	8.1	36.0	22.2	2.5	10.3	22.3
	Minimum	6.6	7.4	10.4	2.5	5.4	6.9
	Mean	NV	22.3	15.3	2.5	7.6	10.1
	Median	7.7	22	14.7	2.5	7.9	8.3
	Standard Deviation	NV	7.9	3.9	0	1.4	4.3
	Coefficient of Variation	NV	35.4	25.4	0	18.7	42.6
C	Sample Size	12	12	12	4	12	12
	Number of BDL	0	NV	0	4	0	0
	Maximum	8.0	35.0	22.1	2.5	10.2	24.3
	Minimum	6.4	7.5	7.7	2.5	4.9	6.8
	Mean	NV	22.0	15.1	2.5	7.5	10.2
	Median	7.7	22.0	15.2	2.5	7.5	8.5
	Standard Deviation	NV	7.6	4.1	0	1.7	4.9
	Coefficient of Variation	NV	34.5	27.1	0	22.8	48.1
D	Sample Size	10	10	10	3	10	10
	Number of BDL	0	NV	10	3	0	0
	Maximum	8.6	35.0	0.5	2.5	13.3	14.9
	Minimum	6.7	11.0	0.5	2.5	2.9	7.0
	Mean	NV	21.3	0.5	2.5	7.5	11.6
	Median	7.6	19.5	0.5	2.5	6.9	12.3
	Standard Deviation	NV	6.9	0	0	3.4	3.2
	Coefficient of Variation	NV	32.2	0	0	44.9	27.9

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

Table 5-15 (Continued).
2000 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)
E	Sample Size	12	12	12	4	11	12
	Number of BDL	0	NV	7	4	0	0
	Maximum	8.3	36.0	4.7	2.5	9.9	11.4
	Minimum	6.9	12.4	0.5	2.5	4.0	5.4
	Mean	NV	22.9	1.3	2.5	6.3	8.6
	Median	7.4	23.0	0.5	2.5	6.4	8.5
	Standard Deviation	NV	6.2	1.4	0	1.8	2.2
	Coefficient of Variation	NV	26.8	104.3	0	29.1	25.3
F	Sample Size	12	12	12	4	12	12
	Number of BDL	0	NV	0	4	0	0
	Maximum	7.7	33.0	23.7	2.5	8.6	17.9
	Minimum	6.2	7.6	1.9	2.5	4.9	5.5
	Mean	NV	21.9	9.2	2.5	6.9	9.4
	Median	7.0	22.0	7.2	2.5	6.8	8.4
	Standard Deviation	NV	7.5	7.6	0	1.3	3.2
	Coefficient of Variation	NV	34.4	82.5	0	19.1	34.3

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

5.5.4.3 Salinity (SAL)

Meteorological factors such as wind, tide, and rainfall contributed to the salinity variation observed in brackish Black Lake (Stations A, B, and C) and the Intracoastal Waterway (ICW) (Station F). Salinity ranges observed in these water bodies (7.7 to 22.3 ppt in Black Lake) (1.9 to 23.7 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 (9.2 ppt) was lower than that of Black Lake (15.1 to 15.3 ppt) due largely to the fresher water influences received from more northerly drainage ways.

Salinities observed at the two upland site stations were affected by surface runoff and not by Black Lake. Median salinities in the

drainage ditch at the southwest corner of the site (Station D) and at the high pressure pump pad (Station E) were 0.5 ppt, which indicates below the detection limit (BDL). Some ephemeral and slight salt effects were associated with the high pressure pump pad, which revealed a peak value at 4.7 ppt. More than half the monthly measurements, however, were BDL during the year which indicates the limited drips sustained were infrequently flushed due to lower than normal rainfall incidents and duration.

5.5.4.4 Oil and Grease (O&G)

Observed O&G levels were below the detectable level (5 mg/l) for all monitoring stations during 2000. The data reflect effective spill prevention and good housekeeping by site personnel.

5.5.4.5 Dissolved Oxygen (DO)

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 2000.

5.5.4.6 Total Organic Carbon (TOC)

Average annual TOC concentrations range from 8.6 to 11.6 mg/l with Station A experiencing the highest single value of 25.0 mg/l during the year. This value is not out of line with the generalized industrial setting and is very consistent with the measurements obtained during the year at all Black Lake stations. Because the variation is so consistent among these three stations and notably different from the other stations, it is

indicated that these measurements reflect ambient Black Lake conditions experiencing drought.

5.5.4.7 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, generally slightly basic, and were only affected by seasonal factors.

b. The salinities observed throughout 2000 were consistent with the ambient brackish environment.

c. Oil and grease levels were below the detectable limit at all stations throughout 2000, 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 especially the grouping of Black Lake only stations, suggesting no substantial transient bio-contamination or ecological events.

5.6 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.

5.6.1 Oil Spills

State and federal agencies require notification if an oil spill meets or exceeds the reportable criteria. This reportable criteria is established by each agency and may vary greatly in the amount to be considered a reportable spill. This is illustrated by the following examples: one barrel for the LDNR, five barrels for the RCT, and a sheen on a navigable waterway for the National Response center. There was only one reportable oil spill during 2000 with a volume totaling 70 bbls shown in Table 5-16. This spill was fully contained on site and did not result in any environmental damage.

In 2000, the total volume of oil moved (received and transferred internally) was approximately 9.9 million m^3 (62.6 mmb). The total number of reportable crude oil spills, total volume spilled, and the percent volume spilled of total volume moved are shown in Table 5-17 for each year from 1982 through 2000.

Table 5-16. 2000 Reportable Oil Spill

Date	Location	Amount	Cause/Corrective Action
7/1/00	WH	70 Bbls	An unleveled frac tank overflowed at cavern 106 resulting in the release of approximately 70 bbls of crude. Operator error was determined as the root cause due to failure to maintain low/medium level in the tank. Contributing causes included the ball float in the high level alarm was not working correctly, and the connection valve between the two sight glasses was plugged. Oil flowed out of the hatch into a containment ditch at NW corner of the pad. Approximately 70 bbls was recovered.

Table 5-17. Number of Reportable 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
1996	4	4.7 (30)	0.00002
1997	1	0.32 (2)	4.0×10^{-9}
1998	1	Sheen	N/A
1999	1	31.8 (200)	0.00056
2000	1	11.1 (70)	0.00011

5.6.2 Brine Spills

Brine spills in quantities of one barrel (42 gallons) or greater are reportable as required by regulation. There were no reportable brine spills on the SPR during 2000.

The SPR disposed of 2.864 m^3 (17.9 mmb) of brine during 2000. Table 5-18 illustrates the total number of brine spills, total volume spilled, and percent volume spilled of total volume disposed for each year from 1982 through 2000.

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.

Table 5-18. Number of Reportable 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
1996	5	179.7 (1,130)	0.0014
1997	0	0	0.0
1998	3	6.2 (39)	0.00028
1999	0	0	0.0
2000	0	0	0.0

6. GROUND WATER MONITORING AND PROTECTION INFORMATION

Ground water monitoring is performed at the Bayou Choctaw, Big Hill, Bryan Mound, Weeks Island and West Hackberry sites to comply with DOE Order 5400.1, and in the case of Weeks Island and West Hackberry, a state agency agreement. Salinity is measured and the presence of hydrocarbons is screened at all sites. The monitoring scheme performed at West Hackberry is required by an agreement between DOE and the LDNR. West Hackberry ground water monitoring and recovery activities were reported quarterly, as required, to the LDNR in 2000. At the Weeks Island site, long-term ground water monitoring is performed and reported as part of the state approved decommissioning plan. Bryan Mound ground water quality is conveyed annually via separate copy of this report to a division of the RCT by special request since 1998. Six wells enclosing the operating brine storage and raw water systems ponds at Big Hill are monitored as part of permit required leak detection. The St. James terminal has undergone a thorough remediation which satisfied state criteria. In addition to this, studies taken have only indicated the presence of small quantities of crude oil. Because of this, there are no permanent ground water monitoring stations located on site although crude oil remediation continued throughout 2000.

Ground water salinity data collected for the past five years are presented graphically, as available, and are then discussed within each site-specific section. The graphs' Y-axes have been standardized with few noted exceptions at either the 0–10 ppt or 0–100 ppt as the baseline. This allows an easier to follow comparison among the monitoring stations at the SPR sites.

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 consists 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 locally with the Mississippi River, flowing away from it during the high river stage and towards the river when in the low stage. Other local influences to the general flow patterns are manifested by structural features such as the piercing salt domes and proximity to off-take.

Historically, there have been four monitoring wells (BC MW1, BC MW2, BC MW3, and BC MW4) at Bayou Choctaw (Figure 6-1). These wells were drilled roughly 9 m (30 ft) below land surface (bls) to monitor potential impact from the brine storage pond and any other potential shallow contamination sources. The verification well study placed seven additional similarly screened wells at various selected locations around the main site and one remotely located down near a selected brine disposal well pad based upon the Phase I non-intrusive site studies.

These wells have now been added to the site's monitoring scheme to enhance evaluation of ground water flow direction and outlying salinity movements and variation. The monitoring results of these wells were neither graphed nor included in this report because there are insufficient data to make representative five-year trending charts as with the historical wells. See the CY 1996 Site Environmental Report for a detailed overview of the Phase II studies of this site. An adjunct of these studies is the determination of an estimated linear velocity for the shallow ground water movement of the monitored zone. For Bayou Choctaw the water in the shallow zone moves an estimated 1.2 to 2.4 m (4 feet to 8 feet) per year in a generally radial direction off the main site and underlying dome.

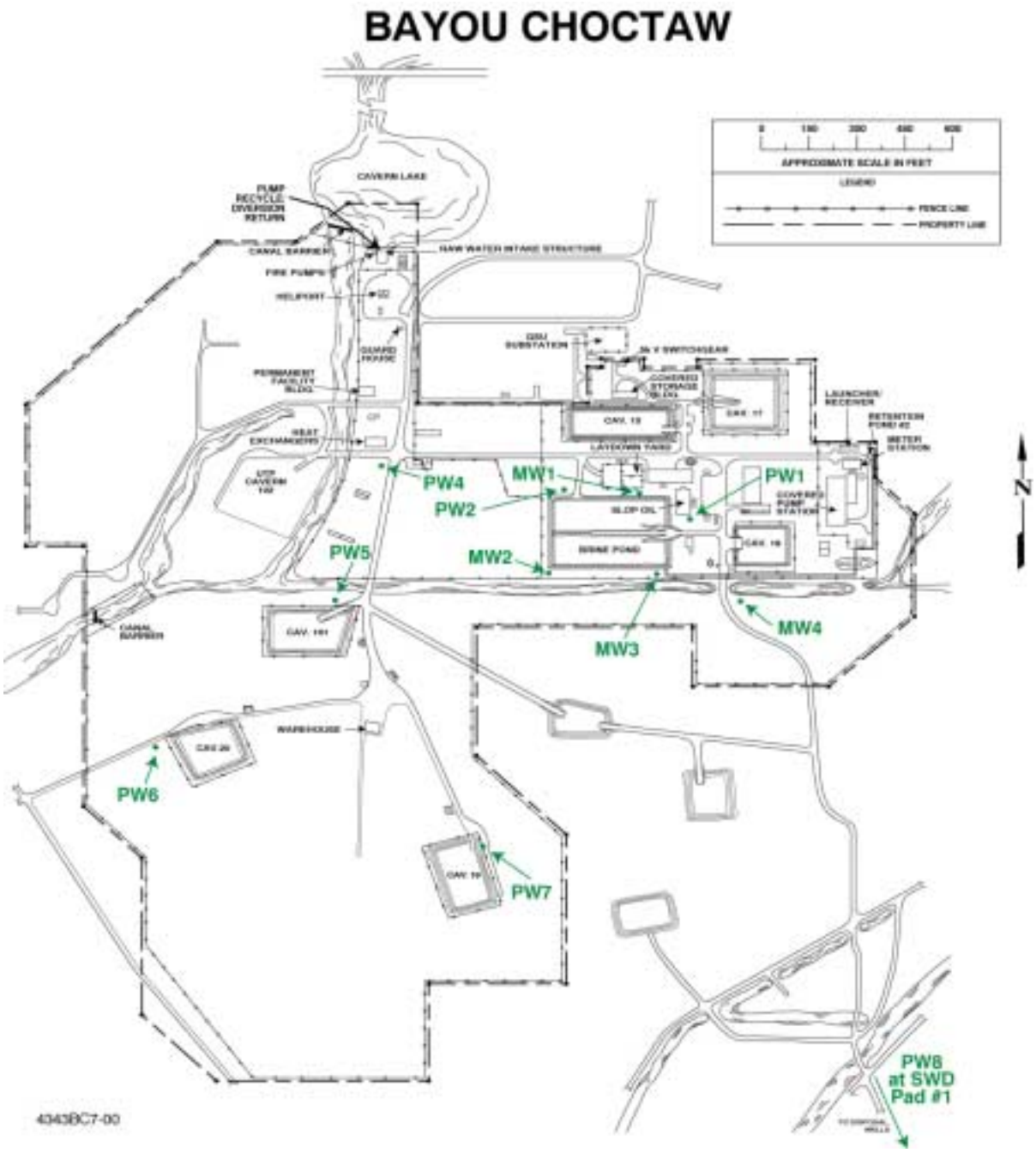


Figure 6-1.
Bayou Choctaw Ground Water Monitoring Wells

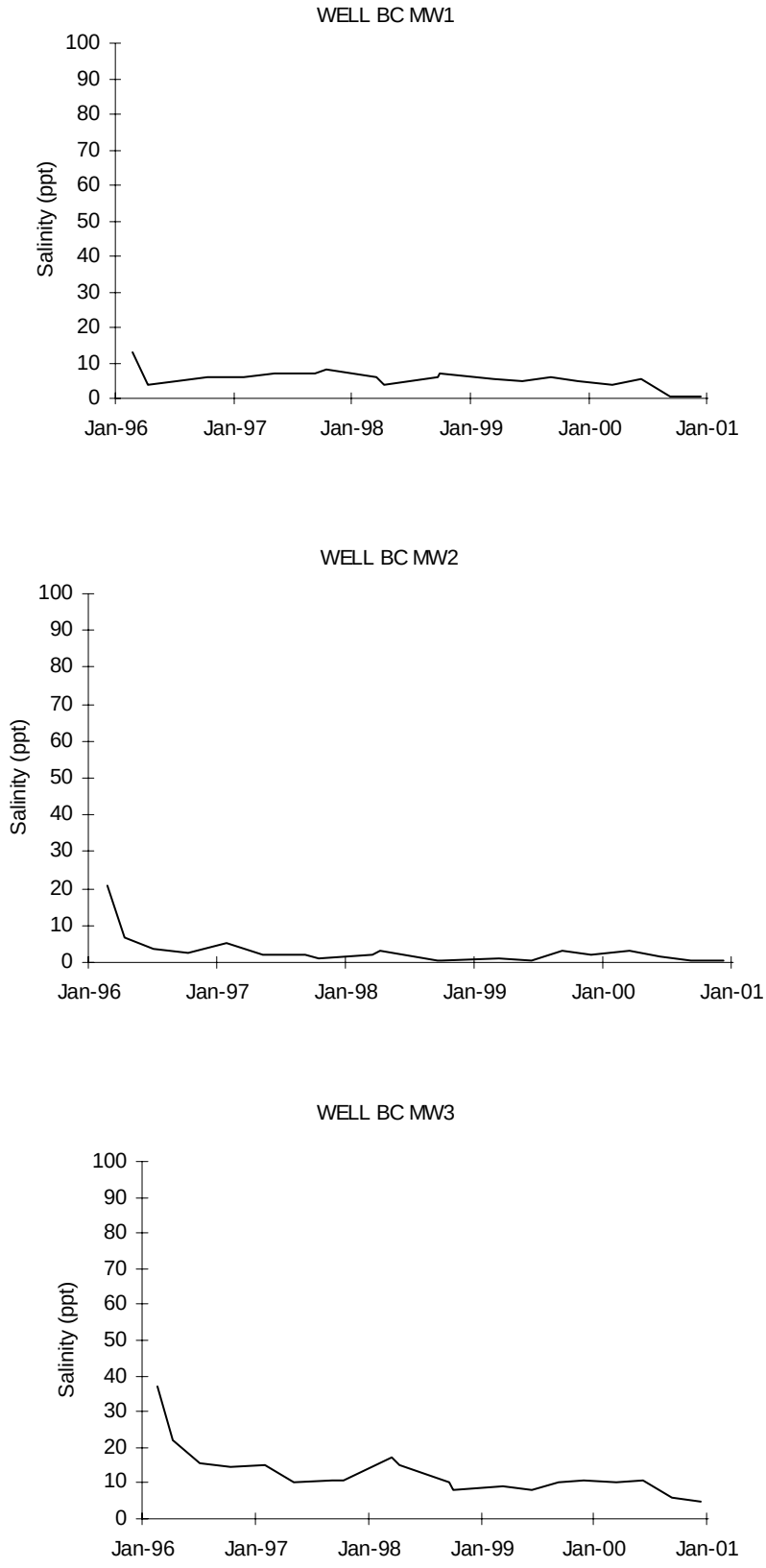


Figure 6-2.
Bayou Choctaw Ground Water Monitoring Well Salinities

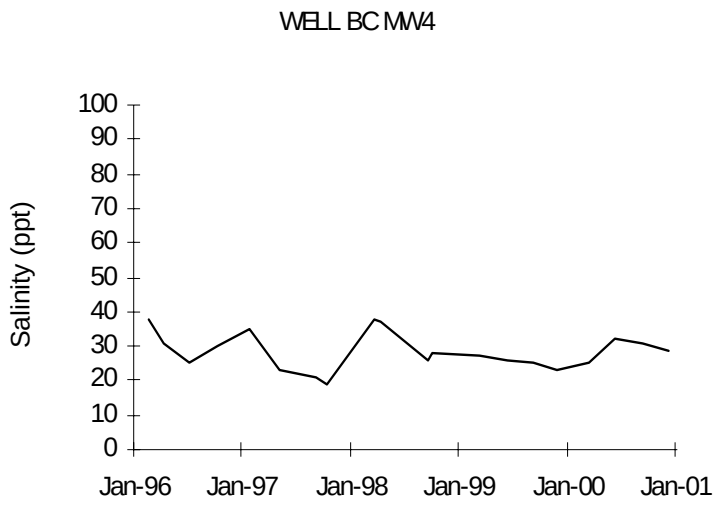


Figure 6-2. (Continued)
Bayou Choctaw Ground Water Monitoring Well Salinities

Ground water salinity observed at the four historical wells (Figure 6-2) has been above an ambient cut-off concentration of 10 ppt for a fresh water environment for some time. This condition of elevated salinity is attributed to a previous owner's distant past operation activities and possibly some recent past brine handling activities.

All four wells exhibit seasonal salinity fluctuations that are affected by rainfall. Higher salinity values usually occur in late winter and early spring, and lower salinity measurements have been observed in late spring and summer. The five year trends at each of these four well locations, however, continues to decrease with time and in a very similar fashion with the exception of well BC MW3 which exhibits a more steeply declining trend indicative of the passage of impact from a single (past release) event.

Past surface brine spills and other activities from previous occupants of the area may have also affected the ground water salinity observed

in these shallow wells. The long-term salinity range observed at well BC MW3 has been much greater than that of the other three historical wells. However, as time goes on, this well is returning to the ambient conditions more reflective of background, as observed with wells BC MW1 and BC MW2. Well BC MW4 located downgradient of the site and south of the E-W canal has revealed a somewhat elevated overall salinity concentration, but the overall time-series trend is decidedly downward. Much of the variability exhibited with the earlier data may have resulted from overpurging and inconsistently applied sampling techniques. At this site, the advent of the dedicated low-flow sampling apparatus and technique has greatly aided the ground water testing by assuring that a more representative sample is routinely obtained. Ground water surface piezometric data of all the wells indicate that ground water movement is radial in all directions from the high point on the dome around Cavern 15. 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 southerly movement was first captured by BC MW3.

The historical graph indicates that the salinity is demonstrably lessening as time goes on, and the transient effects of the spill become either dilute or are moving past this monitoring position to potentially influence the further downgradient position well BC MW4.

Long-term salinity trends have been established which, when examined within the context of the radial ground water movement, assist in identifying possible areas or sources of contamination. Each of the five-year trending charts for the Bayou Choctaw wells indicate decreasing salinity. At the upgradient well BC MW1 and the immediately downgradient intercept well BC MW2 a continuing general (five-year trend) of decreasing salinity continues into 2000.

The variability evident with the data sets early in 1996 attest to the consistency associated with the advent of the low-flow methodology.

It is that early variability which results in the long-term decreasing trends noted. Well BC MW1 is situated up gradient of the potential source represented by the brine pond and well BC MW2 appears to be immediately down gradient of the brine pond see Figure 6-3, Contoured Ground Water Elevations. A potential source of subsurface contamination may be residuals from historical activity that occurred along the northwest corner of the pond. Verification well BC PW2 encountered this area of existing affected ground water. The limited measurements obtained since its installation indicate no trends but rather a flat (with time) area of impact which, judging from the flow patterns, is associated with the current brine pond operations.

Although it has in the past captured the most saline ground water on the site, BC MW3 is decreasing in salinity over time. The downward sloping five-year salinity trend evident at BC MW3 differs from that observed at the other pond wells apparently confirming the ephemeral impact of a former piping leak found and repaired near the low pressure pump pad. The data now indicate the impact of that piping break has essentially recovered to ambient at this position and the year 1996 reflected the majority of that change.

The present five-year salinity trend of well BC MW4 defines a moderating salinity with time. The trend now seen is slightly downward and the wide fluctuations observed in the earlier portions of the well's history appear to have moderated as well. This well is situated away from and down gradient of the brine pond and also downgradient of the effects observed near the formerly higher salinity well BC MW3.

