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

Site Environmental Report For Calendar Year 2001

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

Distribution:

SITE ENVIRONMENTAL REPORT FOR 2001 - STRATEGIC PETROLEUM RESERVE

Enclosed for your information is a copy of the Site Environmental Report for Calendar Year 2001 for the U.S. Department of Energy's Strategic Petroleum Reserve. This report is prepared and published annually for distribution to local, state, and federal government agencies, the Congress, the public, and the news media. The report was prepared for the Department of Energy by DynMcDermott Petroleum Operations Company.

To the best of my knowledge, this report accurately summarizes and discusses the results of the 2001 environmental monitoring program.

If you have any questions or desire additional information, please contact Dan Kelley of the Project Management Office Environmental, Safety and Health Division at (504) 734-4721.

Sincerely,

William C. Gibson, Jr.
Project Manager

FE-4441: (N. Ellis)
Enclosure
As stated

STRATEGIC PETROLEUM RESERVE

SITE ENVIRONMENTAL REPORT

FOR

CALENDAR YEAR 2001

Document No. ASE5400.61A0

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

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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-20
850 South Clearview Parkway
New Orleans, LA 70123

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

Date: _____

Name of Submitter:_____

Street or P.O. Box: _____

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Organization (if applicable): _____

Comments:

_____

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

Subject Matter Expert (SME): _____ Date: _____

SME's Response:_____

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ABBREVIATIONS AND ACRONYNS

ac	acre
A&E	Architect and Engineer
ADM	action description memorandum
AFFF	aqueous film forming foam
AFV	Alternate Fuel Vehicle
AP	Affirmative Procurement
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
bls	below land surface
BM	Bryan Mound
BOD_5	five day biochemical oxygen demand
°C	degrees Celsius
CAA	Clean Air Act
CAP	corrective action plan
CEMP	Code of Environmental Management Principles
CEQ	Council for Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CESQG	conditionally exempt small quantity generator

ABBREVIATIONS AND ACRONYNS

CFS	Cubic feet per second
CFR	Code of Federal Regulations
CO	carbon monoxide
COD	chemical oxygen demand
COE	United States Army Corps of Engineers
CPG	Comprehensive Procurement Guidelines
CQI	Continuous Quality Inprovement
CV	coefficient of variation
CWA	Clean Water Act
CY	calendar year
DCS	Distributed Control System
DM	DynMcDermott Petroleum Operations Company, Inc.
DMR	discharge monitoring report
DO	dissolved oxygen
DOE	United States Department of Energy
DOT	United States Department of Transportation
DPRP	Discharge Prevention and Response Plan
E2	Energy Efficiency
EA	environmental assessment
EFH	East Fillhole
EIQ	emissions inventory questionnaire
EIS	emissions inventory summary

ABBREVIATIONS AND ACRONYNS

EIS	environmental impact statement
EMP	Environmental Monitoring Plan
EMS	Environmental Management System
EO	executive order
EP	Energy Policy
EPA	United States Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
ERP	Emergency Response Procedure
ERT	emergency response team
ESA	Endangered Species Act
ES&H	Environmental Safety & Health
FAR	Federal Acquisition Regulations
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FRP	Facility Response Plan
ft	feet
ft/yr	feet per year
F&WS	United States Fish and Wildlife Service
GALCOE	U.S. Army Corps of Engineers, Galveston Division
GLO	General Land Office
GSA	General Services Administration
GWPMP	Ground Water Protection and Management Plan
gpm	gallons per minute

ABBREVIATIONS AND ACRONYNS

ha	hectare
HAP	hazardous air pollutant
HVAC	High Ventilation Air Conditioning
HW	hazardous waste
ICW	Intracoastal Waterway
I&E	Instrument and Electronic
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
LDHH	Louisiana Department of Health and Hospitals
LELAP	Louisiana Environmental Laboratory Accreditation Program
LPG	Liquefied Petroleum Gas
LPG2	Liquefied Petroleum Gas
LDNR	Louisiana Department of Natural Resources
LOOP	Louisiana Offshore Oil Port