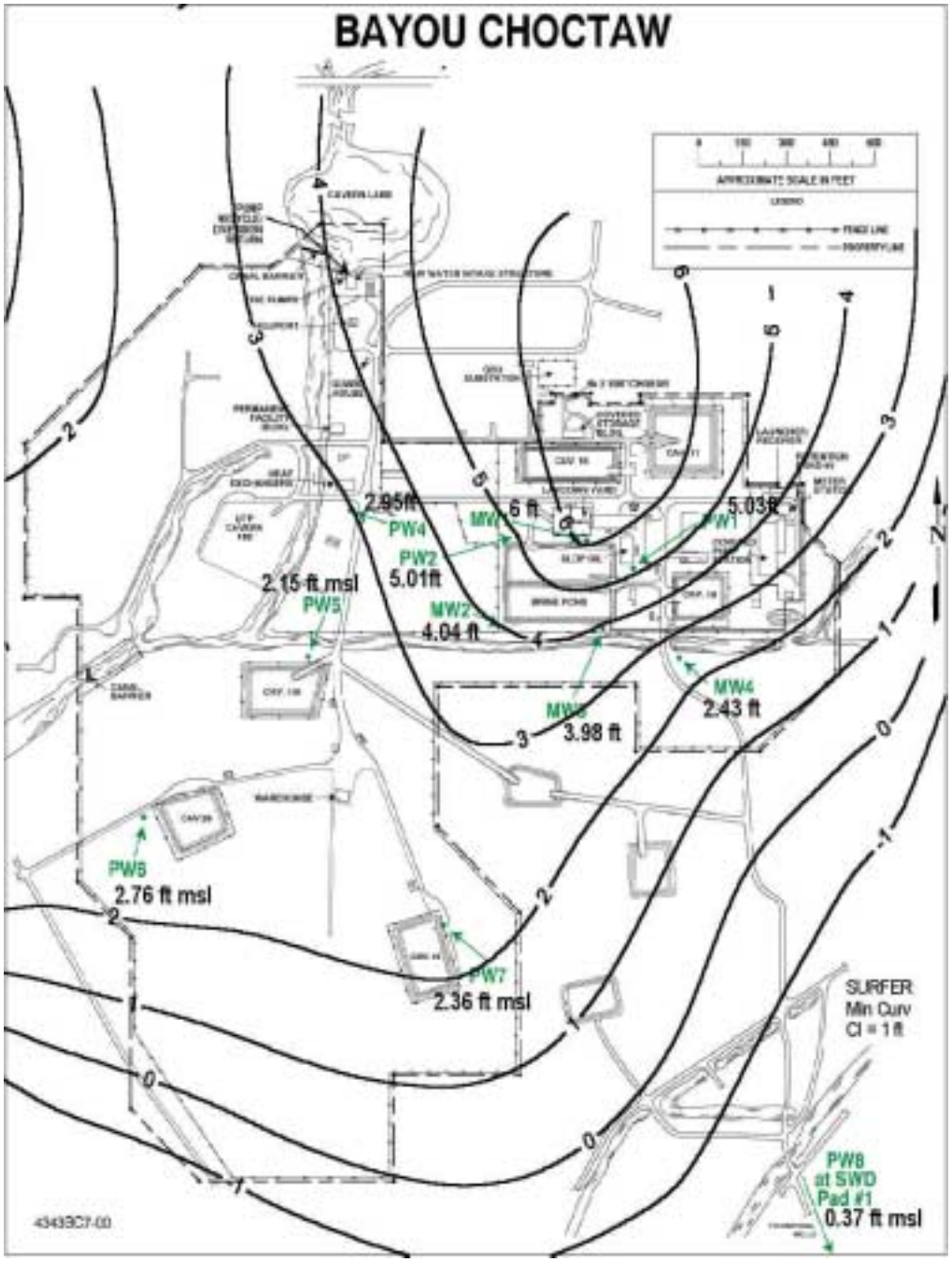


Figure 6-3
Bayou Choctaw Shallow Ground Water Contoured Elevations (3/28/00)

Changes in sampling methodology implemented in 1995 and 1996 may have affected the historical trending at all positions and an overall general five-year decreasing trend is definitely evident with this data set.

All of the data obtained from the verification wells maintained beyond the original scope, with the exception of BC PW7, do not reveal any noticeable time trends to date. All data points at each well location appear to fluctuate very regularly over the four year period of record. Well BC PW7, however, has the most variable data set observed thus far, but the variability is moderating as the well "settles in" with time.

Future ground water data, including that from the newly added wells from the Phase II verification studies and ongoing inspections of the brine pond and site piping, will assist in determining if any contamination observed originated from SPR activities. The shallow ground water monitoring well net is adequately placed and sampled to serve as a complete site-wide detection monitoring system.

Figure 6-3 presents the annual review and plot of the potentiometric surface of the shallow ground water beneath the Bayou Choctaw site. These data illustrate the shape of the potentiometric surface allowing us to deduce the flow direction and estimate the gradient. The Spring quarter data was selected for all SPR sites to aid with comparisons.

6.2 BIG HILL

The three major subsurface hydrogeological formations in the Big Hill area are the Chicot and Evangeline aquifers and the Burkeville 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 BH MW1 to BH MW6) around the brine disposal pond system (Figure 6-4) began in 1987. Big Hill began sampling these wells by the low-flow method in May 1995. The interconnected pond system is composed of three contiguous Hypalon-lined ponds, of which two have a protective concrete topcoat. All three have an underdrain system contained within a surrounding slurry wall system keyed to an underlying clay bed. Salinity data collected from the six wells for the past five years indicate complete consistency among them. Salinity of ground water from all wells has remained at or below the detection limit (1 ppt) of the salinity meter used (Figure 6-5). All observed values that are below the established detection limit are evaluated as one-half the detection limit for statistical calculations. No measured impacts have been determined in the past five-year history graphically presented and no ground water effects associated with the pond operation are evident since monitoring was begun in 1987. Flow in this monitored zone is estimated at almost 4 m (12 ft) per year. Also located on the site are 16 two-inch brine piping leak detection monitoring wells (BH MW2-1 to BH MW2-16). These wells were originally installed at locations immediately adjacent to the buried brine header system, many instances within the piping's backfilled trench, in an effort to early-detect brine releases should a leak occur. In most cases, since the advent of the area-wide drought, these wells, completed for the most part in the backfill of the buried piping trenches, are not sufficiently deep enough to even intercept the shallow uppermost aquifer (Figure 6-4). As a result of life extension

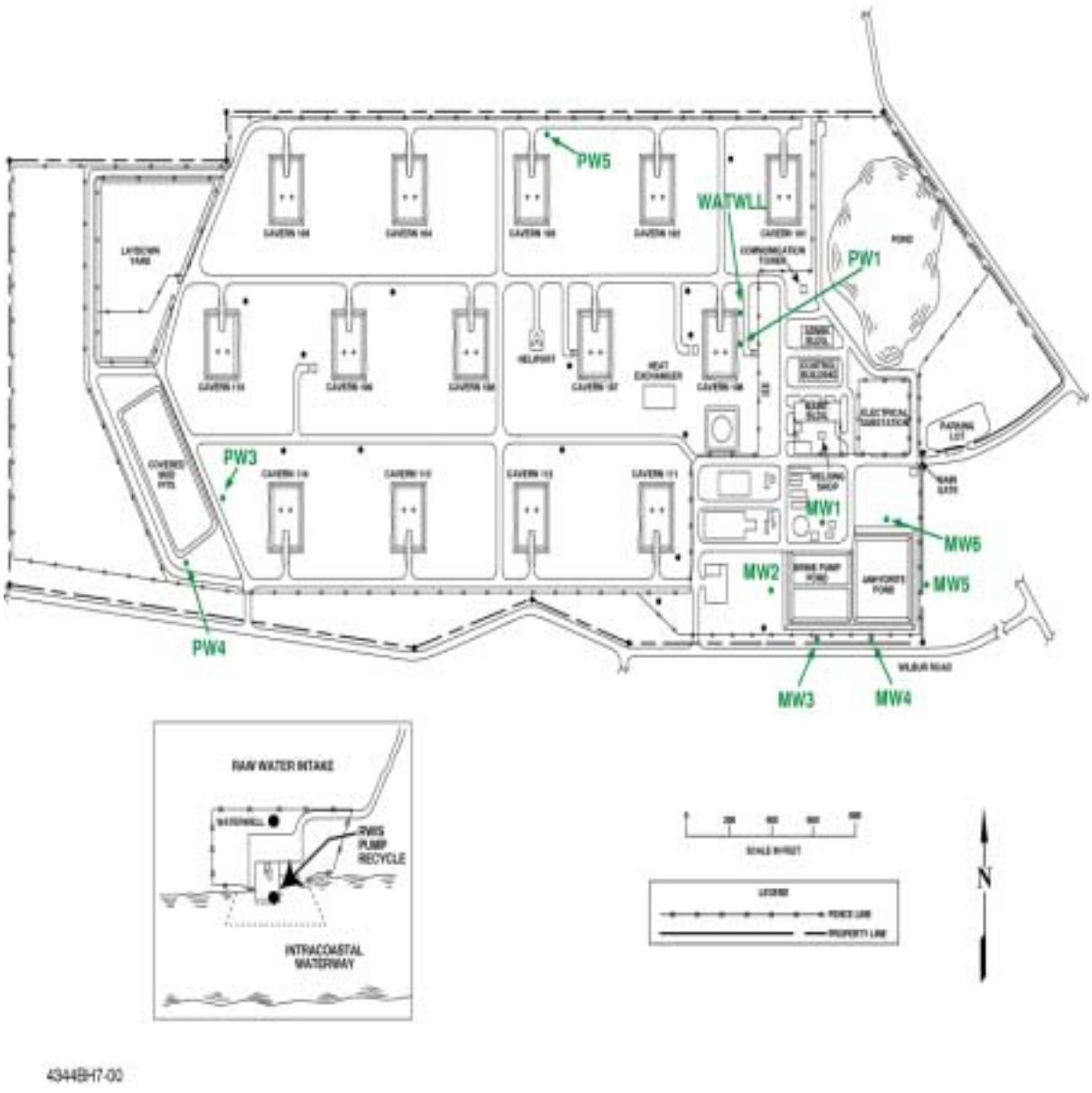


Figure 6-4.
Big Hill Ground Water Monitoring Wells

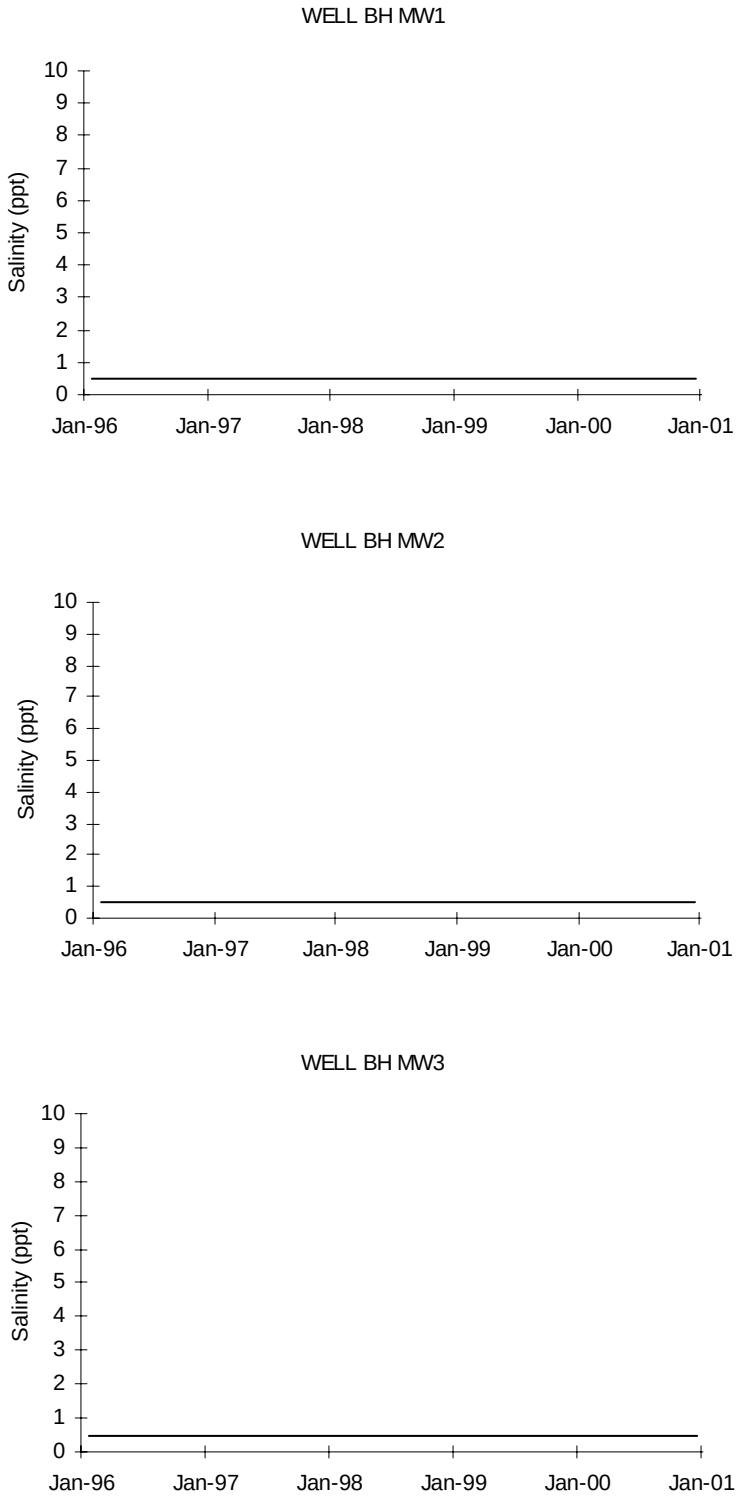


Figure 6-5.
Big Hill Ground Water Monitoring Well Salinities

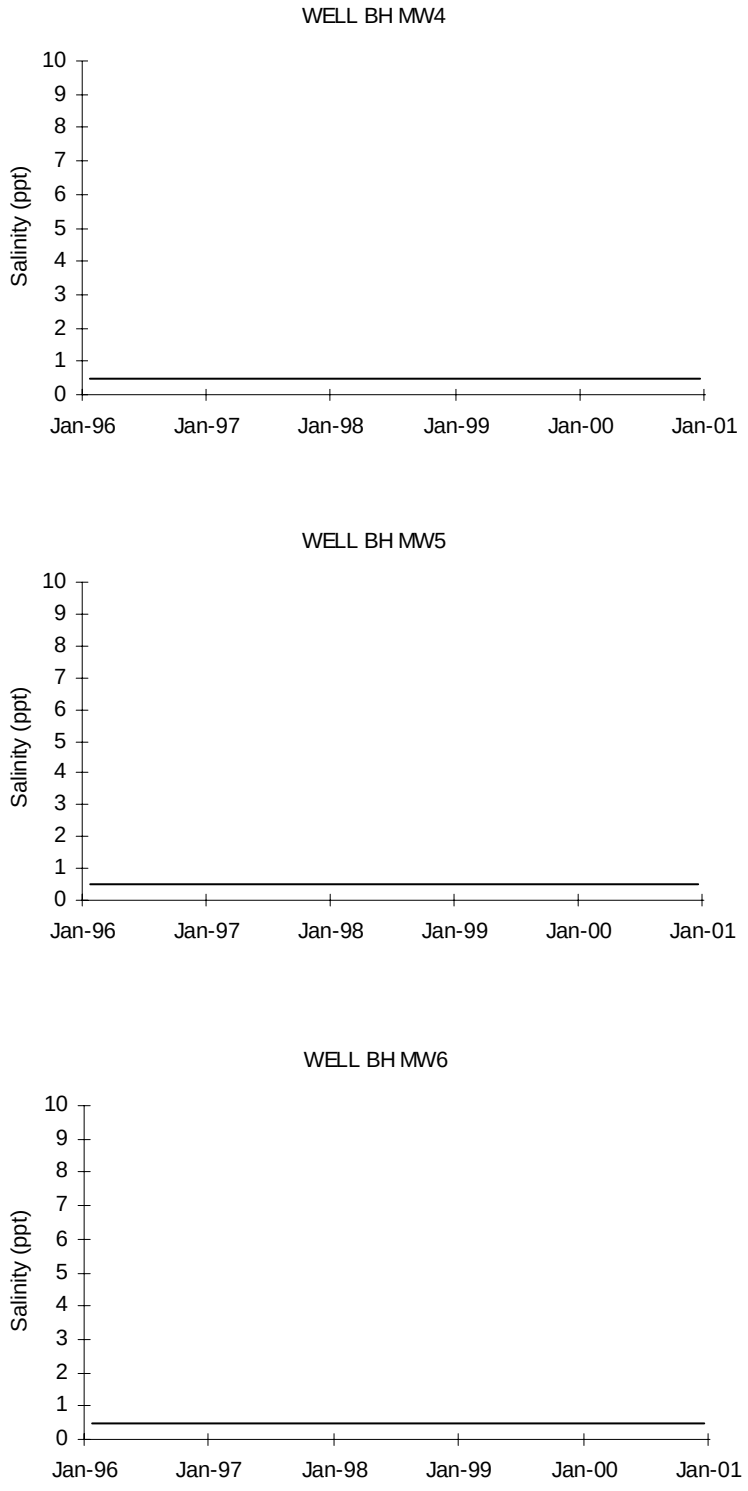


Figure 6-5. (Continued)
Big Hill Ground Water Monitoring Well Salinities

construction, which has replaced much of the below ground brine piping with aboveground piping, the original purpose of these wells has been eliminated. During 2000 only water level measurements were attempted on these points, and for most of the year most of the points were found to be dry. Each of these wells will be abandoned after site construction work is satisfactorily completed, and the contract is let for a licensed contractor to perform the work now proposed for implementation during fiscal year 2001.

Figure 6-6 presents the contours of the spring quarter's potentiometric surface of the shallow water bearing zone beneath the Big Hill site. This depiction can be used to ascertain the general flow direction in the vicinity of the brine holding pond system and also to estimate the gradient.

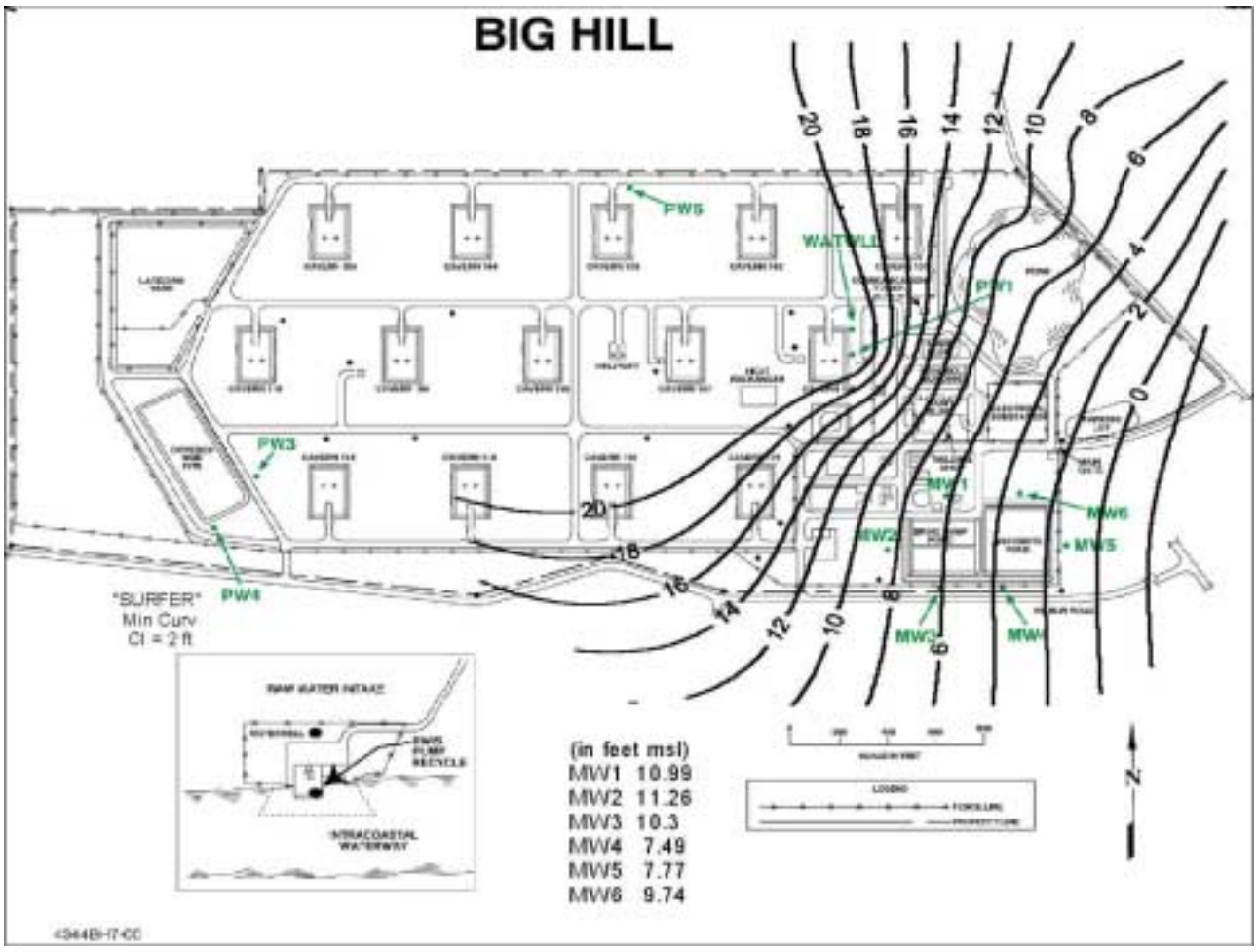


Figure 6-6
Big Hill Shallow Ground Water Contoured Elevations (3/28/00)

6.3 BRYAN MOUND

Site monitoring wells in two water bearing zones, 6 and 15 m (20 and 50 ft) bls indicate that no shallow fresh water exists over the salt dome in the uppermost inter-connected aquifer. This generalization was confirmed by the additional salinity data from the verification well study (VWS) in 1995-96. 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 up-gradient of the Bryan Mound saltdome.

Fifteen monitoring wells have been drilled at Bryan Mound in four phases between 1981 and 1990 (Figure 6-7). Sampling began shortly after installation. Bryan Mound did not begin using the modified low flow technique for sampling these wells until September 1995. Wells BM BP1S, BM BP2S, and BM PZ2S have been removed from monitoring service due to casing damage. BM BP1S is discussed further below. Five additional shallow well locations and one additional deep well were installed in 1996 as part of the VWS, and all of these have been incorporated into the site's monitor well net.

Wide salinity fluctuations observed in the Figure 6-8 graphs commencing early in the year 1995 are due to the site-wide implementation of a change of sampling methodology. Consistent purging methods were instituted but poorly practiced commencing in September 1993, and a later modified (site-specific) version of the new low flow sampling technique was instituted commencing in the fall of 1995.

Salinity trends are evident in contaminated and uncontaminated areas. Elevated ground water salinity measurements in both zones in the brine pond and pump pad area have remained relatively constant overall, despite the fluctuations noted which are believed to be an artifact of an inconsistent sampling technique.

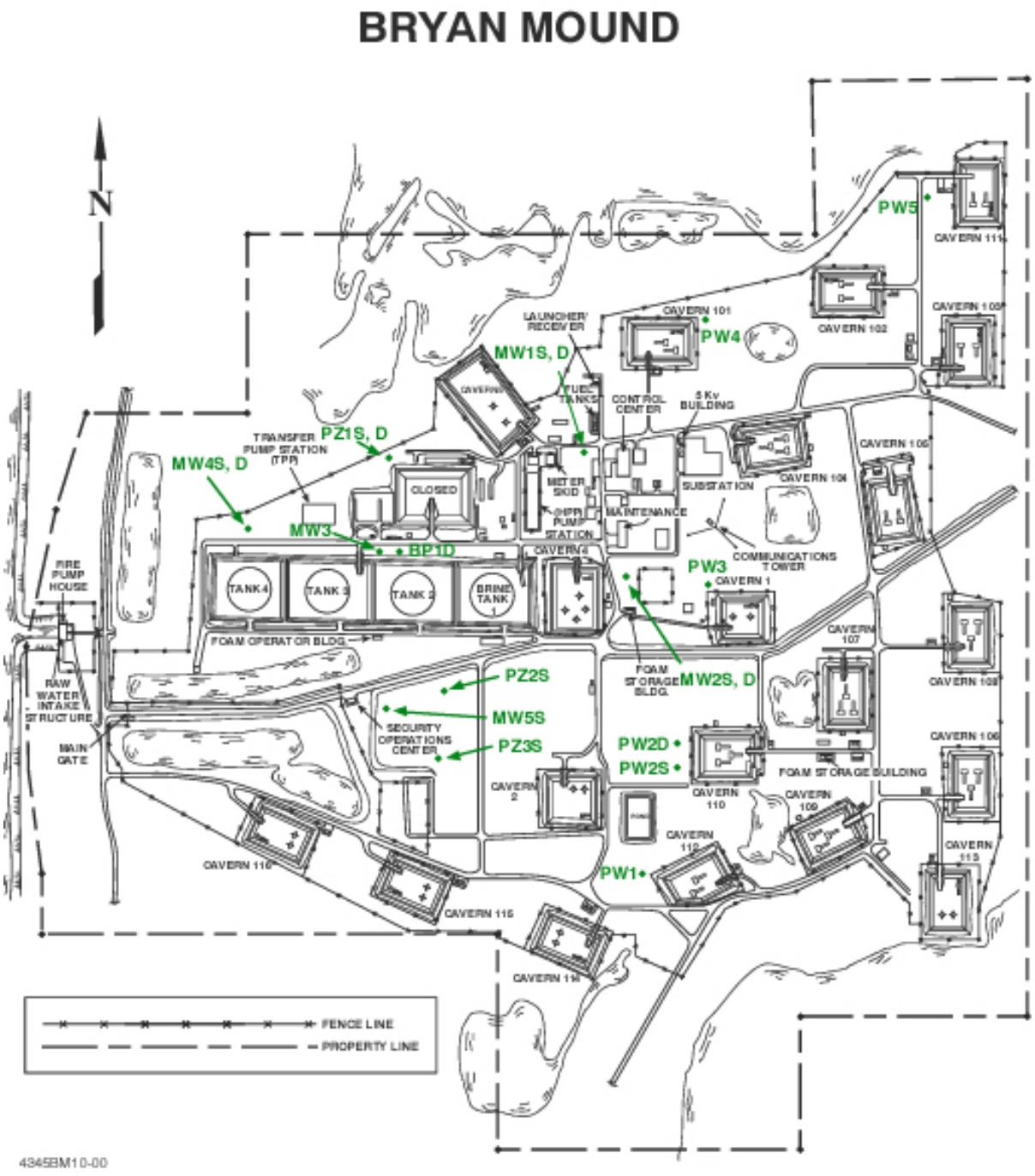
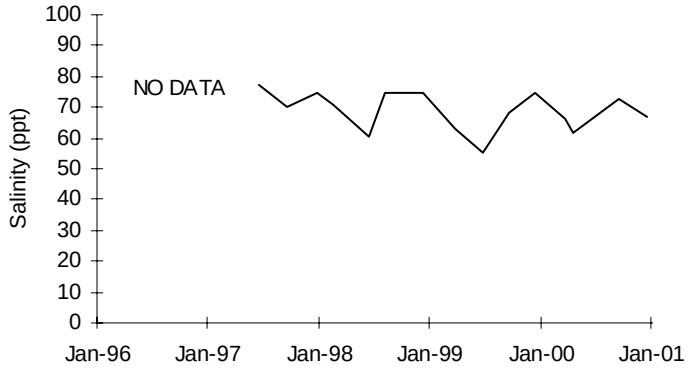
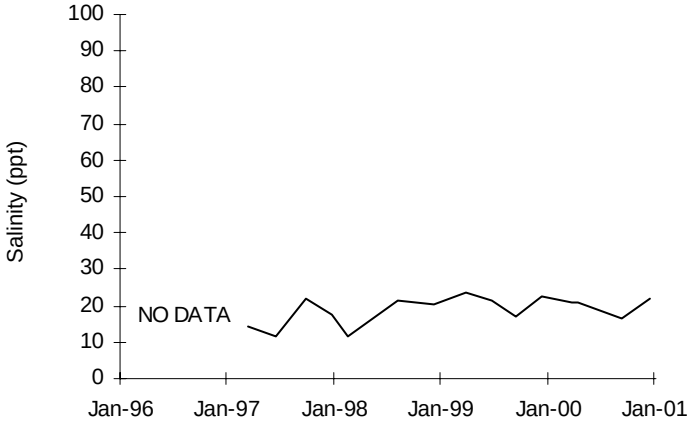


Figure 6-7.
Bryan Mound Ground Water Monitoring Wells

WELL BM PZ1S



WELL BM PZ3



WELL BM MW1S
(Note modified baseline for well-specific data presentation)

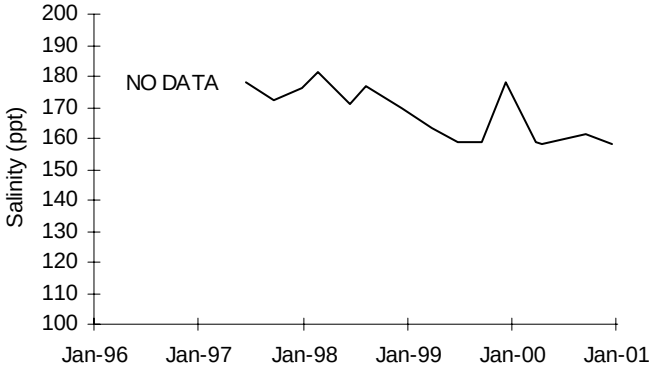
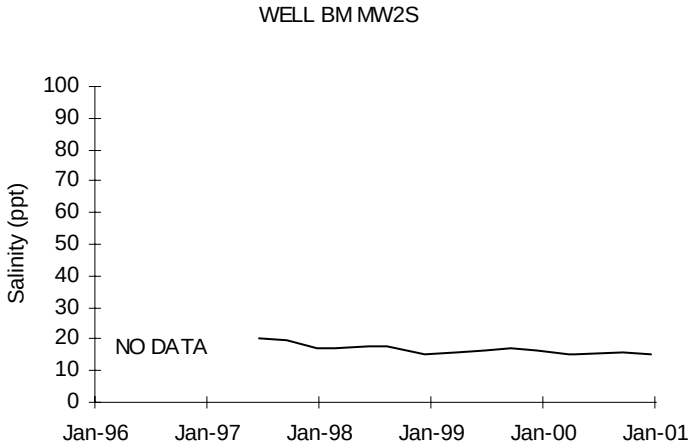
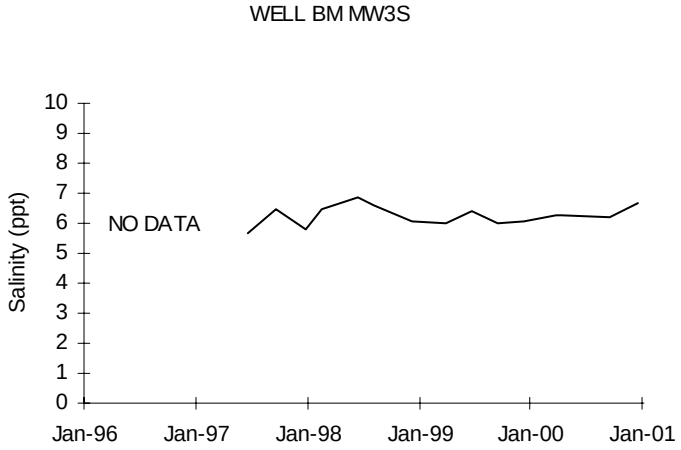


Figure 6-8
Bryan Mound Ground Water Monitoring Well Salinities





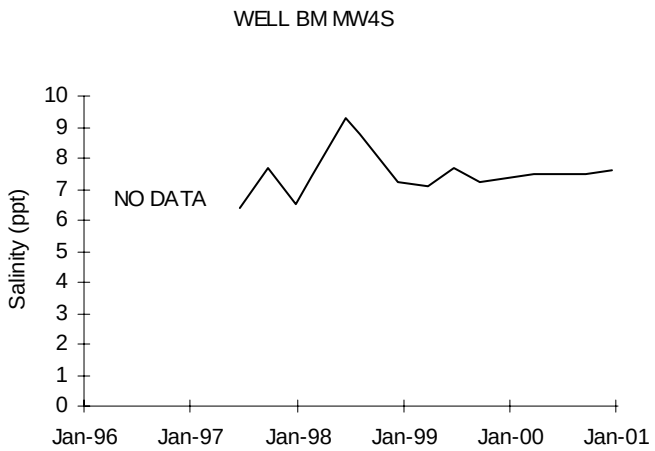
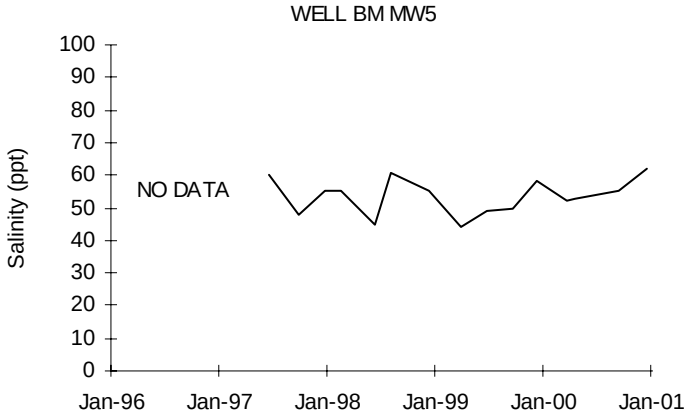
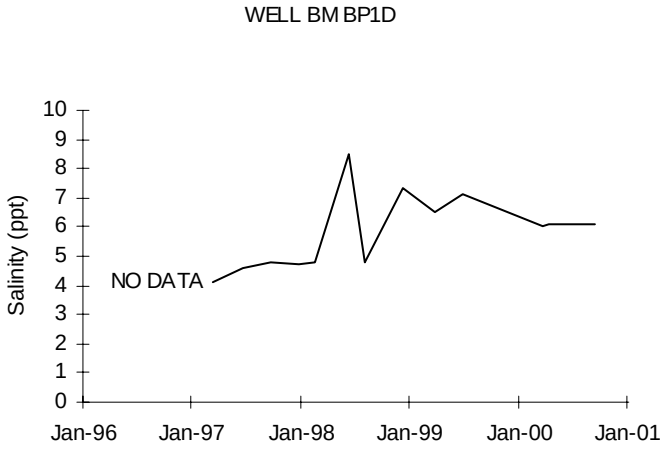


Figure 6-8 (Continued)
Bryan Mound Ground Water Monitoring Well Salinities





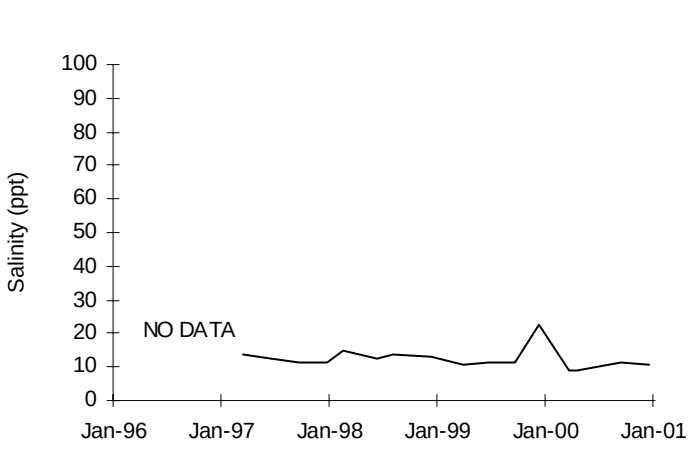


Figure 6-8 (Continued)
Bryan Mound Ground Water Monitoring Well Salinities

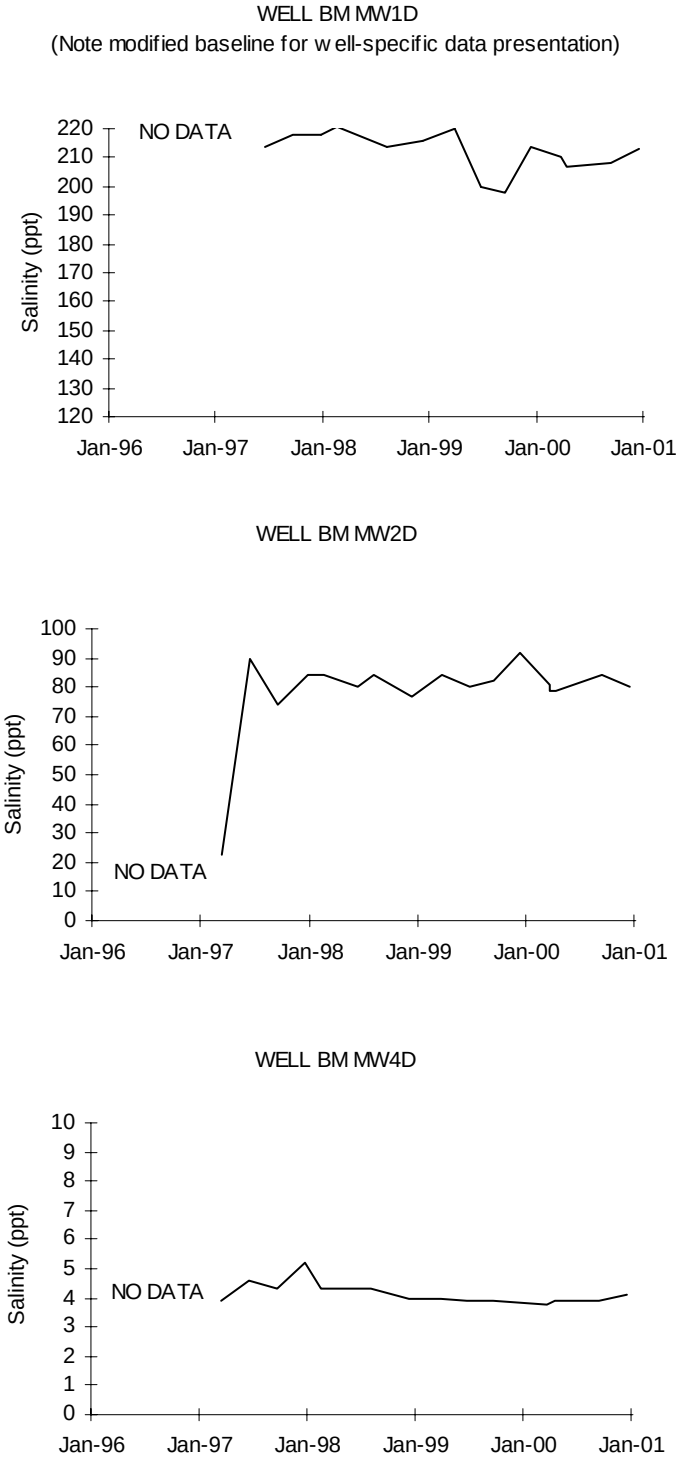


Figure 6-8 (Continued)
Bryan Mound Ground Water Monitoring Well Salinities

After an overall step change in salinity evident in 1995 at both wells BM MW1S and BM MW1D, which was possibly related to the change to a modified low-flow sampling method, a generalized freshening trend is noted with the shallow zone well BM MW1S. This is only somewhat "mirrored" in the deeper zone well at this location.

High salinity measurements observed in the shallow zone near the SOC (BM MW5) and in both the shallow and the deep zones near the maintenance building (BM MW2S and BM MW2D) appear to be stable or just slightly increasing over the long term and not indicative of any significant or noteworthy recent releases or events. Salinity observed in uncontaminated deep and shallow zones at the northwest corner of the site (BM MW4S and BM MW4D) reveal an overall flat or slightly decreasing five year trend; each showing very minor inconsequential fluctuations for CY 2000.

A 1991 study determined that site ground water movement in the shallow, 6 m bls (20 ft), zone was in the northerly direction toward Blue Lake while that of the deep, 15 m bls (50 ft), zone was in the southeasterly direction toward Mud Lake. Local movement is affected by the domal upthrusting and the data from the VWS wells remaining after the study provide additional site coverage for a more reliable re-evaluation. With these new, more peripheral well locations, it is believed that the shallower zone is influenced more by the topography and appears to be flowing radially (in all directions) off the dome (see Figure 6-9, Shallow Ground Water Zone). The flow direction in the lower zone is a bit more of an easterly component resulting in an overall northeasterly flow direction (see Figure 6-10, Deep Ground

Figure 6-9.
Bryan Mound Shallow Ground Water Zone Contoured Elevations (3/28/00)

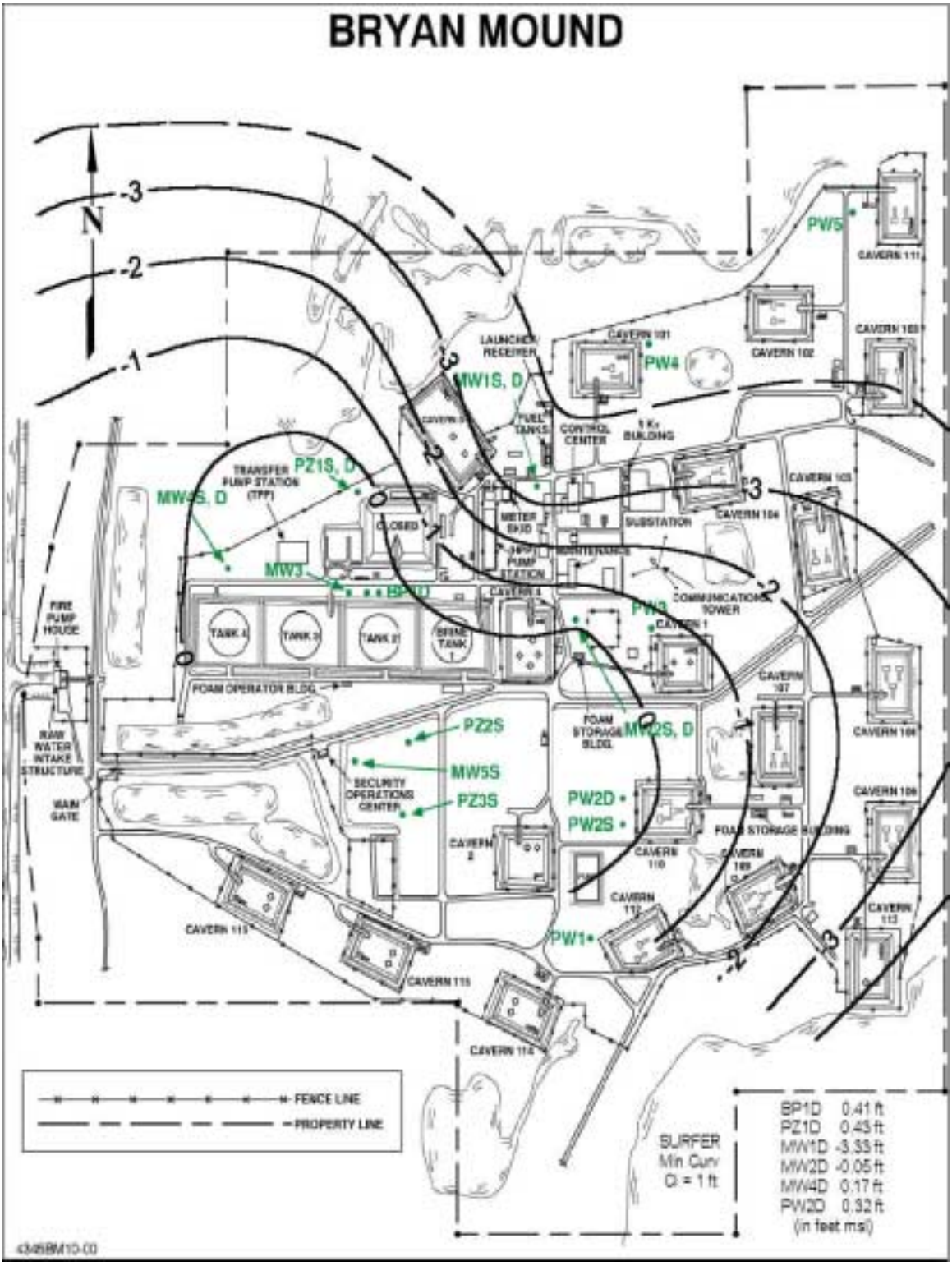


Figure 6-10.
Bryan Mound Deep Ground Water Zone Contoured Elevations (3/28/00)

Water Zone). Both of these aquifers exhibit a very low average linear velocity ranging from an estimated 1.5 m/yr. (5 ft/yr.) in the shallow zone; to 3 m/yr. (10 ft/yr.) in the deeper zone. This slow movement is due to the combined effects of the clay content of the water bearing strata and very low hydraulic gradients which range from 0.0006 m/m to 0.001 m/m (0.002 ft/ft to 0.004 ft/ft). This low average velocity characteristic reduces the risk of contaminating any fresh and potable waterbearing zones known to exist off the flanks of the subsurface dome.

Two areas where ground water salinity exceeds ambient conditions for the Bryan Mound site (>20 ppt) have been located. The first area stretches from the former brine pond eastward to the brine pump pads and to the vicinity of an older brine pond demolished by DOE in 1989. Historical operations (pre-dating DOE ownership) included brine retention in two separate unlined elongated abandoned ponds reclaimed (filled) by DOE in this same area. These historical operations were associated with the brine generation process of a former owner/operator. The second area lies southeast of the security operations center (SOC) adjacent to a closed anhydrite confinement area, and the third lies south of the maintenance building.

Elevated salinity observed at shallow monitor wells since their installation, BM PZ1S, BM MW1S, and former BM BP1S, has been speculated to be associated with brine storage pond activity. The large brine pond with a Hypalon (chlorosulfonated polyethylene) membrane was originally constructed in 1978. The pond was subsequently renovated and enlarged (raised levee for capacity) with installation of a new Hypalon liner and a concrete weight coat in 1982. The Bryan Mound brine pond was successfully taken from brine storage service by September 1998 with subsequent solids removal and closure construction activities concluding in the early spring of 1999. Because of the very slow ground water movement rates and the estimated long lag-time needed for vertical migration, the salinity measurements observed in the pond area and especially those to the northeast and east could be the result of previous seepage from the pond, or from

proximity to former (pre-DOE) operations. Salinity of deep complements to wells BM PZ1S and former BM BP1S (BM PZ1D and BM BP1D) are much lower and considered ambient (<20 ppt) for the site. They indicate no contamination of the deep zone around the immediate vicinity of the former pond and no apparent direct communication with the shallow zone in this area.