ABBREVIATIONS AND ACRONYNS

LPDES	Louisiana Pollutant Discharge Elimination System
LPE	laboratory performance evaluation
LPDES	Louisiana Pollutant Discharge Elimination System
LPE	laboratory performance evaluation
LWDPS	Louisiana Water Discharge Permit System
m^3	cubic meters
ml	milliters
m/yr	meters per year
maint	maintenance
max	maximum
mCi	millicuries
mgd	million gallons per day
mg/l	milligrams per liter
mi	miles
mmb	million barrels
m/sec	meters per second
M&O	management & operating
MSGP	multi-sector general permit
mt	metric tons
NAAQS	National Ambient Air Quality Standards
NE	northeast
NEPA	National Environmental Policy Act

ABBREVIATIONS AND ACRONYNS

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
NOI	Notice of Intent
NORM	naturally occurring radioactive material
NOV	notice of violation
NOx	nitrogen oxide
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 of 1990
OSPRA	Oil Spill Prevention and Response Act
OVA	organic vapor analyzer
P2	Pollution Prevention
P2E2	Pollution Prevention Energy Efficiency

ABBREVIATIONS AND ACRONYNS

PCB	polychlorinated biphenyl
PE	performance evaluation
PM_{10}	particulate matter (larger than 10 microns)
PMO	Project Management Office
PPA	Pollution Prevention Act of 1990
PPOA	Pollution Prevention Opportunity Assessment
PPP	Pollution Prevention Plan
ppt	parts per thousand
PREP	Preparedness for Response Exercise Program
PSD	prevention of significant deterioration
PVC	Polyvinyl Chloride
QC	quality control
RCRA	Resource Conservation and Recovery Act
RCT	Railroad Commission of Texas
RECAP	Risk Evaluation Corrective Action Program
RWIS	raw water intake structure
S	South
SAL	salinity
SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act
Se	selenium
SE	southeast

ABBREVIATIONS AND ACRONYNS

SER	Site Environmental Report
SIP	state implementation plan
SJ	St. James Terminal
SO_2	sulfur dioxide
SOC	security operations center
SOW	statement of work
SPCC	Spill Prevention Control and Countermeasures
SPR	Strategic Petroleum Reserve
SPRPMO	Strategic Petroleum Reserve Project Management Office
SQG	small quantity generator
STP	sewage treatment plant
s.u.	standard units
SW	southwest
TCEQ	Texas Commission on Environmental Quality
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
TPH	Total Petroleum Hydrocarbons
TPQ	threshold planning quantity

ABBREVIATIONS AND ACRONYNS

tpy	tons per year
TRI	Toxic Release Inventory
TSCA	Toxic Substance Control Act
TSD	Treatment Storage Disposal
TSS	total suspended solids
TVP	True Vapor Pressure
TX	Texas
UIC	underground injection control
USCG	United States Coast Guard
UST	underground storage tank
VOC	volatile organic compound
WAD	Work Authorization Directive
VWS	verification well study
WH	West Hackberry
WI	Weeks Island
WILT	Weeks Island Long Term
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 2001.

There was a brine spill and two oil spills that were reportable during CY 2001. Although the total volume of oil moved (received and transferred internally) was approximately 9.8 million m^3 (61.7 million barrels), the total amount of oil spilled in CY 2001 was 1.6 m^3 (10 barrels contained on site). In terms of a visual comparison this would be equivalent to one barrel out of six million barrels spilled. The longer-term trend for oil and brine spills has declined substantially from 27 in 1990 down to three in CY 2001. The brine and oil spills were 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 Environmental Management system is independently certified against the ISO 14001 international standard. The SPR is a charter

member of the EPA 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 ten occasions by outside regulatory agencies during CY 2001. There were no findings associated with these inspections. Four minor noncompliances were self-reported under state and federal discharge permits for all SPR sites during CY 2001, and no Clean Air Act or Clean Water Act Notice of Violations (NOV) were received.