Data from the VWS completed in the summer of 1996 indicate that the primary location of shallow zone salinity impact is in the area of well BM MW1S, which is mirrored by elevated salinity in the underlying deep zone around BM MW1D. This is the location of former in-ground unlined brine retention ponds from pre-DOE operations. The high salinity of the deep well may also indicate limited upgradient communication of the two ground water zones in or near that location or perhaps complete saturation and permeation of the clayey separation layer between the two zones by a dense and strongly ionic salt solution in a very limited area.

The former DOE brine pond was closed in 1999. The final annual structural inspection of the brine pond, made in November 1998, concluded that no obvious structural compromises of the pond's integrity had occurred. From the time when the pond had all its contained liquids and solids removed in 1998 until the close of CY 2000 the shallow ground water has not moved more than about 10 feet laterally. Given the anticipated long lag-time for vertical migration and then the lateral distance required to be covered to the nearest wells, it may be some time for any potential post-closure salinity changes to be evident in the monitoring.

Southeast of the SOC in a second area where elevated salinity ground water is found, an anhydrite disposal area used during early construction and leaching phases of the site may be a contributory source of brine contamination effects. The limited area of contamination is intercepted in the shallow zone by wells BM MW5S and BM PZ3S and has been relatively consistent over the history of long term monitoring, even though the VWS study gave us data

indicating these wells may be affected more by diffusion than by flow gradient.

A brine contamination source in a third area of elevated salinity, near the maintenance building, has not been identified or associated with any known historical operations or incidents, and probably predates SPR activity. Salinity measurements exceeding ambient levels (>20ppt) are observed historically in both zones at wells BM MW2S and BM MW2D, with the shallow well BM MW2S remaining below 20 ppt from 1997 through 2000 with improving quality.

Brine contamination is not evident at the northwest corner of the site. Shallow zone monitor wells BM MW3S and BM MW4S near the southwest corner and west of the former brine pond, respectively, have historically remained relatively stable in the unaffected 5 to 10 ppt range. The ground water salinity at the northwest corner of the site is consistent or better than the salinity observed in Blue Lake, the adjoining surface water feature. These two wells are also downgradient of the anhydrite disposal area and do not reveal any impacts at this time.

6.4 ST. JAMES

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

St. James was leased to Shell Oil Pipeline in January 31, 1997. No permanent ground water monitoring wells have been installed at the St. James site due to the absence of brine and chronic crude oil spills. Underground diesel and gasoline tanks were removed in 1995.As a result of due diligence studies undertaken prior to property transfer to Shell Oil Pipeline, crude oil was located on the shallowest perched water table at two limited areas at St. James. Notification was made to LDEQ in January 1997. Additional investigations and actions were

implemented throughout CY 1997. As a result, one of the areas has been approved as “no further action needed” by the state, and crude oil removal efforts continued through CY 2000 at the other. Since the inception of the recovery operation, 3.8 gallons of oil have been removed from the monitoring wells.

6.5 WEEKS ISLAND

The Chicot formation is the principal aquifer in the Weeks Island area. The aquifer's potentiometric surface is at approximately sea level near Weeks Island and slopes slightly west-southwesterly towards Vermillion Bay. The fresh waterbearing sand layers occurring above the salt provide usable water for the local area.

A sinkhole, found in May 1992 ago on Morton Property, which could potentially affect crude oil storage in the underlying mine, prompted further investigation and relocation of the crude oil stores and decommissioning of the Weeks Island site. Enlargement of the sinkhole, located northwest of the mine's crude oil fill hole, was continuous until arrested by construction and maintenance of a freeze wall plug created in the water table around the throat of a suspected crevasse leading down into the top of the salt formation. Relocation of the bulk of the mine's crude oil inventory to Bayou Choctaw and Big Hill oil storage sites was completed in 1999. Five ground water monitoring points outside of the freeze plug were identified and background or ambient conditions were assessed in the four wells surrounding the sinkhole for the three-year period prior to decommissioning.

The VWS studies were used to further the characterization efforts of the water table aquifer at the Weeks Island site and to install an additional well completing the “net” (see Figure 6-11, Weeks Island Long-Term Monitoring) for the subsequent long-term monitoring proposed. From these long-term monitoring positions, ground water was initially determined to flow generally toward the northwest at an approximate average linear velocity of around 75 feet per year based upon the low gradients observed applied to the fairly large

permeability measured. Subsequent monitoring has followed the flow direction from northwest around to the southwest towards offtake from a nearby shallow well used for cooling and make-up for the freezewall

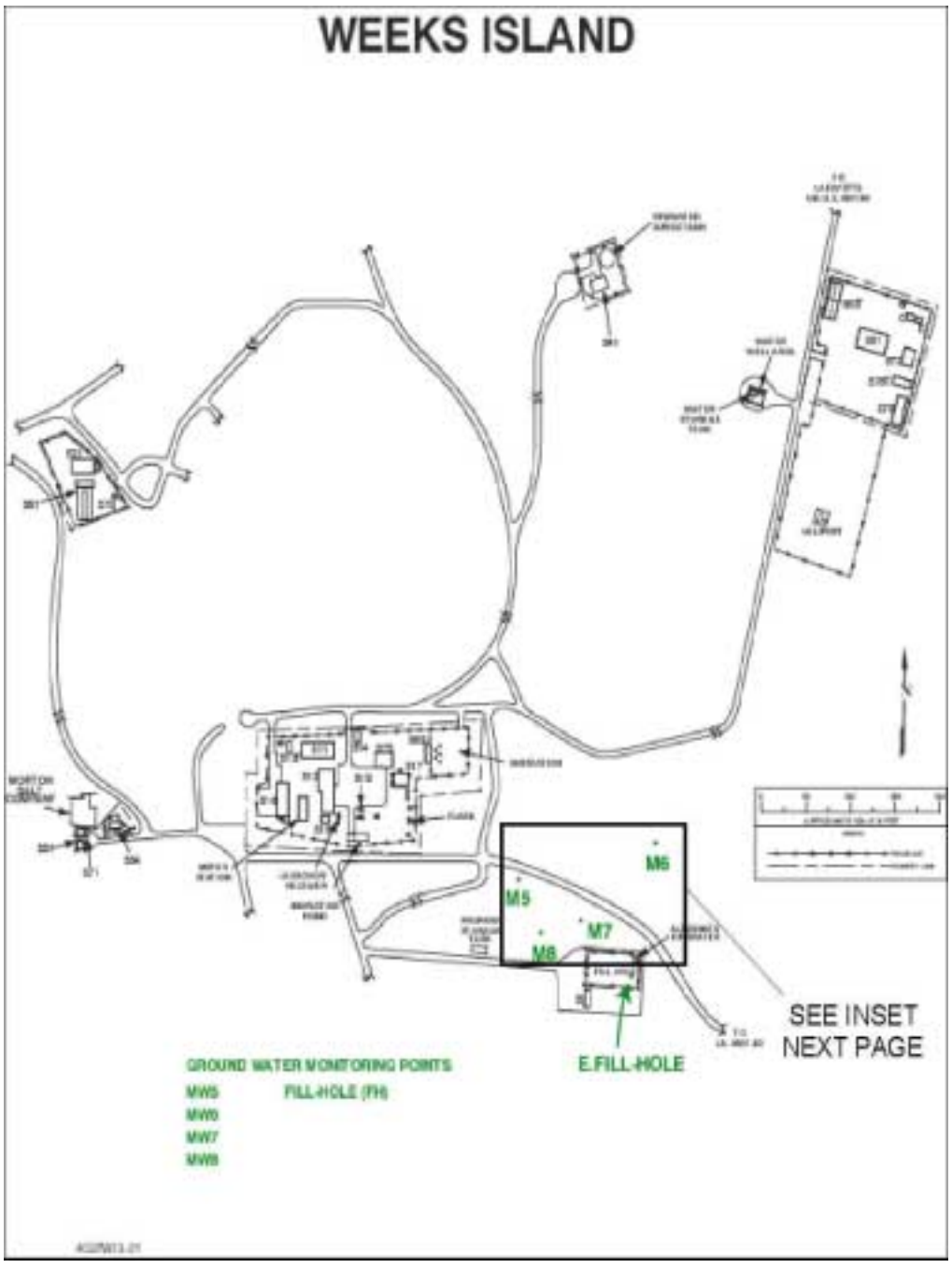


Figure 6-11.
Weeks Island Long Term Monitoring

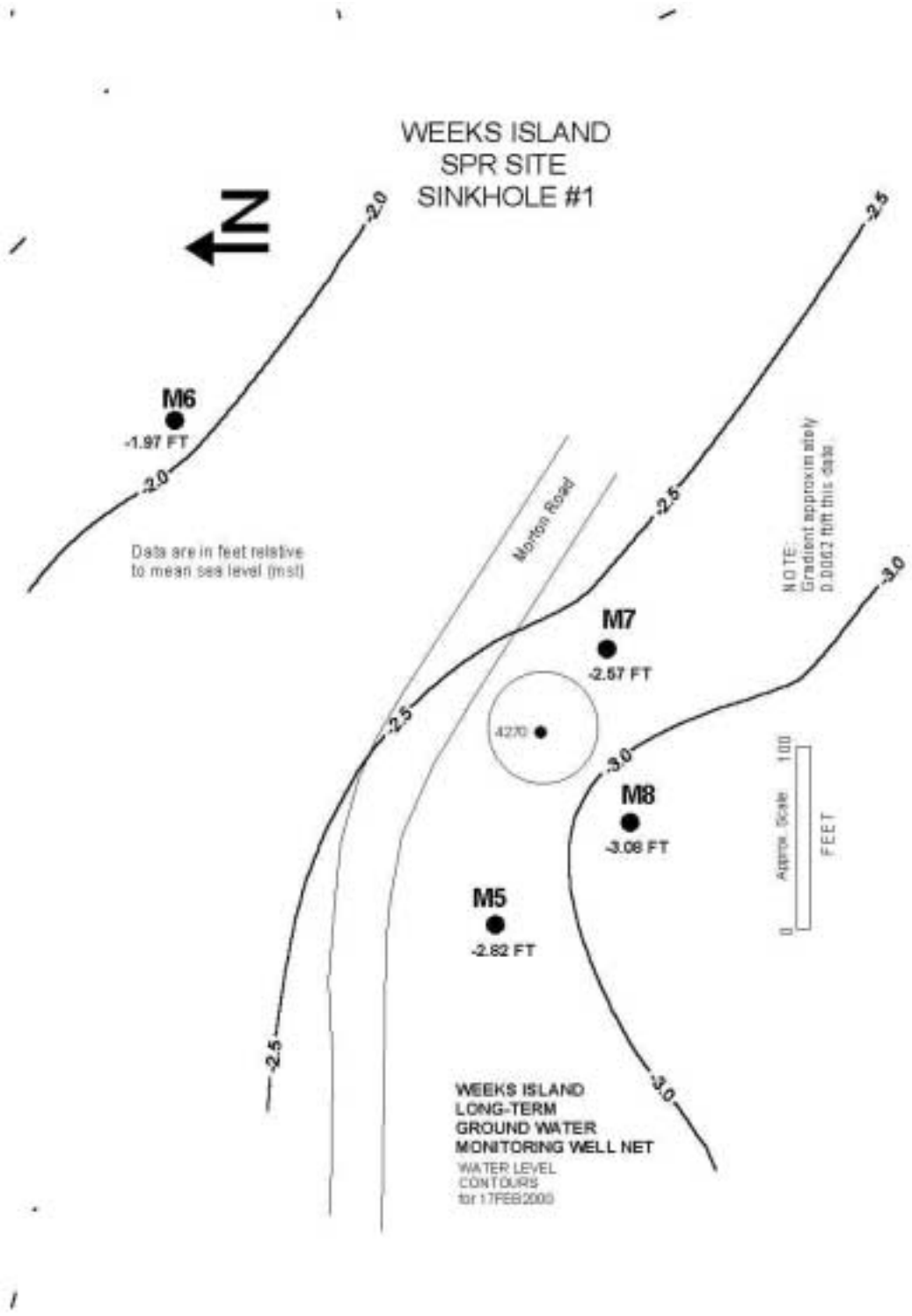


Figure 6-12.
WILT 12 Flow Direction and Gradient

chillers while they worked to maintain the subsurface freezeplug and additional current offtake located further away to the southwest possibly from Morton (see Figure 6-12, WILT 12 Flow Direction and Gradient).

The Weeks Island long-term monitoring program switched over to a detection monitoring mode commencing with the November 1999 sampling. Quarterly samplings are now used to compare to the background conditions established prior to closure. The primary contaminant of concern is crude oil so the parameter total petroleum hydrocarbons (TPH) is used to screen for any components of crude oil. The background thus far established indicates no TPH found in any well at the method limits of detectability of 5 mg/l. As the former freeze wall thaws, it has been noted that the piezometric gradient in this portion of the island's subsurface continues to flattened and a decreasing ground water flow velocity is the result.

6.6 WEST HACKBERRY

The Chicot Aquifer, which occurs 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) bls. A really limited zones found affected and monitored at West Hackberry are nearer the ground surface, the shallow zone at roughly 6 m (20 ft) bls and the deep zone at roughly 15 m (50 ft) bls. Details provided by the VWS in 1996 indicate that the two zones contrast sharply in permeability, and as a result, their estimated linear velocity measurements are quite different. The range of flow rates estimated for the shallow zone is from 50 to 200 feet of movement per year, which results from both variable permeability values and varying gradients across the site. The deep zone exhibits a generalized flow rate estimate of only 7.5 feet per year, which is largely due to the more

clayey nature of the sands conveying these waters and the lower gradients evident within the limited well net.

Situated directly atop the salt dome and given the long industrialized history of the site and the immediate area, a 10 ppt cut-off for salinity is used in comparisons for determining affected and unaffected waters as ambient conditions have been found highly variable across the site.

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 state approved brine pond-decommissioning plan was concluded in November 1999.

Eleven monitoring wells and 15 recovery wells (Figure 6-13) have been installed on the West Hackberry site in five phases. All wells are used to either monitor or control brine contamination movement beneath the brine pond system. Salinity data gathered over the past five years at all wells is depicted in Figure 6-14. Four of the seven wells originally installed for VWS were retained for additional water level measurement around the periphery of the main site.

West Hackberry began using the low flow technique for sampling the non-pumping monitor wells in December 1995. Water level measurements from both zones for the 1st quarter timeframe of 2000 have been reduced to elevations, contoured, and are presented as Figures 6-15 and 6-16, Shallow Zone and Deep Zone, respectively. Effects of the long-term pumping are evident in both zones at the time the measurements were made in February 2000. In the shallow zone map (Figure 6-15) two well defined cones of depression appear to be coalescing as a result of the majority of offtake coming from only two wells, WH P2S and WH P3S. The contour map of the water levels in