In past years, the SPR sites generally operated as either Conditionally Exempt Small Quantity Generators (CESQG) in Texas, or Small Quantity Generators (SQG) in Louisiana. During CY 2001, the LDEQ amended its generator status regulations to match that of the Title 40 of the Code of Federal Regulations. This allowed the SPR Louisiana facilities to operate under CESQG status. 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. Submissions of Toxic Release Inventory Reports were not required during 2001 because the SPR did not place crude oil into commerce.

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 2001.

The SPR met its drill and exercise requirements for CY 2001 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 five SPR sites during 2001 identified no Environmental Category type I or II (Administrative) findings and only six Environmental Category III findings (Best Management Practice). None of the findings indicated that there was any environmental degradation occurring as result of these findings. Twice a third party Registrar, Advanced Waste Management, Inc., who verifies certification against the ISO 14001 standard, audited the DM Environmental Management System (EMS) with only three minor non-conformances found. Surveillance audits are conducted every six 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.

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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.

Emergency crude oil is stored in the Strategic Petroleum Reserve in salt caverns. Created deep within the massive salt deposits that underlie most of the Texas and Louisiana coastline, the caverns offer the best security and are the most affordable means of storage, costing up to 10 times less than aboveground tanks and 20 times less than hard rock mines.

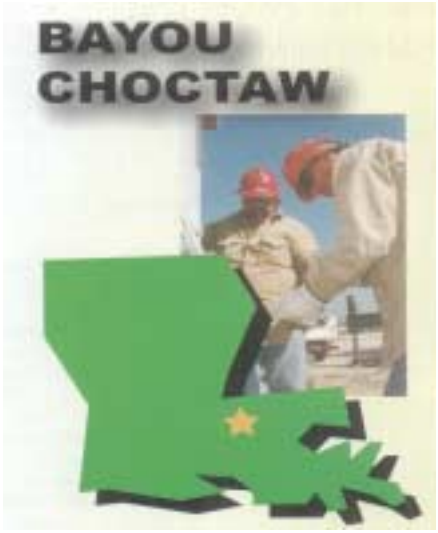
Storage locations along the Gulf Coast were selected because they provide the most flexible means for connecting to the Nation's commercial oil transport network. Strategic Reserve oil can be distributed through interstate pipelines to nearly half of the Nation's oil refineries or loaded into ships or barges for transport to other refineries. By the end of 2001, 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. 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

Protecting the environment through oil spill prevention and control is a primary commitment at the SPR and each site has structures in place to contain or divert

any harmful release that could impact surrounding waterways or land areas. Onsite spill control equipment, detailed emergency plans, and extensive training are used to ensure that the environment is safeguarded.

At year's end, the SPR employed approximately 942 government and contractor personnel, excluding subcontract maintenance and construction personnel.

1.1 BAYOU CHOCTAW



The Strategic Petroleum Reserve (SPR) Bayou Choctaw storage facility is located in Iberville Parish, Louisiana. The storage facility occupies 356 acres.

The Bayou Choctaw salt dome was selected as a storage site early in the SPR program due to its existing brine caverns, which could be readily converted to oil storage and its proximity to commercial marine and pipeline crude oil distribution facilities. Development of the site was initiated in 1977 and completed in 1991. Small canals and bayous flow through the site area and join larger bodies of water off site.

The area surrounding the site is a freshwater swamp, which includes substantial stands of bottomland hardwoods with interconnecting waterways. The site proper is normally dry and protected from spring flooding by the site's flood control levees and pumps. The surrounding forest and swamp provides habitat for a diverse wildlife population, including many kinds of birds

and mammals such as raccoon and deer, and reptiles including the American alligator.

1.2 BIG HILL

The Strategic Petroleum Reserve (SPR) Big Hill storage facility is located in Jefferson County, Texas. The storage site covers approximately 270 acres over the Big Hill salt dome.

The Big Hill storage facility is the SPR's most recent storage facility and is located close to commercial marine and pipeline crude oil distribution facilities. Development of the site was initiated in 1982 and completed in 1991.

Most of the site is upland habitat, consisting of tall grass. A few 150-year-old live oak trees are present on the site. Identified bird concentrations and rookeries are located in the area of the site.

No rare, threatened, or endangered species habitat has been identified in the vicinity of the Big Hill site. Wildlife in the area includes coyote, rabbits, raccoon, and many bird species. The nearby ponds and marsh provide excellent habitat for the American alligator and over-wintering waterfowl.