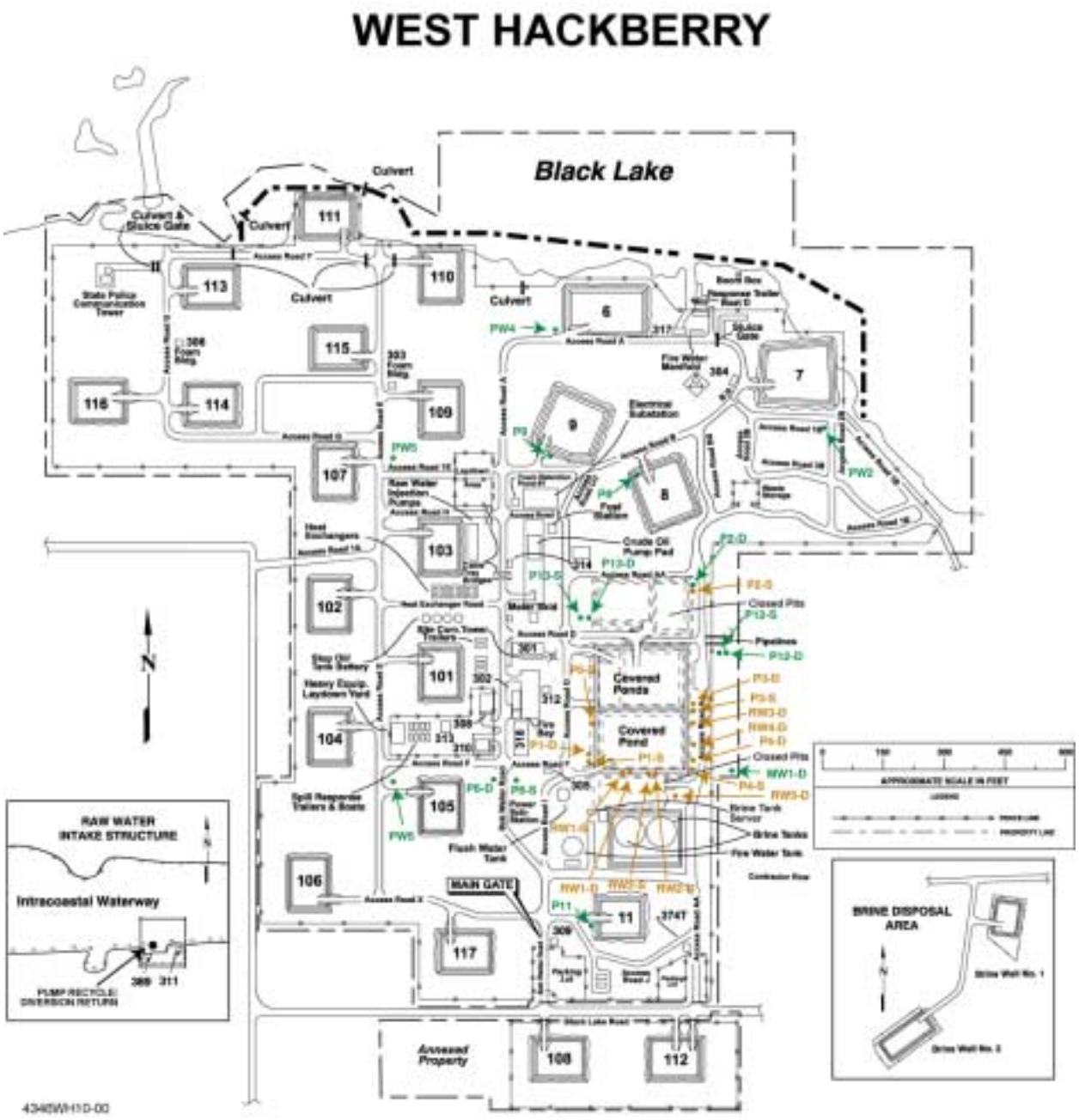


Figure 6-13.
West Hackberry Ground Water Monitoring Wells

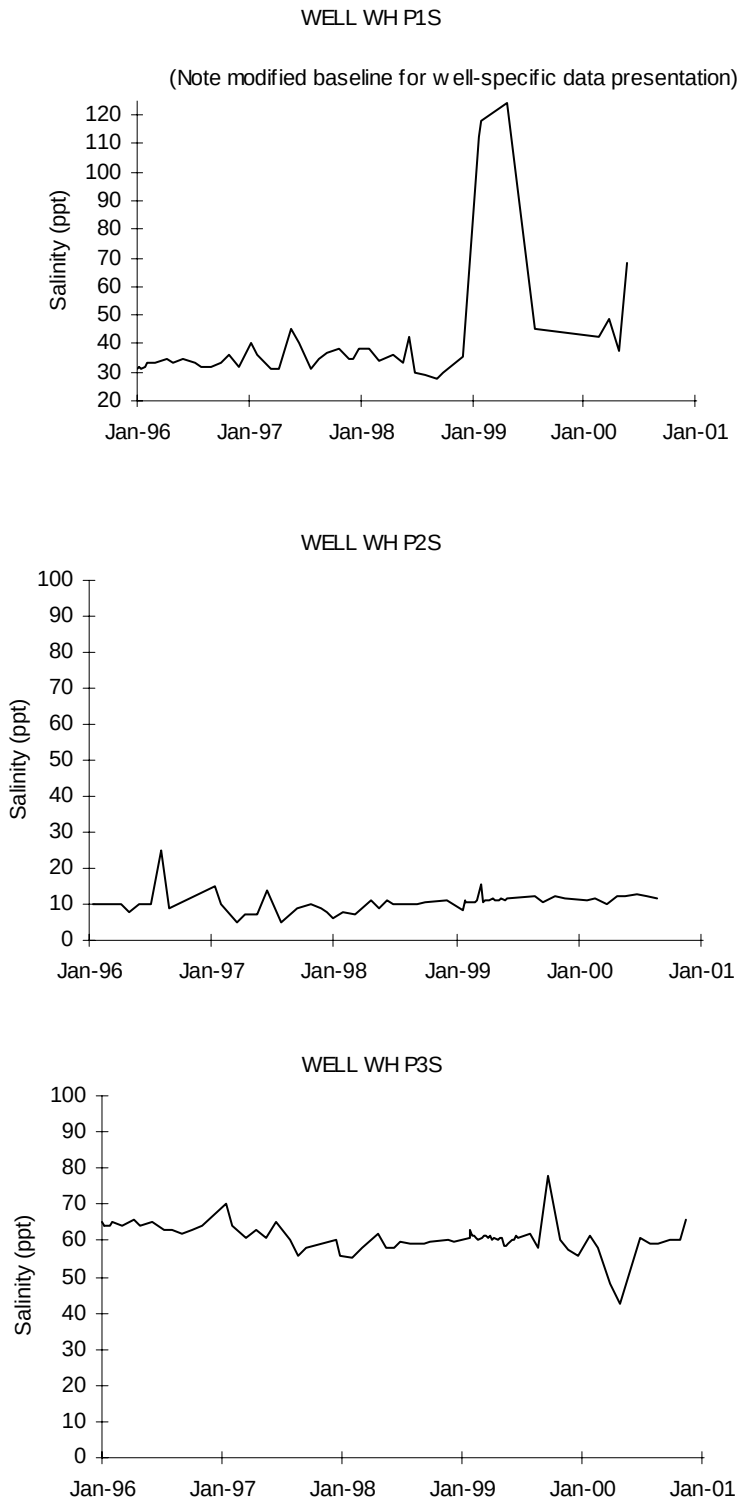


Figure 6-14.
West Hackberry Ground Water Monitoring Well Salinities

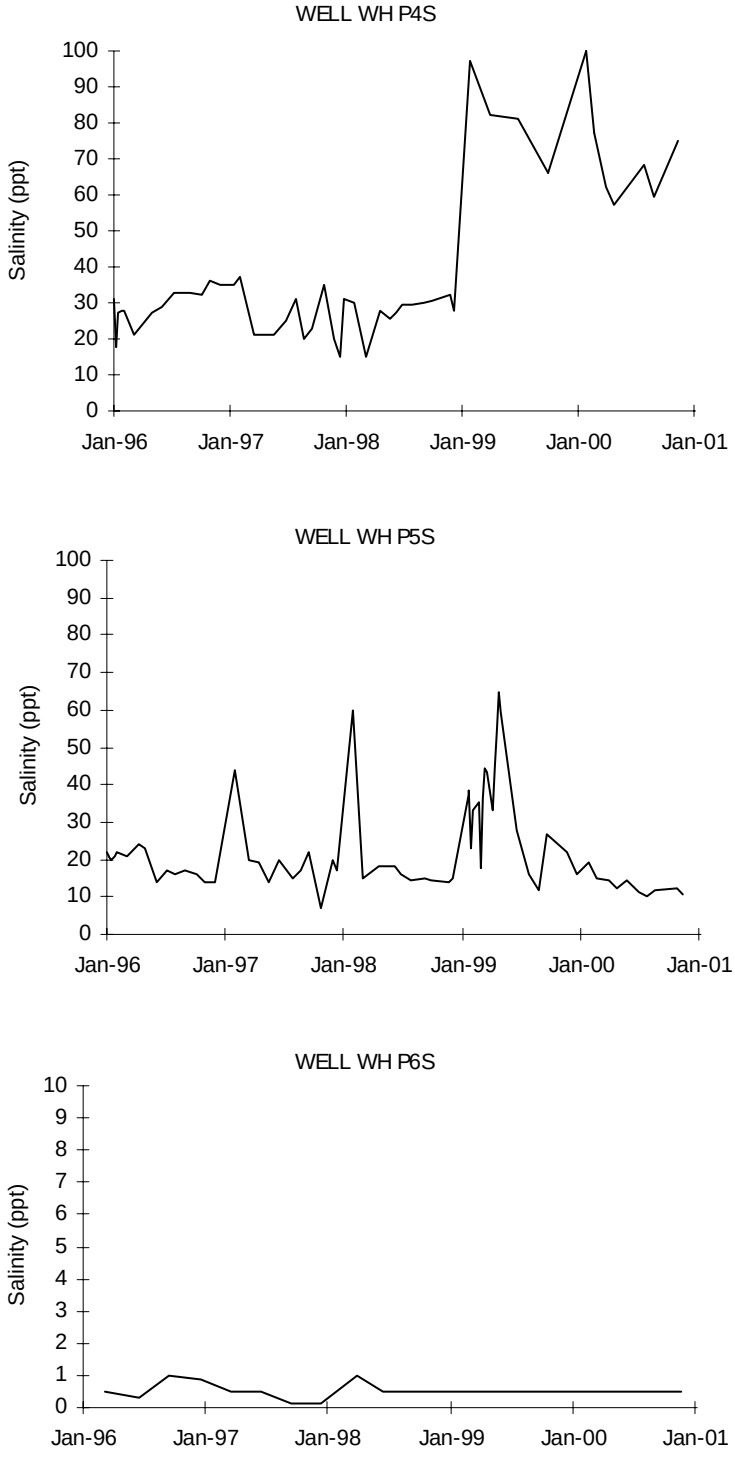


Figure 6-14 (Continued)
West Hackberry Ground Water Well Salinities

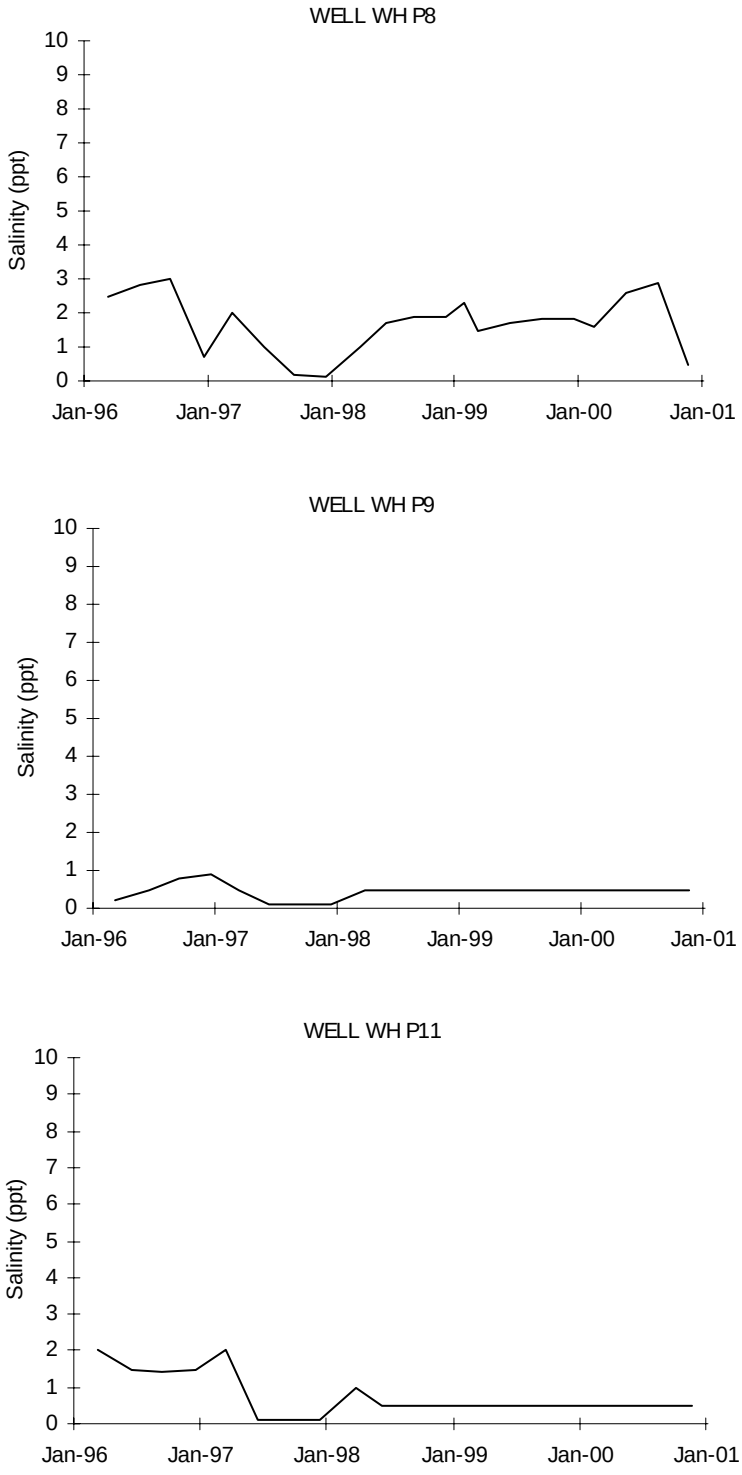


Figure 6-14 (Continued)
West Hackberry Ground Water Well Salinities

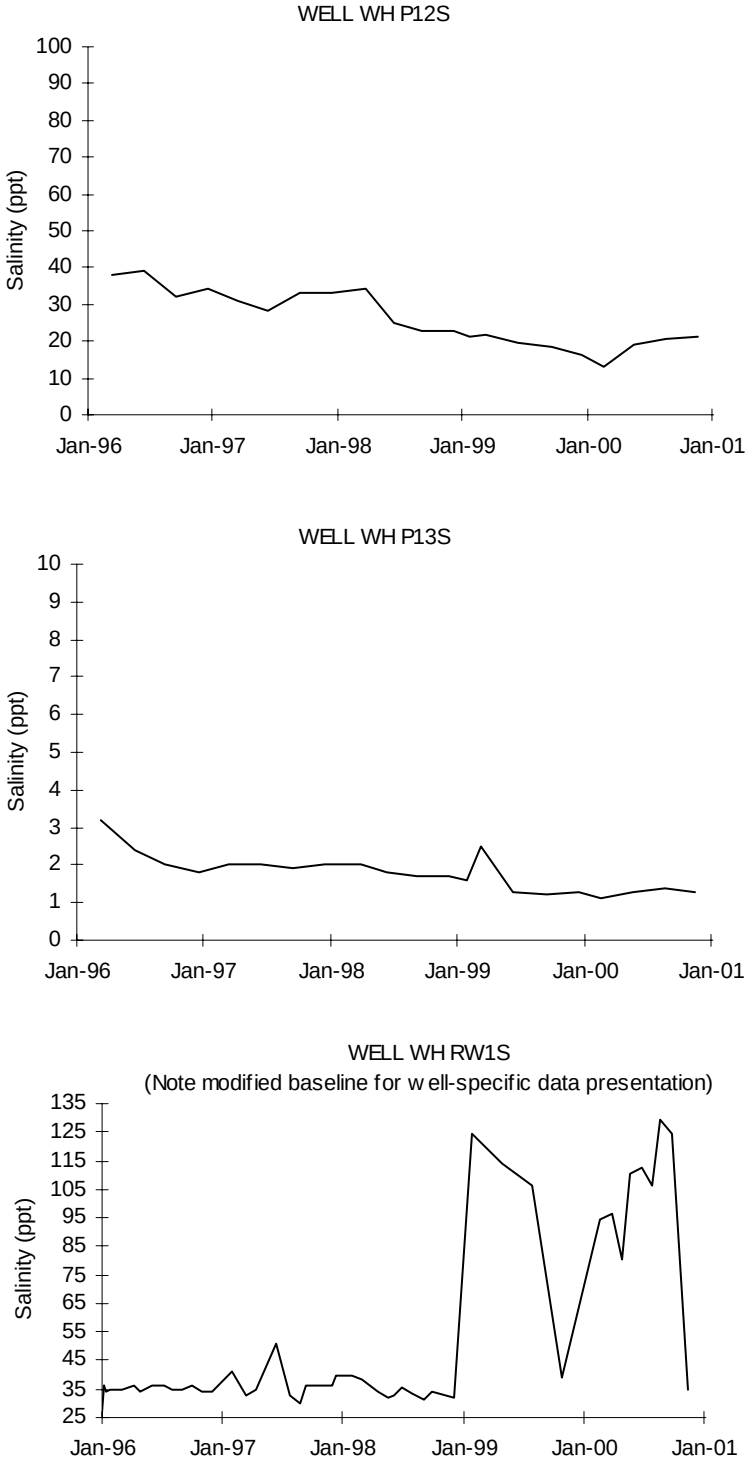


Figure 6-14 (Continued)
West Hackberry Ground Water Monitoring Well Salinities

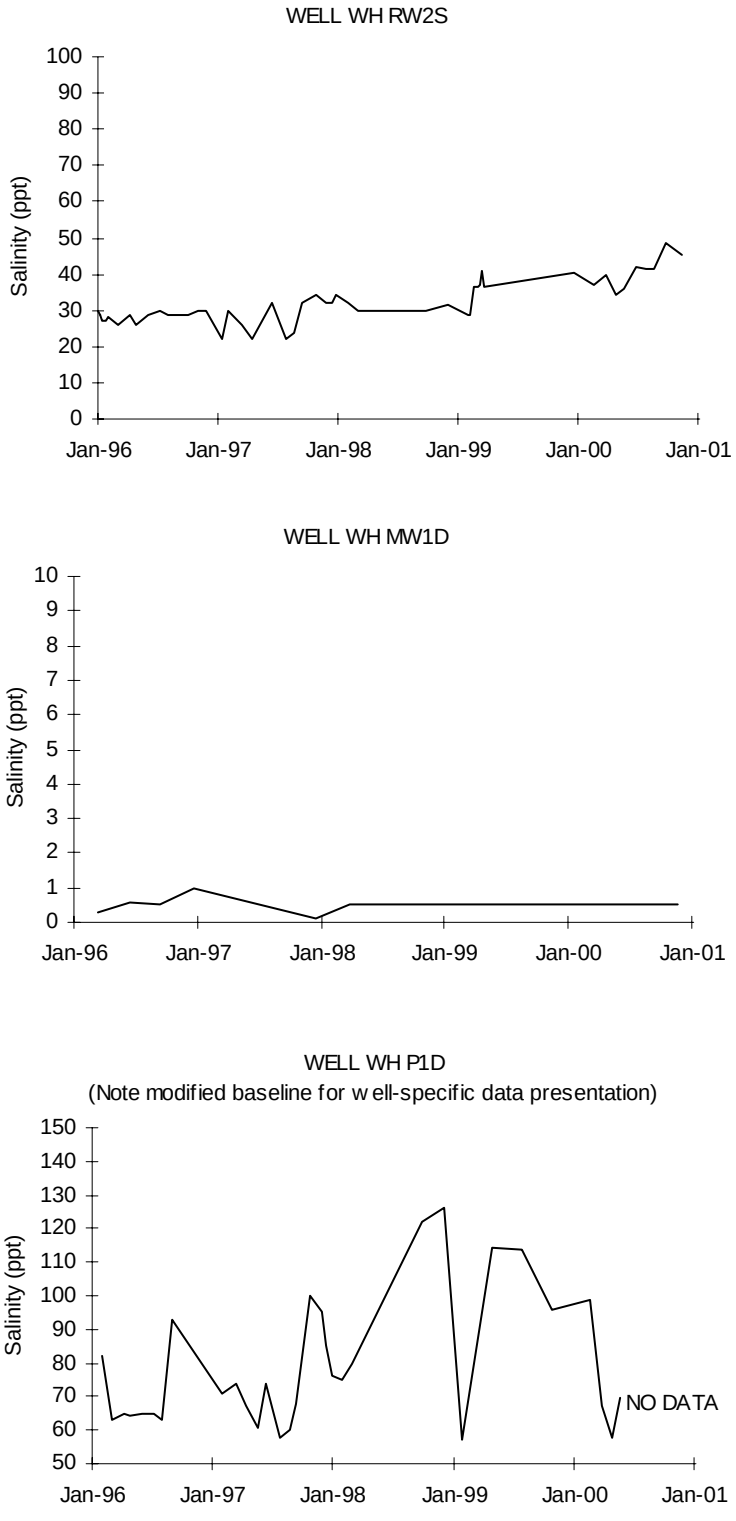


Figure 6-14 (Continued)
West Hackberry Ground Water Monitoring Well Salinities

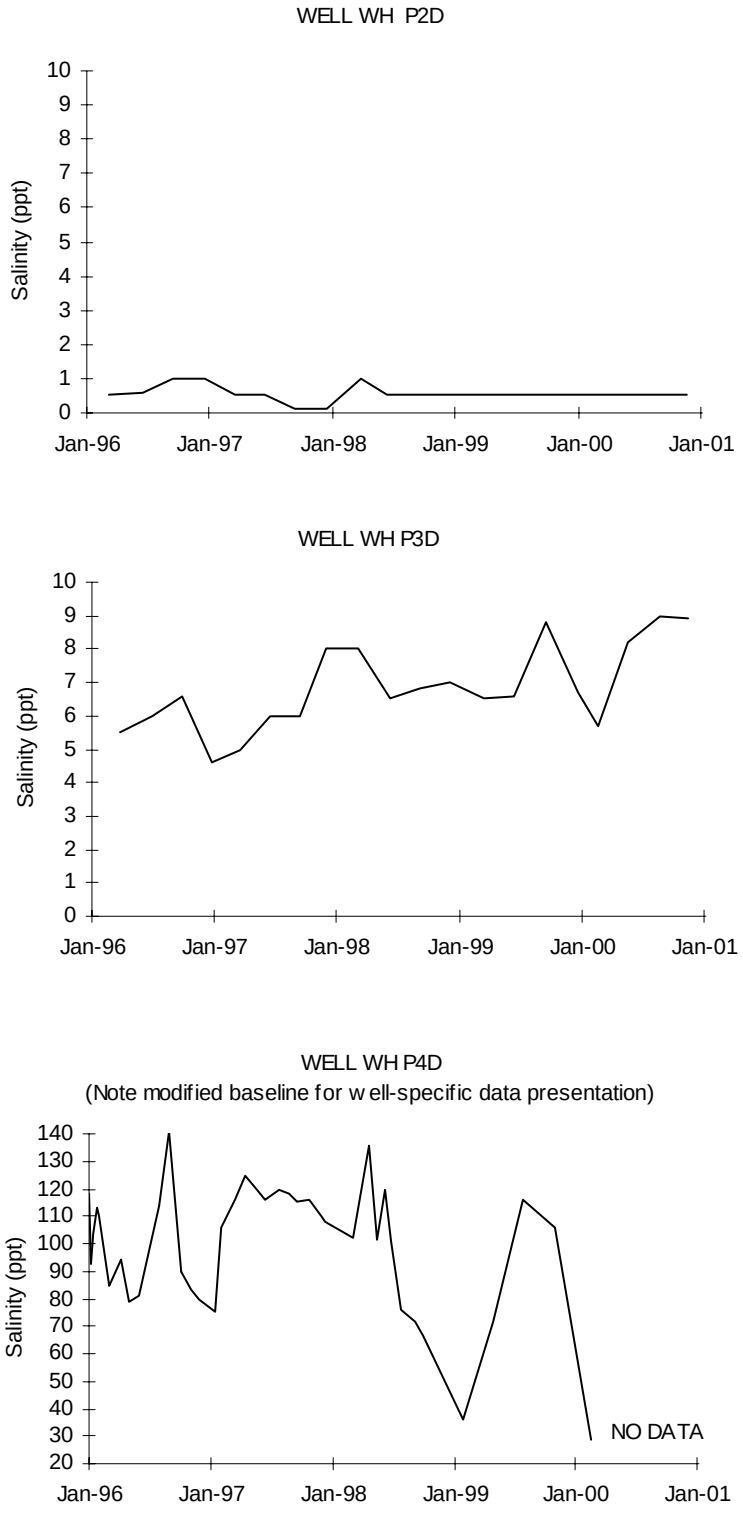


Figure 6-14 (Continued)
West Hackberry Ground Water Monitoring Well Salinities

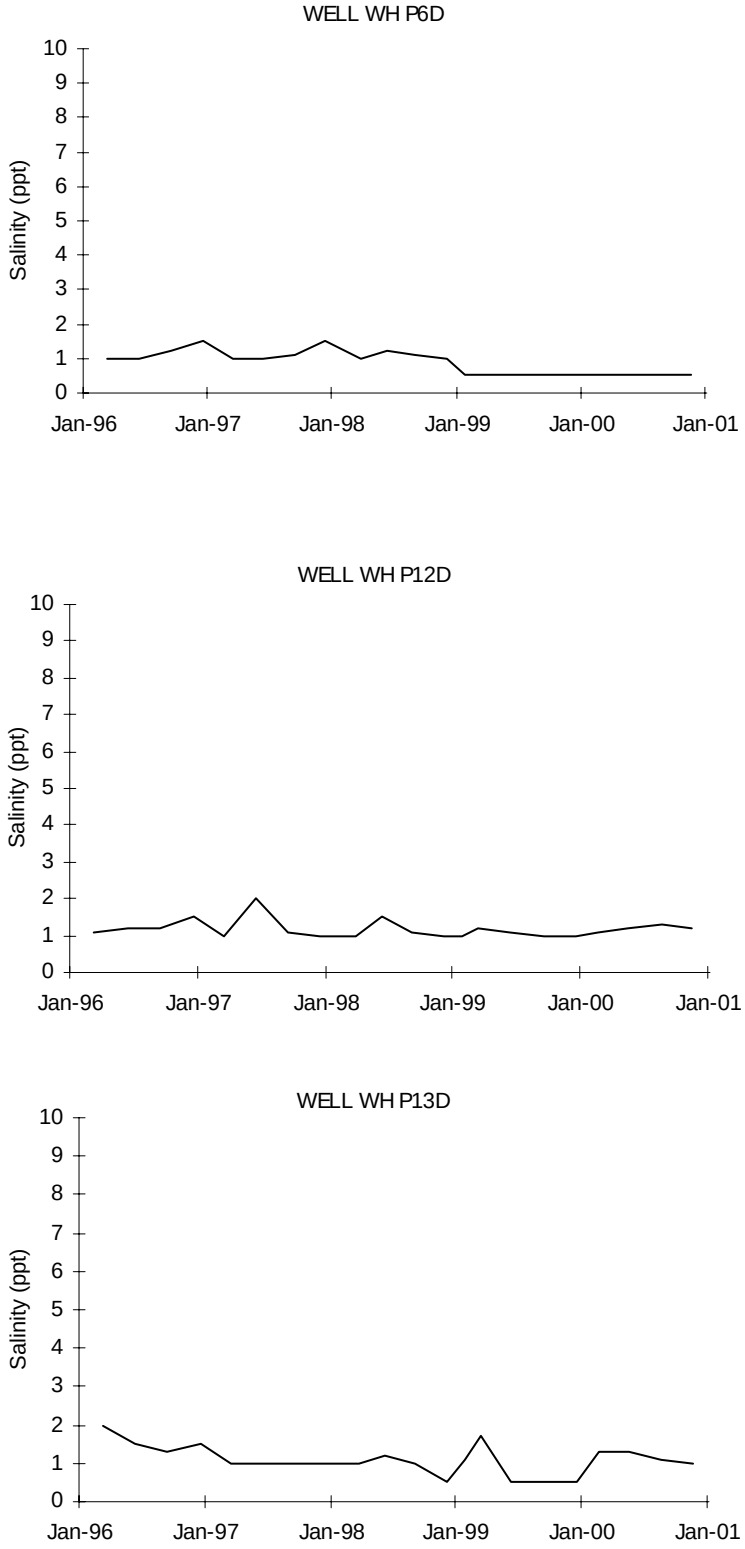


Figure 6-14 (Continued)
West Hackberry Ground Water Monitoring Well Salinities

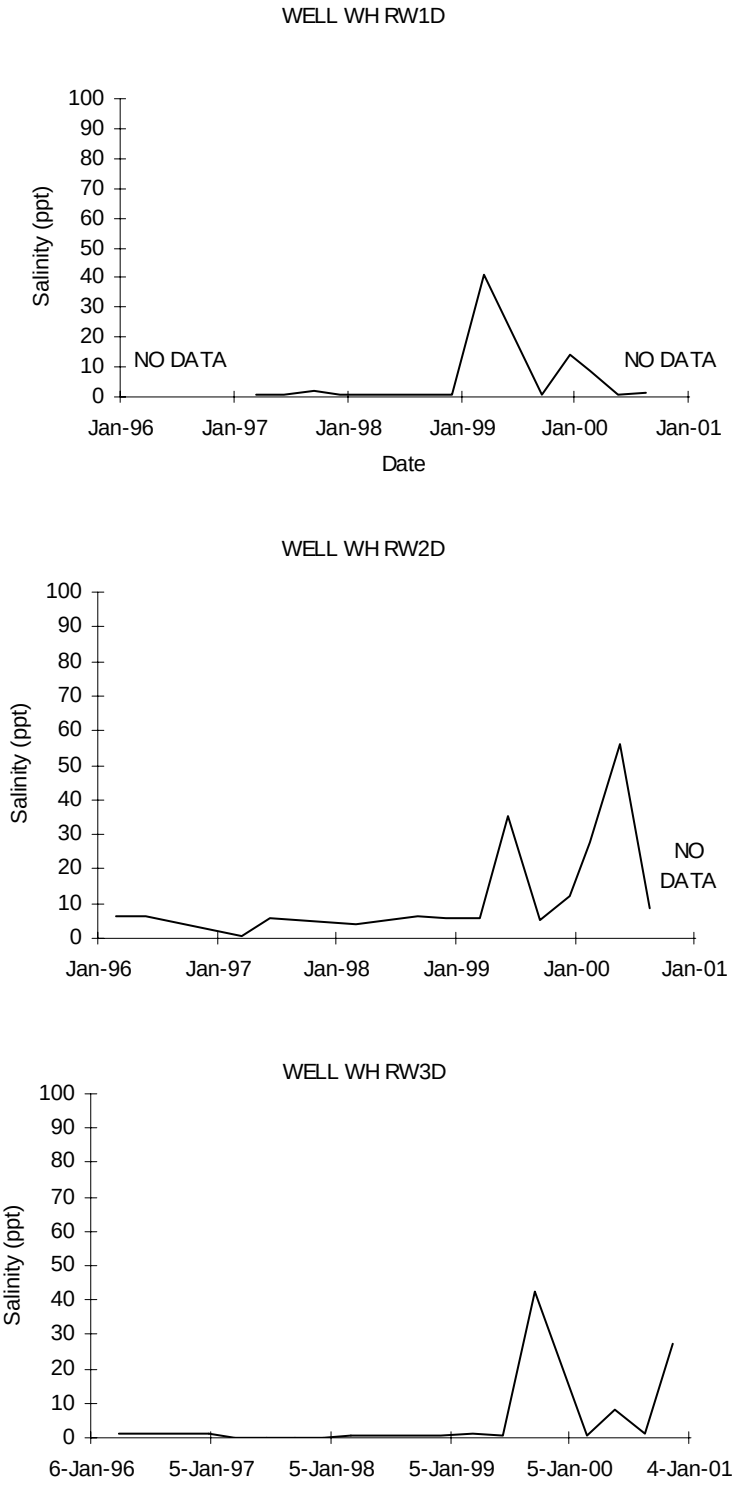


Figure 6-14 (Continued)
West Hackberry Ground Water Monitoring Well Salinities

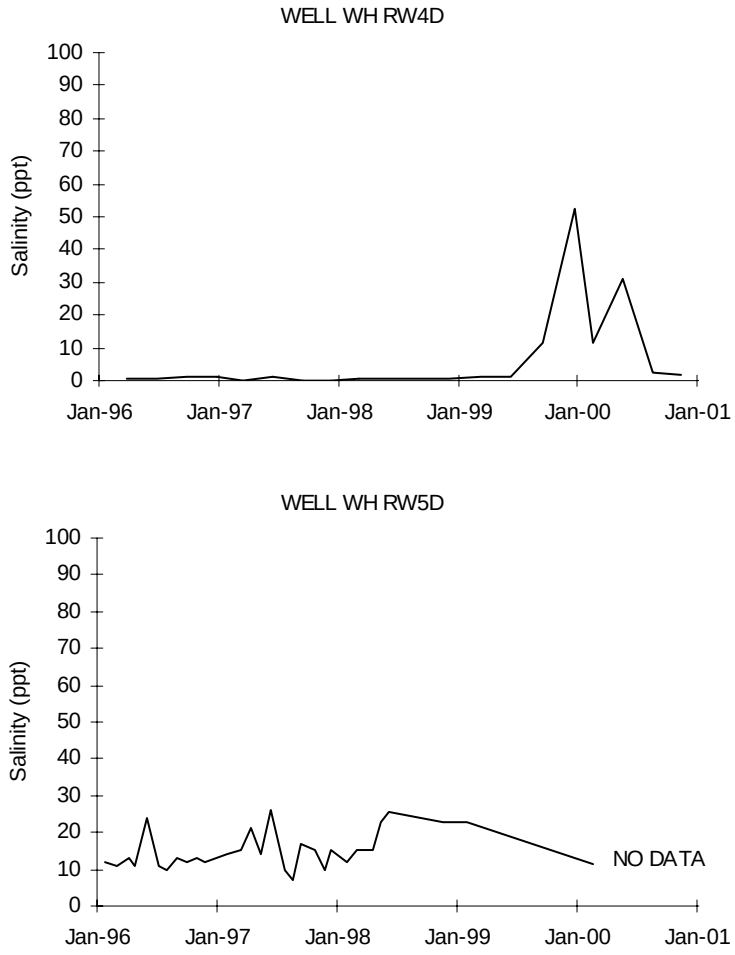


Figure 6-14 (Continued)
West Hackberry Ground Water Monitoring Well Salinities

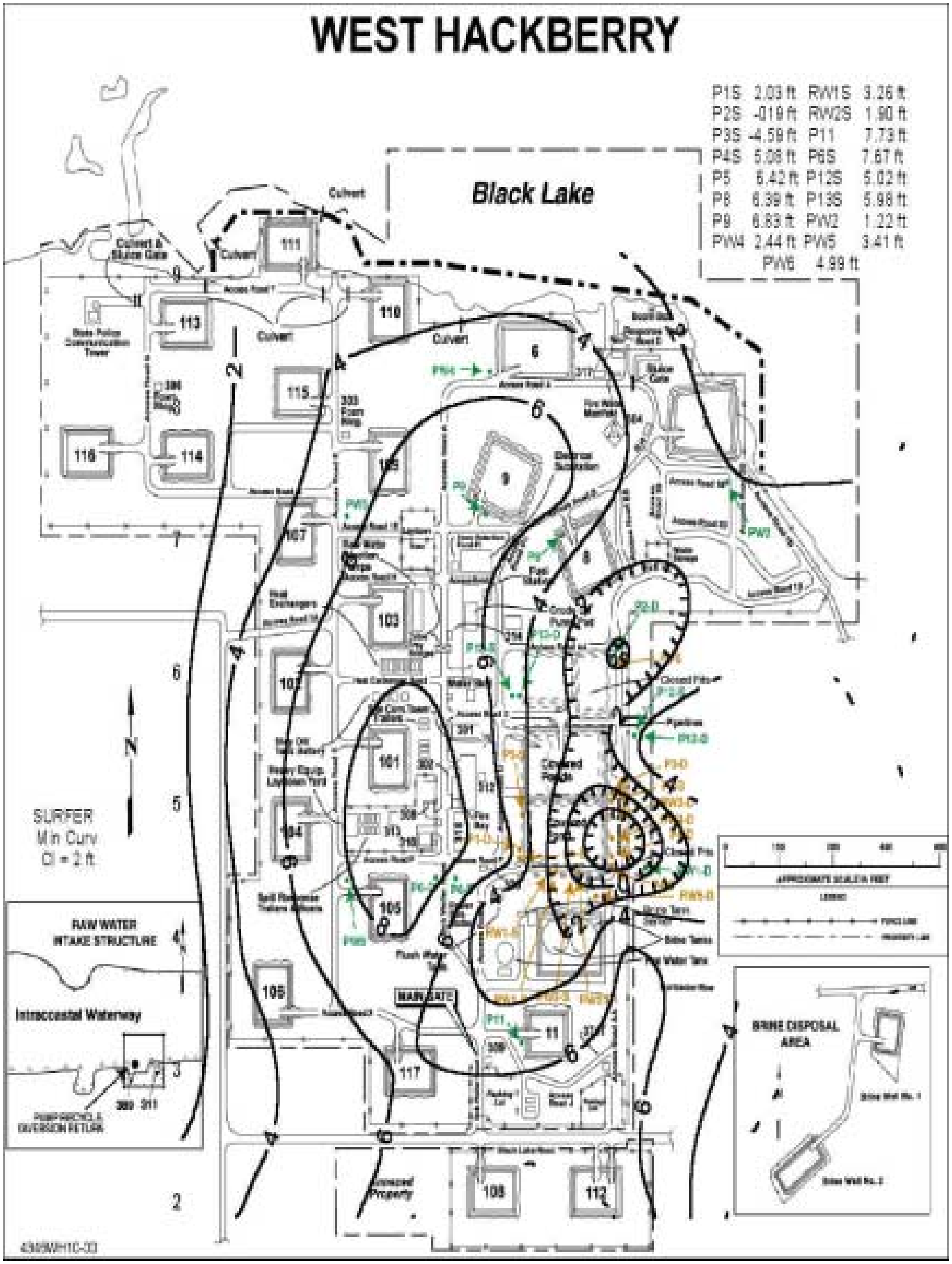


Figure 6-15.
West Hackberry Shallow Ground Water Zone Contoured Elevations (2/21-23/00)

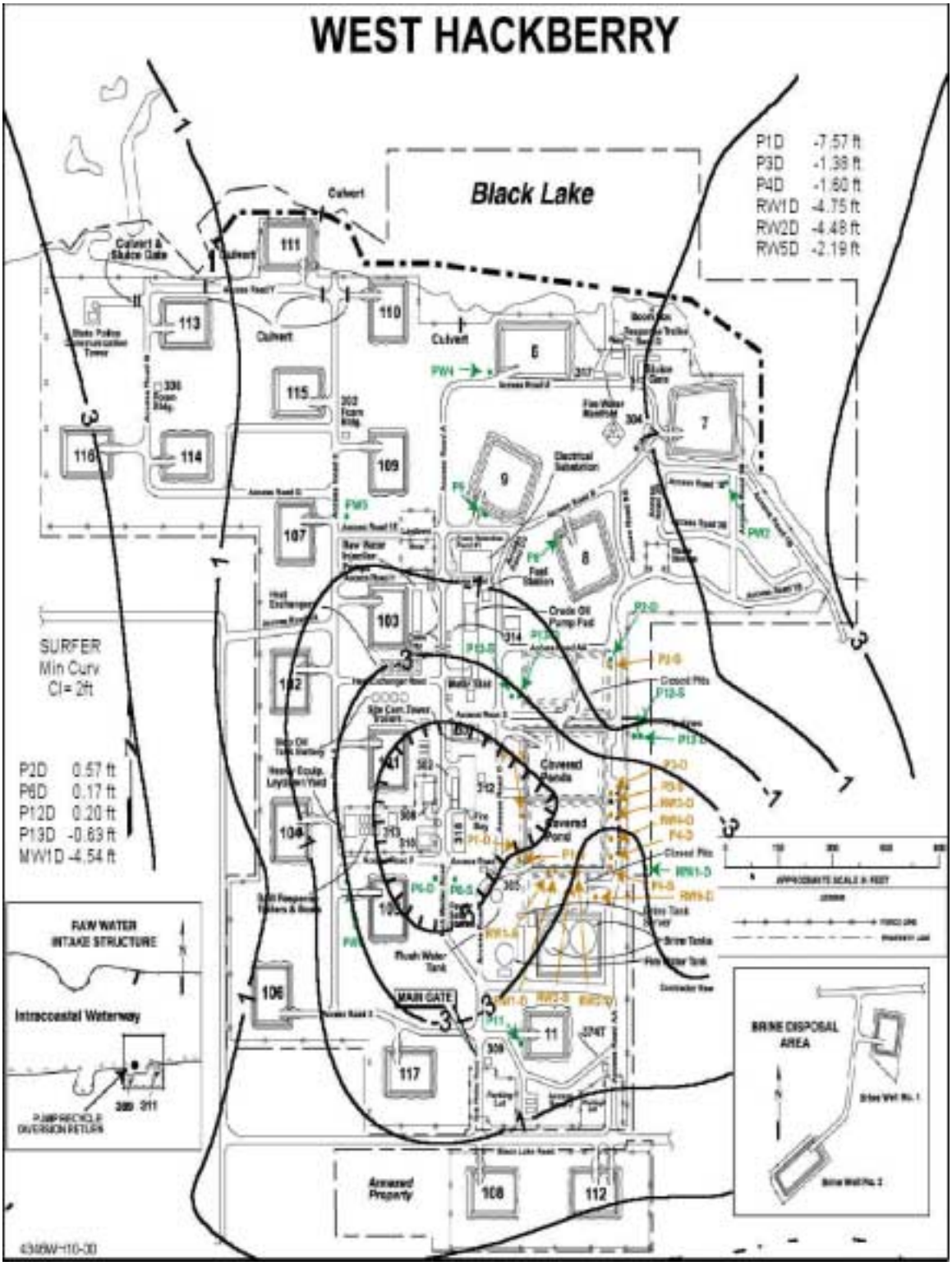


Figure 6-16.
West Hackberry Deep Ground Water Zone Contoured Elevations (2/21-23/00)

the underlying deep zone reveals a rather flat but pervasive cone situated under well WH P1D. The low permeability of the deeper zone routinely produces very deep drawdown levels at the pumping wells, which in turn, produces unusually deep and pronounced cones of depression as an artifact of the contouring.

Ground water recovery in both zones beneath the brine pond system has remained a maintenance intensive project during the eight years of Phase III continuous pumping. Gaps in the line graphs presented as 6-14 denote periods when pumps were inoperable or when wells were dry. Pond decommissioning construction, which involved internal demolition, cleaning and testing, and final state-required liner puncturing, may have resulted in some interim salinity spikes commencing early in 1999. Loss of the pond for discharge management of recovered ground water has aggravated overall recovery operations in the latter two years of pumping due to the construction of a manifold discharge piping system to our aboveground tanks. Manifolding also made it necessary to add backflow prevention devices at each well location connection creates a high maintenance item over time due primarily to persistent clogging from mineralization and salts.

As a result of decreasing and intermittent recovery experienced after pond decommissioning, the ground water production goals for the recovery project were revised by LDNR to that of "practicably obtainable" in the interim period until LDNR could complete their review and act upon the closure petition and post closure ground water monitoring proposal. This approval came in September 2000. Ground water recovery and ground water monitoring have continued throughout the 2000 calendar year.

Observed recovery well salinity measurements depict a complex picture of ground water contamination beneath the pond system. Salinity is more elevated and spatially variable in the shallow zone than the deep zone with the exception of the two deep zone wells WH P1D and WH P4D on opposing west and east sides of the brine pond,

respectively, where salinity, even though highly variable, can inexplicably exceed that of any other well.

A brine plume exists in an east-northeastward shaped ellipse beneath the brine pond in the shallow zone from the southwest corner over to Well WH P3-S. Its saline ground water is captured by six recovery wells. Wells WH P1S and WH P5S intercept the plume on the west side of the pond, wells WH RW1S and WH RW2S on the south side, and WH P3S and WH P4S on the east side. Wide salinity fluctuations of data graphs are attributed to salinity stratification in the wells and to oscillating cones of depression in both zones. Prior to mid-1993, submersible recovery well pumps ran intermittently and could not maintain a stable cone of depression or resultant stable salinity. These submersibles were replaced for a period spanning almost 5 years; however, two of these type of pumps were re-introduced in 1999 for their flow volumes and continued to pump heavily in the 2000 calendar year.

Until sporadic spikes of elevated salinity were experienced with pond closure construction early in 1999, a slight decreasing salinity trend had been observed at wells WH P1S, WH P5S, and WH RW1S along the west side of the brine pond. Each of the wells exhibits a response to closure construction which eventually subsides sometime in 2000. This time-series signature is especially noticeable in well WH PW5 and is reflected in the post-closure data of the other two. A slightly increasing post-closure salinity trend is apparent at well WH RW2S and is barely discernible at WH P2S. Well WH P3S continues to show a more variable but overall slightly decreasing trend with the advent of one of the submersible pumps being re-introduced here. With pre-recovery 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 western recharge area as the source of brine contamination decreases, due to pond closure in late 1999. This improving salinity response may be delayed to the wells on the east as the overlying salt impregnated soils slowly respond to the now diminished available percolation and post-closure recharge.

Ground water recovery efforts may be slightly influencing certain areas and wells around the pond in a positive way. For example, the general declining trend evident with well WH P3S along the east side of the pond is notable in as much as this well is located directly in the middle of the shallow zone plume and is in a direct downgradient flow path from the former pond.

It appears that elevated deep zone salinity remains limited to wells WH P1D and WH P4D since no effects other than spurious swings have been identified elsewhere in the deep well network. The salinity in deep zone recovery wells WH RW1D and WH RW2D near high salinity WH P1D, and wells WH P3D, WH RW3D, and WH RW4D north of high salinity WH P4D, remain near ambient although sporadic spikes and salinity swings are noted in the long-term time-series plots of the monitoring. The salinity of deep recovery well WH RW5D south of WH P4D remains above the unaffected cut-off of 10 ppt (11.4 measured early in 2000)) and is apparently situated along the edge of the same area of contamination intercepted by WH P4D. This well has been heavily affected by scaling and screen encrustation to the point that it is essentially incapable of producing regular flows. No flows were observed even though the well is actively pumped on a regular schedule. A special manual sampling effort was made in early 2000.

Shallow monitoring wells WH P8, WH P9, and WH P11 at caverns 8, 9, and 11, respectively, are located away from the brine pond and intercept unaffected waters that are near ambient levels compared to up-gradient well WH P6S. Two of these wells (WH P8 and WH P11) have detected minor localized impacts from former firewater line leakage and have since returned to ambient unaffected levels over the present five year history.

Shallow zone monitoring wells WH P6S, WH P12S, and WH P13S, and deep zone monitoring wells WH P2D, WH P6D, WH P12D, WH P13D, and WH MW1D are nearer the brine pond than wells at the caverns and with the exception of well WH P12S, also intercept

ambient ground water. Well WH P12S is the only down gradient monitoring well that is affected by the shallow zone brine plume extending eastward from the brine pond. Its salinity remains elevated (18.5 ppt annual average in 2000) which has been generally consistent since sampling began in 1992 (range 13.1 to 39 ppt, Std. D = 6.6 ppt, avg. = 27.93 ppt, n = 36); however, the well has shown a reversal of the freshening trend which commenced the last half of 1998. The gradual rise in salinity noted for 2000 at this position may be a delayed (travel time) response to the closure construction spikes seen nearer the pond early in 1999.

Cones of depression have been sustained in both zones as a result of successful ground water recovery through all of 2000. The differences in shallow and deep zone potentiometric surfaces indicate that the two zones are hydraulically separate; however, the overall potential is downward combined with the increased density of saline water, contamination will tend to seek lower elevations. The two zones behave as leaky, poorly confined waterbearing units exhibiting static heads considerably above the elevations of an overlying confining unit. Recharge would be expected to occur somewhere off site at an up-gradient location; however, local topographic modifications of the surrounding area from the underlying salt piercement appear to have combined with the onsite offtake to locally modify the regional ground water movement beneath the site. From the addition of several outlying shallow wells placed for the VWS, we now find that ground water contours indicate a radial flow of water subparalleling surface topography off the dome, placing a recharge potential for the shallow zone directly under the main site in a N-S trending ridge. Insufficient data are available to assess the deeper zone in a similar fashion. The deeper zone exhibits an overall higher degree of confinement and is also considerably less permeable as evidenced in the much lower average linear velocity (flow rate) estimate of 7.5 ft/yr. versus the 50 ft/yr. to 200 ft/yr. estimated for the shallow zone.

7. QUALITY ASSURANCE

The SPR sites undergo periodic evaluation throughout the year in the form of annual internal audits as well as inspections 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 Assessments, and program inspections at selected sites by state and federal environmental agencies.

7.1 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. These procedures include maintenance of chain-of-custody, collection of quality control (QC) samples, and field documentation.

7.2 DATA MANAGEMENT

SPR and contractor laboratories generate SPR data. 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 SPR ES&H Management Information System (SEMIS) 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.

7.3 LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY LABORATORY ACCREDITATION PROGRAM (LELAP)

The Louisiana Department of Environmental Quality (LDEQ) has mandated that any laboratory submitting results from environmental samples to the department must be accredited by the state. DOE has required that all SPR laboratories participate in the accreditation program. As part of this program the laboratories are required to analyze Performance Evaluation samples twice per calendar year, once in each the first and third quarter. Through this program, LDEQ ensures verifiable and consistent data generation by requiring the environmental analytical laboratories of permitted dischargers perform analysis on blind samples for each of the permit parameters. The Bayou Choctaw, Big Hill, Bryan Mound and West Hackberry laboratories have completed and reviewed their accreditations. These laboratories have successfully completed the first and third quarter 2000 round of sampling. Resultant data was provided to LDEQ, via the Performance Evaluation (PE) sample contractor/provider, on a standard report form. The results of this study indicated that these SPR laboratories performed acceptably and are approved for continued DMR/LPDES analyses.

7.4 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 percent frequency to determine precision and accuracy, respectively.

Analytical methodology is based on the procedures listed in Table 7-1. Several hundred of these quality assurance analyses were performed in 2000 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.

Table 7-1. SPR Wastewater Analytical Methodology

Parameter	Method	Source*	Description
Biochemical Oxygen Demand	5210(B) 405.1	APHA EPA-1	5 Day, 20°C 5 Day, 20° C
Chemical Oxygen Demand	D1252-88(B) 410.4 5220(D)	ASTM EPA-1 APHA	Micro Spectrophotometric Proc. Colorimetric, Manual Closed Reflux, Colorimetric
Fecal Coliform	Part III-C-2 9222(D)	EPA-2 APHA	Direct Membrane Filter Method Membrane Filter Procedure
Residual Chlorine	4500-C1(G) 330.5 8021	APHA EPA-1 Hach	DPD Colorimetric Spectrophotometric, DPD DPD Method
Oil & Grease (Total, Recoverable)	413.1	EPA-1	Gravimetric, Separatory Funnel Extraction
Oil & Grease (Partition, Gravimetric)	5520-(B)	APHA	Gravimetric, Separatory Funnel Extraction
Total Organic Carbon	415.1 D4839-88 5310(C) D2579(A) 5310(B)	EPA-1 ASTM APHA ASTM APHA	Combustion or Oxidation Persulfate – UV Oxidation, IR Combustion – IR
Dissolved Oxygen	D888-87(D) 360.1 360.2 4500-O(C) 4500-O(G)	ASTM EPA-1 EPA-1 APHA APHA	Membrane Electrode Membrane Electrode Winkler Method with Azide Mod. Winkler Method with Azide Mod. Membrane Electrode
Hydrogen Ion conc. (pH)	D1293-84(A&B) 150.1 4500-H^+(B)	ASTM EPA-1 APHA	Electrometric Electrometric Electrometric
Total Dissolved Solids (Residual, Filterable)	160.1 2540(C)	EPA-1 APHA	Gravimetric, Dried at 180°C Gravimetric, Dried at 180°C
Total Suspended Solids (Residual, Non-Filterable)	160.2 2540(D)	EPA-1 APHA	Gravimetric, Dried at 103-105°C Gravimetric, Dried at 103-105°C
Salinity	D4542-85 (Sect. 7) 2520(B) & 2510 210B	ASTM APHA APHA (16th Ed.)	Refractometric Electrical Conductivity Hydrometric
Biomonitoring	1006.0 1007.0	EPA-3 EPA-3	Menidia beryllina 7 day survival Mysidopsis bahia 7 day survival
Copper	200.7	EPA-1	Inductively coupled plasma atomic emission spectrometric method for trace element analysis of water and waste.

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

EPA-3 = U.S. EPA, Short Term Methods for Estimnating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms, Document No. EPA/600/4-87/028.

7.5 CONTROL OF SUBCONTRACTOR LABORATORY QUALITY ASSURANCE

The M&O Contractor subcontracts some of the required analytical work. 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 for adequacy of their analytical and quality assurance program.

Appendix A
SPR ES&H Standards

STRATEGIC PETROLEUM RESERVE ES&H 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
10 CFR 835	RP	Occupational Radiation Protection - Applicable and Enforceable Portions
14 CFR 77	IS	(Aviation) Objects Affecting Navigable Airspace
14 CFR 91	IS	(Aviation) General Operating and Flight Rules
14 CFR 121	IS	(Aviation) Operating Requirements: Domestic, Flag, and Supplemental Operations
14 CFR 125	IS	(Aviation) Certifications and Operations
14 CFR 127	IS	(Aviation) Certification and Operations of Scheduled Air Carriers with Helicopters
14 CFR 133	IS	(Aviation) Rotorcraft External Load Operations
14 CFR 135	IS	(Aviation) Operating Requirements: Commuter and On-Demand Operations
14 CFR 137	IS	(Aviation) Agricultural Aircraft Operations
14 CFR 139	IS	(Aviation) Certification and Operation: Land Airport Serving Certain Air Carriers
14 CFR 145	IS	(Aviation) Repair Stations
14 CFR 830	IS	(Aviation) Notification And Reporting - Accidents and Incidents
29 CFR 1903.2	IS	Posting of Notice: Availability of the Act, Regulations, and Applicable Standards
29 CFR 1903.13	IS	Imminent Danger
29 CFR 1904	MO	Recordkeeping and Reporting Occupational Injuries and Illnesses
29 CFR 1910 SUBPART A	IS,FP	General (1 through 8)
29 CFR 1910 SUBPART B	IS	Adoption and Extension of Established Federal Standards (11 through 19)
29 CFR 1910 SUBPART D	IS	Walking-Working Surfaces (21 through 30)
29 CFR 1910 SUBPART E	IS	Means of Egress (35 through 38)
29 CFR 1910 SUBPART F	IS	Powered Platforms, Manlifts, and Vehicle Mounted Work Platforms (66 through 68)
29 CFR 1910 SUBPART G	IH	Occupational Health and Environmental Control (94 through 98)

STRATEGIC PETROLEUM RESERVE ES&H STANDARDS

STANDARD	AREA	DESCRIPTION
29 CFR 1910 SUBPART H	IS,CS,FP	Hazardous Materials (101 through 126)
29 CFR 1910 SUBPART I	IS	Personal Protective Equipment (132 through 139)
29 CFR 1910 SUBPART J	IS,FP	General Environmental Controls (141 through 147)
29 CFR 1910 SUBPART K	MS	Medical and First Aid (151)
29 CFR 1910 SUBPART L	IS,FP	Fire Protection (155 through 165)
29 CFR 1910 SUBPART M	IS	Compressed Gas and Compressed Air Equipment (169)
29 CFR 1910 SUBPART N	IS	Materials Handling and Storage (176-179, 181, 183-184)
29 CFR 1910 SUBPART O	IS	Machinery and Machine Guarding (211 through 213, 215, 219)
29 CFR 1910 SUBPART P	IS	Hand/Portable Powered Tools and Other Hand-Held Equipment (241 through 244)
29 CFR 1910 SUBPART Q	IS	Welding, Cutting, and Brazing (251 through 255)
29 CFR 1910 SUBPART R	IS	Special Industries (269)
29 CFR 1910 SUBPART S	IS	Electrical (301 through 306, 331–335, 399)
29 CFR 1910 SUBPART T	IS	Commercial Diving Operations (401 through 402, 410, 420-427, 430, 440-441)
29 CFR 1910 SUBPART Z	IH	Toxic and Hazardous Substances (1000 through 1450 except 1029, 1043, 1045, 1047, 1050-1051)
29 CFR 1926	IS	Designations for General Industry Standards Incorporated Into Body of Construction Standards

STRATEGIC PETROLEUM RESERVE ES&H STANDARDS

STANDARD	AREA	DESCRIPTION
APPENDIX A		
29 CFR 1926 SUBPART A	MO	General (1 through 5)
29 CFR 1926 SUBPART B	IS	General Interpretations (10 through 16)
29 CFR 1926 SUBPART C	IS,FP	General Safety and Health Provisions (20 through 35)
29 CFR 1926 SUBPART D	IS	Occupational Health and Environmental Controls (50 through 66)
29 CFR 1926 SUBPART E	IS,FP	Personal Protection and Life Saving Equipment (95 through 107)
29 CFR 1926 SUBPART F	IS,FP	Fire Protection and Prevention (150 through 155)
29 CFR 1926 SUBPART G	IS	Signs, Signals, and Barricades (200 through 203)
29 CFR 1926 SUBPART H	IS	Materials Handling, Storage, Use, and Disposal (250 through 252)
29 CFR 1926 SUBPART I	IS	Tools - Hand and Power (300 through 307)
29 CFR 1926 SUBPART J	IS	Welding and Cutting (350 through 354)
29 CFR 1926 SUBPART K	IS	Electrical (400 through 408, 416-417, 431-432, 441, 449)
29 CFR 1926 SUBPART L	IS	Scaffolds (450 through 454)
29 CFR 1926 SUBPART M	IS	Fall Protection (500 through 503)
29 CFR 1926 SUBPART N	IS	Cranes, Derricks, Hoists, Elevators, and Conveyors (550 through 555)

STRATEGIC PETROLEUM RESERVE ES&H STANDARDS

STANDARD	AREA	DESCRIPTION
29 CFR 1926 SUBPART O	IS	Motor Vehicles, Mechanized Equipment, and Marine Operations (600 through 606)
29 CFR 1926 SUBPART P	IS	Excavations (650 through 652)
29 CFR 1926 SUBPART Q	IS	Concrete and Masonry Construction (700 through 706)
29 CFR 1926 SUBPART R	IS	Steel Erection (750 through 752)
29 CFR 1926 SUBPART S	IS	Underground Construction, Caissons, Cofferdams, and Compressed Air (800 through 804)
29 CFR 1926 SUBPART T	IS	Demolition (850 through 860)
29 CFR 1926 SUBPART U	IS	Blasting and the Use of Explosives (900 through 914)
29 CFR 1926 SUBPART V	IS	Power Transmission and Distribution (950 through 960)
29 CFR 1926 SUBPART W	IS	Rollover Protective Structures; Overhead Protection (1000 through 1003)
29 CFR 1926 SUBPART X	IS	Stairways and Ladders (1050 through 1060)
29 CFR 1926 SUBPART Y	IS	Diving (1071 through 1092)
29 CFR 1926 SUBPART Z	IH	Toxic and Hazardous Substances (1100 through 1152 except 1129, 1145, 1147)
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 68	CW	Private Aid to Navigation
33 CFR 126	CW	Handling Class I (Explosive) Materials or Other Dangerous Cargo
33 CFR 153	CW	Control of Pollution by Oil and Hazardous Substances, Discharged Removed

STRATEGIC PETROLEUM RESERVE ES&H STANDARDS

STANDARD	AREA	DESCRIPTION
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 60, Appendix A	CA	Determination of Emissions from Volatile Compounds Leaks
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

STRATEGIC PETROLEUM RESERVE ES&H STANDARDS

STANDARD	AREA	DESCRIPTION
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
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

STRATEGIC PETROLEUM RESERVE ES&H STANDARDS

STANDARD	AREA	DESCRIPTION
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
40 CFR 700	CS	General
40 CFR 761	CS	PCB Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions
40 CFR 763	IH,CS	Asbestos
40 CFR 1500	MR	NEPAPurpose, Policy and Mandate
40 CFR 1501	MR	NEPA and Agency Planning
40 CFR 1502	MR	NEPA Environmental Impact Statement
40 CFR 1503	MR	NEPA Commenting
40 CFR 1504	MR	NEPA 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	NEPA Agency Compliance
40 CFR 1508	MR	NEPA Terminology and Index
40 CFR 1515	MR	Freedom of Information Act Procedures
40 CFR 1516	MR	Privacy Act Implementation
49 CFR 130	CS	Oil Spill Prevention and Response Plans
49 CFR 171	TS	General Information, Regulations, and Definitions

STRATEGIC PETROLEUM RESERVE ES&H STANDARDS

STANDARD	AREA	DESCRIPTION
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 11988	CW	Floodplain Management
EO 11990	CW	Protection of Wetlands
EO 11991	MR	Protection and Enhancement of Environmental Quality
EO 12088	MR	Federal Compliance with Pollution Control Requirements
EO 12898	MR	Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations
EO 13101	PP	Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition
EO 13123	PP,MR	Greening the Government Through Efficient Energy Management
EO 13148	MR	Greening the Government Through Leadership in Environmental Management
EO 13149	PP	Greening the Government Through Federal Fleet and Transportation Efficiency
EO 13158	CW	Marine Protected Area
33:LAC I.3	MR	Departmental Administrative Procedures
33:LAC I.13	MR	Risk Evaluation/Corrective Action Program
33:LAC I.14	MR	Groundwater Fees
33:LAC I.15	MR	Permit Review
33:LAC I.39	MR	Notification Regulations and Procedures for Unauthorized Discharge
33:LAC I.45	MR	Policy and Intent
33:LAC I.47	MR	Program Requirements
33:LAC I.49	MR	Organization and Personnel Requirements
33:LAC I.51	MR	On-site Inspection/Evaluation
33:LAC I.53	MR	Quality System Requirements
33:LAC I.55	MR	Sample Protocol/Sample Integrity

STRATEGIC PETROLEUM RESERVE ES&H STANDARDS

STANDARD	AREA	DESCRIPTION
33:LAC I.57	MR	Maintenance of Accreditation
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
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.30	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.59	CA	Chemical Accident Prevention and Minimization of Consequences
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

STRATEGIC PETROLEUM RESERVE ES&H STANDARDS

STANDARD	AREA	DESCRIPTION
33:LAC V.26	HW	Corrective Action Management Units and Temporary Units
33:LAC V.37	HW	Financial Requirements
33:LAC V.38	HW	Universal Wastes
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 V.51	HW	Fee Schedules
33:LAC VII.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
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

STRATEGIC PETROLEUM RESERVE ES&H STANDARDS

STANDARD	AREA	DESCRIPTION
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
33:LAC XI.15	HW	Enforcement
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 XIX.1	CW	General Provisions (Statewide Order 29-B)
43:LAC XIX.2	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
LAC:XV chpt 1	RP	Radiation Protection - General Provisions
LAC:XV chpt 2	RP	Registration of Radiation Machines and Facilities
LAC:XV chpt 3	RP	Licensing of Radioactive Material
LAC:XV chpt 4	RP	Standards for Protection Against Radiation
LAC:XV chpt 5	RP	Radiation Safety Requirements for Industrial Radiographic Operations
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

STRATEGIC PETROLEUM RESERVE ES&H STANDARDS

STANDARD	AREA	DESCRIPTION
30:TAC I.106	CA	Exemption from Permitting
30:TAC I.111	CA	Control of Air Pollution from Visible Emissions and Particulate Matter
30:TAC I.112	CA	Control of Air Pollution from Sulfur Compounds
30:TAC I.113	CA	Control of Air Pollution from 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
30:TAC I.116	CA	Control of Air Pollution by Permits for New Construction or Modification
30:TAC I.117	CA	Control of Air Pollution from Nitrogen Compounds
30:TAC I.118	CA	Control of Air Pollution by Episode
30:TAC I.119	CA	Control of Air Pollution from 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 Sewage Facilities
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.324	CW	Used Oil
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.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

STRATEGIC PETROLEUM RESERVE ES&H STANDARDS

STANDARD	AREA	DESCRIPTION
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.69	MR	Resource Protection
31:TAC XVI.503	CW	Coastal Management Program
37:TAC XIII.501	FP	Texas Commission on Fire Protection, Flammable Liquids
No number	CA	Technical Guidance Package for Chemical Sources, Storage Tanks, TNRCC, Feb 1995
No number	CA	Technical Guidance Package for Chemical Sources, Equipment Leak Fugitives, TNRCC, Mar 1995
R.S. 30:2361-2379 SARA Title III	CS	Hazardous Materials Information Development, Preparedness and Response Act
TCRA, 505-507 SARA Title III	CS	Texas Tier Two Reporting Forms and Instructions
TRCR part 11	RP	Texas Regulations for Control of Radiation - General provisions
TRCR part 12	RP	Texas Regulations for Control of Radiation - Fees
TRCR part 13	RP	Texas Regulations for Control of Radiation - Hearing and Enforcement Procedures
TRCR part 21	RP	Standards for Protection Against Radiation - Permissible Doses, Precautionary Procedures, Waste Disposal
TRCR part 22	RP	Notices, Instructions and Reports to Workers; Inspections
TRCR part 31	RP	Radiation Safety Requirements and Licensing and Registration Procedures for Industrial Radiography
TRCR part 41	RP	Licensing of Radioactive Material -Exemptions, Licenses, General Licenses, Specific Licenses, Reciprocity, Transport
ANSI Standards	IS	OSHA Referenced Standards
ANSI/ISO 14001-1996	MR	Environmental Management Systems Specification With Guidance For Use
ASME Standards	IS	OSHA Referenced Standards
EPA 453/R-93-026	CA	Protocol for Equipment Leak Emission Estimates, Jun 1993
EPA 530/R-93-001	CW	RCRA Groundwater Monitoring; Draft Technical Guidance
EPA 600/2-85/105	CW	Practical Guide for Groundwater Sampling
EPA 600/4-78-012	CW	Methods for Measuring the Acute Toxicity of Effluents to Aquatic Organisms
EPA 600/4-79-019	CW	Handbook for Analytical Quality Control in Water and Wastewater Laboratories
EPA 600/4-79-020	CW	Methods for Chemical Analysis of Water and Wastes

STRATEGIC PETROLEUM RESERVE ES&H STANDARDS

STANDARD	AREA	DESCRIPTION
EPA 600/4-82-029	CW	Handbook for Sampling and Sample Preservation of Water and Wastewater
EPA/600/4-83-039	CW	Addendum to Handbook for Sampling and Sample Preservation, EPA 600/4-82-029
EPA/600/8-78-017	CW	Microbiological Methods for Monitoring the Environment, Water and Wastes
EPA/600/R-92/088	PP	Facility Pollution Prevention Guide
EPA 833-R-92-002	PP	Storm Water Management for Industrial Activities
EPA, ISBN:0-86587-279-1	CW	EPA Groundwater Handbook
EPA, ISBN:0-86587-752-1	PP	EPA Waste Minimization Opportunity Assessment Manual
EPA Region IV	MR	Engineering Support Branch Standard Operating Procedures and Quality Assurance Manual, 4/1/86
FAA AC 150/5345-27	IS	Specification for 8' and 12' Unlighted and Externally Lighted Wind Cone Assembly
FAA AC 150/5390-2	IS	Heliport Design, January 4, 1988
FAA AC 70/7460-1G	IS	Obstruction Marking and Lighting, October 1985
NFPA	FP	Fire Protection Handbook
NFPA 1	FP	Fire Prevention Code
NFPA 10	FP	Portable Fire Extinguishers
NFPA 11	FP	Low Expansion Foam
NFPA 12	FP	Carbon Dioxide Extinguishing Systems
NFPA 12A	FP	Halon 1301 Fire Extinguishing Systems
NFPA 13	FP	Installation of Sprinkler Systems
NFPA 14	FP	Installation of Standpipe and Hose Systems
NFPA 15	FP	Water Spray Fixed Systems
NFPA 16	FP	Deluge Foam-Water Sprinkler Systems and Foam-Water Spray Systems
NFPA 20	FP	Installation of Centrifugal Fire Pumps
NFPA 24	FP	Installation of Private Fire Service Mains and Theri Appurtenances
NFPA 25	FP	Water-Based Fire Protection Systems
NFPA 30	FP	Flammable and Combustible Liquids Code
NFPA 37	FP	Stationary Combustion Engines and Gas Turbines
NFPA 43D	FP	Storage of Pesticides
NFPA 45	FP	Fire Protection for Laboratories Using Chemicals
NFPA 49	FP	Hazardous Chemical Data

STRATEGIC PETROLEUM RESERVE ES&H STANDARDS

STANDARD	AREA	DESCRIPTION
NFPA 51B	FP	Cutting and Welding Processes
NFPA 54	FP	National Fuel Gas Code
NFPA 55	FP	Compressed and Liquefied Gases in Portable Cylinders
NFPA 70	FP, IS	National Electric Code
NFPA 70B	FP	Electrical Equipment Maintenance
NFPA 70E	FP	Electrical Safety Requirements for Employee Workplaces
NFPA 72	FP	National Fire Alarm Code
NFPA 75	FP	Protection of Electronic Computer/Data Processing Equipment
NFPA 77	FP	Static Electricity
NFPA 80	FP	Fire Doors and Fire Windows
NFPA 80A	FP	Exterior Fire Exposures
NFPA 90A	FP	Installation of Air Conditioning and Ventilating Systems
NFPA 92A	FP	Smoke Control Systems
NFPA 96	FP	Ventilation Control and Fire Protection of Commercial Cooking Operations
NFPA 101	FP, IS	Safety to Life from Fire in Buildings and Structures
NFPA 101A	FP	Alternative Approaches to Life Safety
NFPA 110	FP	Emergency and Standby Power Systems
NFPA 122	FP	Fire Prevention and Control in Underground Metal and Nonmetal Mines
NFPA 170	FP	Fire Safety Symbols
NFPA 204	FP	Roof Coverings and Roof Deck Constructions
NFPA 220	FP	Types of Building Construction
NFPA 221	FP	Fire Walls and Fire Barrier Walls
NFPA 231	FP	General Storage
NFPA 231C	FP	Rack Storage of Materials
NFPA 232	FP	Protection of Records
NFPA 241	FP	Construction, Alteration, and Demolition Operations
NFPA 253	FP	Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source
NFPA 255	FP	Test of Surface Burning Characteristics of Building Materials
NFPA 291	FP	Fire Flow Testing and Marking of Hydrants

STRATEGIC PETROLEUM RESERVE ES&H STANDARDS

STANDARD	AREA	DESCRIPTION
NFPA 295	FP	Wildfire Control
NFPA 297	FP	Principles and Practices for Communication Systems
NFPA 302	FP	Pleasure and Commercial Motor Craft
NFPA 306	FP	Control of Gas Hazards on Vessels
NFPA 307	FP	Marine Terminals, Piers, and Wharves
NFPA 321	FP	Basic Classification of Flammable and Combustible Liquids
NFPA 325	FP	Fire Hazard Properties of Flammable Liquids, Gases, and Volatile Solids
NFPA 326	FP	Safe Entry of Underground Storage Tanks
NFPA 327	FP	Cleaning of Safeguarding Small Tanks and Containers Without Entry
NFPA 328	FP	Control of Flammable and Combustible Liquids and Gases in Manholes, Sewers, and Similar Underground Structures
NFPA 329	FP	Handling Underground Releases of Flammable and Combustible Liquids
NFPA 385	FP	Tank Vehicles for Flammable and Combustible Liquids
NFPA 402M	FP	Aircraft Rescue and Fire Fighting Operations
NFPA 418	FP	Heliports
NFPA 430	FP	Liquid and Solid Oxidizers
NFPA 471	FP	Responding to Hazardous Materials Incidents
NFPA 472	FP	Professional Competence of Responders to Hazardous Materials Incidents
NFPA 491M	FP	Hazardous Chemical Reactions
NFPA 497A	FP	Classification of Class I Hazardous Locations for Electrical Installations in Chemical Process Areas
NFPA 505	FP	Powered Industrial Trucks Including Type Designations, Areas of Use, Maintenance and Operations
NFPA 512	FP	Truck Fire Protection
NFPA 550	FP	Fire Safety Concepts Tree
NFPA 600	FP	Industrial Fire Brigades
NFPA 601	FP	Guard Service in Fire Prevention
NFPA 703	FP	Fire Retardant Impregnated Wood and Dire Retardant Coatings for Building Materials
NFPA 704	FP	Identification of the Fire Hazards of Materials
NFPA 780	FP	Installation of Lightning Protection Systems
NFPA 820	FP	Fire Protection in Wastewater Treatment and Collection Facilities

STRATEGIC PETROLEUM RESERVE ES&H STANDARDS

STANDARD	AREA	DESCRIPTION
NFPA 901	FP	Standard Classifications for Incident Reporting and Fire Protection Data
NFPA 902M	FP	Fire Reporting Field Incident Manual
NFPA 903	FP	Fire Reporting Property Survey Guide
NFPA 904	FP	Incident Follow-Up Report Guide
NFPA 906	FP	Fire Incident Field Notes
NFPA 921	FP	Fire and Explosion Investigations, Guide for
NFPA 1000	FP	Fire Service Professional Qualifications Accreditation and Certifications System
NFPA 1021	FP	Fire Officer Professional Qualifications
NFPA 1031	FP	Professional Qualification of Fire Inspector
NFPA 1033	FP	Fire Investigator Professional Qualifications
NFPA 1401	FP	Fire Protection Training Reports and Records
NFPA 1404	FP	Fire Department Self-Contained Breathing Apparatus Program
NFPA 1406	FP	Outside Live Fire Training Evolutions
NFPA 1410	FP	Training for Initial Fire Attack
NFPA 1420	FP	Pre-Incident Planning for Warehouse Occupancies
NFPA 1500	FP	Fire Department Occupational Safety and Health Program
NFPA 1561	FP	Fire Department Incident Management System
NFPA 1582	FP	Medical Requirements for Fire Fighters
NFPA 1901	FP	Pumper Fire Apparatus
NFPA 1902	FP	Initial Attack Fire Apparatus
NFPA 1903	FP	Mobile Water Supply Fire Apparatus
NFPA 1911	FP	Service Tests of Pumps on Fire Department Apparatus
NFPA 1921	FP	Fire Department Portable Pumping Units
NFPA 1922	FP	Fire Service Self-Contained Pumping Units
NFPA 1932	FP	Use, Maintenance and Service Testing of Fire Department Ground Ladders
NFPA 1961	FP	Fire Hose
NFPA 1962	FP	Care, Use, and Service Testing of Fire Hose Including Connections and Nozzles
NFPA 1963	FP	Fire Hose Connections
NFPA 1964	FP	Spray Nozzles (Shutoff and Tip)

STRATEGIC PETROLEUM RESERVE ES&H STANDARDS

STANDARD	AREA	DESCRIPTION
NFPA 1971	FP	Protective Clothing for Structural Fire Fighting
NFPA 1972	FP	Helmets for Structural Fire Fighting
NFPA 1973	FP	Gloves for Structural Fire Fighting
NFPA 1974	FP	Protective Footwear for Structural Fire Fighting
NFPA 1976	FP	Protective Clothing for Proximity Fire Fighting
NFPA 1981	FP	Open-Circuit Self-Contained Breathing Apparatus for Fire Fighters
NFPA 1983	FP	Fire Service Life Safety Rope and Systems Components
NFPA 1991	FP	Vapor-Protective Suits for Hazardous Chemical Emergencies
NFPA 1992	FP	Liquid Splash-Protective Suits for Hazardous Chemical Emergencies
NFPA 1993	FP	Support Function Protective Garments for Hazardous Chemical Operations
NFPA 1999	FP	Protective Clothing for Medical Emergency Operations
DOE/EH-0350	CA	Management of Polychlorinated Biphenyls (PCBs)
DOE/EH-0358	MR	Performance Objectives and Criteria for Conducting DOE Environmental Audits
DOE G 450.4-1B	MR	Integrated Safety Management System Guide, March 2001
DOE G 414.1-1A	MR	Management Assessment And Independent Assessment Guide, May 2001
DOE/EM-0276	PP	Annual report on Waste Generation and Waste Minimization Progress
DOE/EP-0108	FP	Standard for Fire Protection of DOE Electronic Computer/Data Processing Systems
DOE/FM-0145	PP	Waste Minimization/Pollution Prevention Crosscut Plan 1994
DOE Guideline	PP	DOE Waste Minimization reporting Requirements, Nov. 1994
DOE Handbook	PP	Guidance for the Preparation of the Waste Minimization and Pollution Prevention Awareness Plan, Dec 1993
DOE Handbook	PP	Pollution Prevention Handbook
DOE Handbook	PP	Waste Minimization Reporting System (Wmin) User's Guide
DOE HDBK, 1090-9	IS	Hoisting And Rigging Handbook
DOE Memorandum	PP	EPA's Interim Final Guidance to Hazardous Waste Generators on the Elements of a Waste Minimization Program
DOE Orders	MO,MR	For all applicable DOE Orders See Contract No. DE-AC96-93PO18000 Applicable Standards List
SPRMO 220.2	MO	Observations report
DOE S-0118	PP	Pollution Prevention Program Plan
DOE-STD-1088-95	FP	Fire Protection for Relocatable Structures

STRATEGIC PETROLEUM RESERVE ES&H STANDARDS

STANDARD	AREA	DESCRIPTION
DOE Standard Spec. 17900	PP	Paint Repair of Exterior Metal Surfaces
SPRPMO O 3790.1	MR	Employee Occupational Medical and Counseling Programs
No number	MO,MR	Environmental, Safety, and Health Management Plan (FY 1998 - FY 2002)
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
AL 5500.11	MO,MR	Drill and Exercise Program Plan
ASE 5400.48	MR	Annual Site Environmental Report
ASI 3400.1	MO, MR	Conduct of Training for the SPR M&O Contractor
ASI 4000.10	FP	Integrated Logistics Support Procedures
ASI 4330.16	FP,IS	Work Order System Procedures
ASI 4400.4	PP	Supply Services Manual
ASI 5400.15	MR	Environmental Instructions Manual
ASI 5480.19	MO,MR	Conduct of Operations at the SPR
ASI 5480.26	IS,FP,CW, HW	ES&H Training Requirements
ASI 5480.22	IS	Accident Prevention Manual
ASI 5600.1	FP	Security Operations Manual
ASI 5700.11	IS	Root Cause Analysis Instruction
ASI 5700.15	MR	Quality Assurance Manual
ASI 6410.2	FP	Construction Management Procedures Manual
ASI 6430.15	MO,MR	Design Review Procedure
ASL 1000.15	MR	Self-Assessment Program Implementation Plan
ASL 4700.1	MO,MR	Configuration Management Plan and Procedures
ASL 5480.18	FP	Fire Protection Manual
ASL 5480.44	IS	Electrical Safety Program Plan
ASL 5499.30	CW	Cavern Inventory & Integrity Control Plan
ASL 5500.1	MO,MR	Emergency Management Plan
ASL 5500.10	MO,MR	Emergency Readiness Assurance Plan

STRATEGIC PETROLEUM RESERVE ES&H STANDARDS

STANDARD	AREA	DESCRIPTION
ASL 5500.25	MO,MR	Emergency Response Team Organization and Training Plan
ASL 6400.18	MO,MR	Drawdown Management Plan
ASL 6400.31	MO,MR	Drawdown Readiness Program Plan
ASP 4000.11	FP	Integrated Logistics Support Master Plan
ASP 5000.8	MO,MR	Master Action Tracking Management and Control System
ASP 5400.2	MR	Environmental
ASR 4330.5	FP	Interim Repair/Mitigation Authorization
ASR 5480.49	MO,MR	Environmental, Safety and Health (ES&H) Orientation Video Program
ASR 5700.3	MO,MR	Independent Quality Assurance Assessments
ASR 5700.4	FP	Deviation and Waiver Requests
ASR 7000.1	MO,MR	Readiness Review Board
ASR 7000.2	MO,MR	SPR Crosstalk Information Exchange Program
BCL 5400.16	CW	Bayou Choctaw Spill Prevention, Control, and Countermeasures Plan
BCI 5500.3	EM, FP	Bayou Choctaw Emergency Response Procedures
BHL 5400.21	CW	Big Hill Spill Prevention, Control, and Countermeasures Plan
BHI 5500.4	EM, FP	Big Hill Emergency Response Procedures
BMI 6420.27	FP	Bryan Mound Foam Deluge System Interim Operations Manual
BML 5400.17	CW	Bryan Mound Spill Prevention, Control, and Countermeasures Plan
BMI 5500.5	EM, FP	Bryan Mound Emergency Response Procedures
D506-01162-02	FP	Bryan Mound: Preventive Maintenance Procedures Manual
D506-01163-03	FP	West Hackberry: Preventive Maintenance Procedures Manual
D506-01164-04	FP	Bayou Choctaw: Preventive Maintenance Procedures Manual
D506-01167-07	FP	St. James: Preventive Maintenance Procedures Manual
D506-01168-08	FP	Big Hill: Preventive Maintenance Procedures Manual
D506-02569-09	TSM, CS	Hazardous Materials Packaging & Transportation Plan
D506-03287-09	HW,PP,CW	Pollution Prevention Plan
MSL 7000.133	CW, HW	Laboratory Programs & Procedures
NOL 5400.44	CW	New Orleans Warehouse Spill Prevention, Control, and Countermeasures Plan
NOL 5500.6	EM, FP	New Orleans Emergency Response Procedures

STRATEGIC PETROLEUM RESERVE ES&H STANDARDS

STANDARD	AREA	DESCRIPTION
No number	CW,PP,CA, HW,CS	Environmental Exhibit 6.6
No number	CW	SPR Groundwater Protection Management Program
No number	PP,HW	SPR Qualified Products List
No number	MO, MR	SPRPMO Environmental, Safety and Health Manual
No number	MO, MR	SPRPMO Level III Design Criteria
WHL 5400.20	CW	West Hackberry Spill Prevention, Control, and Countermeasures Plan
WHI 5500.9	EM,FP	West Hackberry Emergency Response Procedures
120 IAC	IS	Boiler And Pressure Vessels - Degas Project Only
055-001-01049-4	CW	Quality Criteria for Water
ACGIH TLV	IH	Threshold Limit Values For Chemical Substances - Current Year & Applicable Substances
ACP USCG	CW	Area Contingency Plan for New Orleans
ACP USCG	CW	Area Contingency Plan for Lake Charles
ACP USCG	CW	Area Contingency Plan for Port Arthur
ACP USCG	CW	Area Contingency Plan for Galveston
ACP-EPA	CW	Area Contingency Plan for EPA Region 6
AIHMM	PP	Hazardous Materials Management Education Program Observations and Recommendations: Environmental Mgmt, Hazardous Waste Minimization, and Pollution Prevention for the SPR Operations
American Public Health Assoc.	CW	Standard Methods for the Examination of Water and Wastewater
AP-42	CA	Compilation of Air Pollutant Emission Factors, Mobile Sources
API	MR	Amer. Petroleum Institute - Recommended Practices and Guides
API - Standard	CA	API Standard 653 for Tank Inspection, Repair, Alteration, and Reconstruction
CERI-89-224	CW	Seminar on Site Characterization for Subsurface Remediations
FM	FP	Factory Mutual - Approval Guide and Loss Prevention Data Sheets
ICIMF	IS	Oil Cos. International. Marine Forum - International Oil Tanker and Terminal Safety Guide
IEEE Standards	IS	OSHA Referenced Standards
LP 92-03	PP	Pollution Prevention Assessment Manual for Texas Businesses
MIL-HDBK-1008	FP	Fire Protection for Facilities - Engineering, Design and Construction

STRATEGIC PETROLEUM RESERVE ES&H STANDARDS

STANDARD	AREA	DESCRIPTION
MP 94W0000131	CA	SPR Gas and Geothermal Heat Effects on Crude Oil Vapor Pressure, Dec. 1994
NACE	FP, IS	National Association of Corrosion Engineers
NEC	FP, IS	National Electric Safety Code
No number	CW	Construction of Geotechnical Boreholes and Groundwater Monitoring Systems Handbook (LDOTD and LDEQ)
No number	CW	Earth Manual, 2nd Ed.
No number	CW	Engineering Geology Field Manual
No number	CW, CA	Environmental Monitoring Plan
No number	CW	Groundwater Manual
No number	CW	Groundwater Program
No number	CA	Louisiana Air Permit Procedures Manual, Jun 1995
No number	CW	Louisiana's Suggested Chemical Weed Control Guide for 1994 (LA Cooperative Extension Services)
No number	CA	Nonattainment New Source Review Guidance Manual, Oct 1993
No number	CW	The Sterling Brine Handbook (Int'l Salt Co.)
No number	CW	Water Measurement Manual
OSWER-9950.1 (1986)	CW	RCRA Groundwater Technical Enforcement Guidance Document (TEGD)
RBCA (OS21)	CW	Proposed Approach for Implementing a Louisiana Dept. of Env. Quality Risk-Based Corrective Action Program
RG-133	PP	Pollution Prevention Assessment Manual
UFC/UBC	FP	International Conference of Building Officials - Uniform Building Code and Uniform Fire Code
UL	FP	Underwriter's Laboratory - Building Materials, Fire Resistance, Fire Prot. Equip., & Haz. Location Equip. Directories
Water Supply Paper 1473	CW	Study and Interpretation of the Chemical Characteristics of Natural Water (HEM)
Y-87-1	CW	Corps. of Engineers Wetlands Delineation Manual

STRATEGIC PETROLEUM RESERVE ES&H STANDARDS

KEY TO ACRONYMS:

AIHMM American Institute of Hazardous Materials Mgmt.
API American Petroleum Institute
CA Protection of Air Quality
CFR Code of Federal Regulations
CS Control of Toxic Substances
CW Protection of Water Quality
EO Executive Order
ESH Environmental, Safety, and Health Directorate
FM Factory Mutual
FP Fire Protection
HW Solid and Hazardous Waste Generation and Control
IH Industrial Hygiene
IS Industrial Safety
LAC Louisiana Administrative Code
M Manual (DOE)
MO Management and Oversight
MR Management, Oversight, and Reporting
MS Medical Services
NEC National Electric Code
NFPA National Fire Protection Association
O Order (DOE)
P Policy (DOE)
PP Pollution Prevention and Waste Minimization
RCRA Resource Conservation and Recovery Act
RP Radiation Protection
SEN Secretary of Energy Notice
TAC Texas Administrative Code
TRCR Texas Regulations for the Control of Radiation
TS Transportation Safety
UBC Uniform Building Code
UFC Uniform Fire Code
UL Underwriter's Laboratory

Appendix B
SPR Environmental Policy Statements

U. S. Department of Energy
STRATEGIC PETROLEUM RESERVE PROJECT MANAGEMENT OFFICE
New Orleans, La.

POLICY

SPRPMO P 451.1

DATE: 02-28-01
SUNSET REVIEW: 02-28-03
EXPIRES: 02-28-05

SUBJECT: ENVIRONMENTAL POLICY STATEMENT

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1. **PURPOSE AND SCOPE.** The purpose of this Environmental Policy Statement is to confirm the commitment of the Department of Energy (DOE) Strategic Petroleum Reserve Project Management Office (SPRPMO) to the goal of environmental protection for all PMO activities.

2. **POLICY.** It is the policy and practice of the SPRPMO, as an operating unit of DOE, to conduct its operations in an environmentally sound manner. Protection of the environment and protection of the public are responsibilities that are of paramount importance to our facilities.

   It is the SPRPMO's policy and practice to conduct our operations in compliance with applicable Federal, state, and local environmental statutes, regulations, and standards. The SPRPMO is firmly committed to ensuring incorporation of all Departmental and national environmental goals in the daily conduct of business. SPRPMO's environmental management program shall pursue continual improvement in performance by establishing and maintaining documented environmental objectives and targets that correspond to the mission, vision, and core values subscribed to at the SPRPMO.

   DOE Management and Operation and other contractors also share our responsibilities for good environmental management. We expect our contractors to conduct facility operations in an environmentally sound manner that limits the risk to the environment and protects the public health.

   It is the SPRPMO's goal to create a pollution prevention ethic within the work place. It is the SPRPMO's policy to undertake appropriate measures to prevent the generation of wastes, and other residual materials requiring disposal or release to the environment through recycling, reuse, and source reduction. Where the generation of such wastes cannot be avoided, the SPRPMO will take actions to reduce their volume and toxicity and ensure proper disposal. Employee initiative in the establishment of sound pollution prevention and waste minimization practices is encouraged by all levels of facility management. We will work cooperatively and openly with the appropriate Federal, state, and local agencies, public stakeholders, and site employees to prevent pollution, achieve environmental compliance and enhance environmental quality.

   It is our goal to design, develop, construct, operate, and maintain facilities and operations in a manner that shall be resource-efficient and will protect the quality of the environment consistent with our mission.

William C. Gibson, Jr.
Project Manager
Strategic Petroleum Reserve

DISTRIBUTION: All SPRPMO Employees **INITIATED BY:** APM, Technical Assurance

(Note: This policy is the version current as of publication of this document.)

POLICY

DynMcDermott Petroleum Operations Company

RESPONSIBLE ORGANIZATION: ENVIRONMENTAL, SAFETY AND HEALTH SUBJECT CLASSIFICATION: ENVIRONMENTAL CONTROL OWNER: ENVIRONMENTAL MANAGER	SUPERSEDES: ASP5400.2E0, "ENVIRONMENTAL POLICY" APPROVED BY: R. MCGOUGH, PROJECT MANAGER	POLICY NO: ASP5400.2 VERSION: F0 EFFECTIVE DATE: 5/1/01 PAGE 1

THIS IS A CATEGORY C CONTROLLED DOCUMENT AND IS CONTROLLED BY THE PUBLICATION CONTROL DEPARTMENT

TITLE: Environmental Policy

Applicability: All DynMcDermott (DM) Organizations

References:
- **a)** DOE Environmental Work Authorization Directive to DM M&O Contractor for the USDOE SPR Contract No. DE-AC96-93PO18000
- **b)** DOE P450.4, "Safety Management Systems Policy"
- **c)** DM instruction ASI5400.15, Environmental Instructions Manual
- **d)** DM instruction ASI5400.55, ISO 14001 Environmental Management System Manual
- **e)** DM plan ASL5400.41, Pollution Prevention Plan
- **f)** International Organization for Standardization (ISO) 14001 Environmental Management Systems
- **g)** Environmental Standard Set, available in Microsoft Outlook in Public Folders/All Public Folders/ES&Q

Significant Changes Since the Last Revision: Changed "ES&H" to "ES&Q". Deleted section 4.J, Quality Assurance, and moved 4.J.[1] under 4.B., ES&Q Director. Changed the term "independent assessment' under 4.J.[1] to "management appraisal." Deleted section 4.M., Information Systems. Other minor changes were made to sentence structure. Changed paragraphs are marked with a revision bar in the right margin.

1. PURPOSE AND SCOPE

DynMcDermott Petroleum Operations Company (DM) follows regulations, orders, and policies that make up the Department of Energy (DOE)-mandated "environmental standard set," under which the Strategic Petroleum Reserve (SPR) operates. This policy establishes the requirements and responsibilities for DM as a good steward of the environment and a progressive corporate citizen.

2. DEFINITIONS

A. Environmental Instructions Manual - The document that instructs employees on how to comply with environmental requirements in their normal work routine. Along with reference d), it implements the environmental policy statement.

B. Environmental Management Systems – As used in this document, all systems and subsystems thereof used for management of the environmental program, including elements of Integrated Safety Management Systems (ISMS), international

environmental management systems, and environmental management principles, as applicable.

C. Environmental Standard Set - The list of regulations, industrial codes, and internal and external supporting documents that define the environmental program and provide the basis on which the SPR operates. It is the subset of the ES&H Standards List denoted by CA, CW, CS, PP, HW, and MR in the "area" column. The ES&H Standards List and denoted Environmental Standards Set are located in Microsoft Outlook in Public Folders/All Public Folders/ES&Q.

3. POLICY

3.1. POLICY STATEMENT

DynMcDermott operates only in an environmentally responsible manner.

3.2 OVERALL ENVIRONMENTAL PROGRAM

DM is committed to continued excellence, leadership, and stewardship in protecting the environment. DM will manage, operate, and maintain the SPR sites with the highest regard for the protection of human health and the environment. Environmental protection is a primary management responsibility, as well as the responsibility of every employee. In keeping with this policy and the nature and scale of SPR activities, DM's objective as a company is to reduce waste, prevent pollution, and achieve minimal adverse impact on air, water, and land through excellence in environmental management.

3.3 ENVIRONMENTAL GUIDELINES

DM environmental guidelines are as follows:

A. **Employee Responsibility.** Environmental protection is a line responsibility and an important measure of employee performance. In addition, every employee is responsible for environmental protection.

B. **Prevention of Pollution.** Reducing or eliminating the generation of waste has been and continues to be a prime consideration in process design and operations and is viewed by management the same as safety and loss prevention. Reuse and recycling of materials has been and will continue to be considered prior to classification and disposal of waste.

C. **Compliance.** DM fully complies with federal, state, and local environmental laws, regulations, statutes, and permits, and with other requirements including DOE, industry, and internal environmental standards, as applicable.

D. **Continual Improvement Through Decision-Making and Implementation.** DM considers pollution prevention, waste minimization, and affirmative procurement

in all levels of decision-making and ensures full implementation of the environmental management system (EMS).

E. **Meeting Objectives and Targets.** DM endeavors to meet objectives and targets including those described in the Environmental Work Authorization Directive (WAD), which is part of the DOE/DM contract (see reference a)), and the ISO 14001 Aspect Impact Matrix (see reference d)).

4. RESPONSIBILITIES

A. Project Manager

[1] Approve and ensure dissemination of DM's Environmental Policy annually.

[2] Review and approve an environmental management system to support the SPR's mission.

[3] Lead the ISO 14001 Environmental Management System Management Team.

B. ES&Q Director

[1] Have the authority and responsibility for developing, implementing, and refining the environmental management system.

a. Provide clear and explicit delegation of authority and responsibility for implementation of all elements of the environmental management system.

b. Ensure, during the budget process, adequate consideration of the referenced environmental protection criteria.

c. Approve annual environmental protection objectives and targets.

d. Facilitate management appraisal and DM self-assessment programs for the Environmental department.

C. Environmental Manager

[1] Perform "ownership" functions relating to this policy (pursuant to the authority of the director of the responsible organization):

a. Ensure accuracy of content.

b. Interpret and administer provisions.

c. Obtain concurrence on precedent-setting cases.

d. To the extent an exception is allowed, approve or deny requests for the exception.

e. Initiate revisions when required.

f. Ensure that the environmental policy is appropriate to the nature, scale, and environmental impacts of SPR mission activities.

g. Establish a list of environmental aspects and impacts from which SPR objectives and targets may be developed.

h. Assign a person to fill the role of environmental management system management representative.

[2] Establish criteria for ensuring environmental protection.

[3] Recommend methods of operation that will reduce adverse environmental impacts.

[4] Support the Operations and Maintenance (O&M) and Engineering and Construction (E&C) directorates in obtaining all necessary environmental permits and authorizations.

[5] Provide support to other directorates as necessary based on environmental laws and regulations, and other regulations.

[6] Provide oversight of environmental activities.

[7] Support O&M in achieving their environmental objectives and targets.

[8] Provide guidance to assist line personnel in carrying out their environmental responsibilities.

D. Environmental Management System Management Representative

[1] Coordinate the overall implementation of the DM environmental management system.

[2] Serve as management representative for the Environmental Management System Management Team.

[3] Function as the primary contact for the ISO 14001 Environmental Management System Registrar, facilitating needs and activities as necessary.

E. Procurement

[1] Ensure that all scopes of work are reviewed by Environmental, Safety and Quality (ES&Q) personnel for environmental program provisions.

[2] Provide support to ES&Q and other directorates in conveying the needs of the

environmental program to subcontractors and ensure that subcontractors are aware of their contractual responsibilities to comply with environmental laws and regulations.

F. Engineering and Construction

[1] Ensure that the required elements of the environmental management system are included in developing plans and objectives.

[2] Ensure that engineering design principles and decisions eliminate or minimize adverse environmental impacts in all work packages.

[3] Include necessary environmental requirements in all scopes of work and work specifications used in subcontracts.

[4] Ensure that all site construction is covered by applicable environmental permits and assessments.

[5] Transmit all design packages and scopes of work/design specifications to ES&Q for review for environmental adequacy prior to their approval.

[6] Ensure that environmental concerns are included in all risk assessments.

G. Operations and Maintenance

[1] Implement the environmental management system in accordance with references c), d), and e).

[2] Ensure that the SPR sites are operated and maintained in compliance with the environmental management system to minimize actual and potential environmental impacts.

[3] Monitor activities to ensure compliance with applicable permits, authorizations, regulations, and laws.

[4] Include necessary environmental requirements in all scopes of work/work specifications used in subcontracts.

[5] Ensure that all site personnel and subcontractor personnel are adequately trained in environmental protection procedures.

[6] Operate and maintain each site in compliance with applicable laws and regulations as well as existing permit provisions and other authorizations.

[7] Ensure that all required reports are prepared and that reporting requirements are implemented as necessary.

[8] Cease site operations or other activities during environmental emergencies or

when conditions exist that could imminently cause damage.

[9] Minimize generation of wastes through pollution prevention, especially source reduction.

H. Finance

[1] Provide for environmental management system needs during budget review.

I. Office of General Counsel

[1] Support ES&Q in determining the statutory and regulatory requirements of the environmental management system.

[2] Ensure that subcontract provisions require subcontractor compliance with environmental laws and regulations, and appropriate elements of the environmental management system.

J. Subcontract Manager's Technical Representatives

[1] Ensure that subcontractors comply with the environmental management system provisions of their subcontracts.

[2] Ensure that subcontractors comply with the terms and conditions of all permits and authorizations.

K. Human Resources and Development

[1] Introduce the DM environmental policy to new hires.

[2] Provide a method for evaluating employees' environmental performance.

L. DM Managers

[1] Ensure that employees at each level are aware of the potential environmental impacts of their work activities and the potential consequences of departure from specific operating procedures.

[2] Ensure that personnel performing tasks that may cause significant environmental impacts are competent based on appropriate education, training, and/or experience.

M. DM Employees

[1] To the extent of their job scope:

a. Be aware of their responsibilities for conformance with this policy and DM procedures that deal with environmental compliance, including emergency

preparedness and response.

b. Be aware of the potential consequences of departure from specific operating procedures.

c. Be qualified to perform the environmental-related activities of their jobs.

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