1.3 BRYAN MOUND

The Strategic Petroleum Reserve (SPR) Bryan Mound storage facility is located in Brazoria County, Texas. The storage facility occupies 500 acres, which almost encompasses the entire Bryan Mound salt dome.

The Bryan Mound salt dome was selected as a storage site early in the SPR program due to its existing brine caverns, which could be readily converted to oil storage, and its proximity to commercial marine and pipeline crude oil distribution facilities. Development of the site was initiated in 1977 and completed in 1987.

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. The coastal prairie is covered with tall grass forming a cover for wildlife. Water bodies surrounding the site provide a diverse ecosystem. Marshes and tidal pools are ideal habitats for a variety of birds, aquatic life, and mammals. Migratory waterfowl as well as nutria, raccoon, skunks, rattlesnakes, turtles, and frogs can be found on and in the area surrounding Bryan Mound.

1.4 WEEKS ISLAND

The Weeks Island facility located in Iberia Parish, Louisiana was decommissioned in 1999 and is currently under ongoing long term environmental monitoring.

The area surrounding the island is a combination of marsh, bayous, manmade canals, and bays, contiguous with the Gulf of Mexico, that provide a vast estuarine nursery ground for an array of commercially and recreationally important finfish and shellfish.

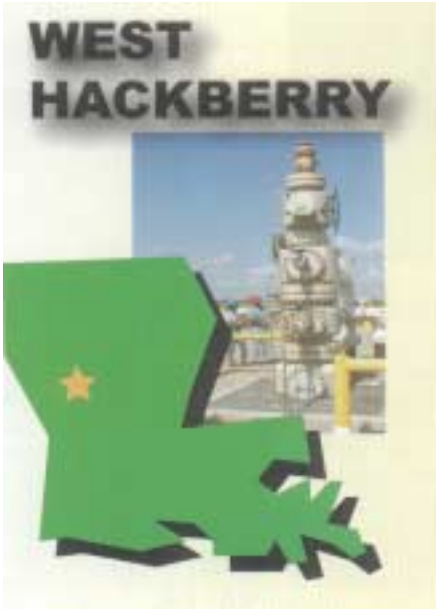
The vegetation communities on Weeks Island are diverse. Lowland hardwood species proliferate in the very fertile loam soil common at the higher elevations. The predominant tree species are oak, magnolia, and hickory, and extend down to the surrounding marsh. Pecan trees are also present. Gulls, terns, herons, and egrets 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, bats, squirrels, 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.

1.5 WEST HACKBERRY



The Strategic Petroleum Reserve (SPR) West Hackberry storage facility is located in Cameron Parish, Louisiana. The storage site covers approximately 565 acres on top of the West Hackberry salt dome.

The West Hackberry salt dome was selected as a storage site early in the SPR program due to its existing brine caverns, which could be readily converted to oil storage and its proximity to commercial marine and pipeline crude oil distribution facilities. Development of the site was initiated in 1977 and completed in 1988.

Numerous canals and natural waterways bisect the area. The surrounding area consists of marshland with natural ridges. These ridges, called cheniers, typically support grass and trees and affect water flow through the marshes. In many areas, lakes, bayous, and canals are concentrated so that the marsh may not seem to be a landmass, but rather a large region of small islands.

The marshlands surrounding the West Hackberry site provide excellent habitat for a variety of wetland species. Many bird

species frequent the area, including southern bald eagle, Arctic peregrine falcon, brown pelicans, and waterfowl. Other inhabitants include red fox, raccoon, nutria, opossum, wolf, bobcat, rabbits, and white-tailed deer. The American alligator is extremely common, breeding and nesting in this area. The marsh also supports a variety of other reptiles, fish, shellfish, and mammals.

1.6 SPR HEADQUARTERS

The project management office for SPR operations is housed in two adjacent office buildings and a nearby warehouse in Harahan, Louisiana. This facility is the main office through which DynMcDermott manages, operates, maintains and supports 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 lease, not owned, by the Department of Energy.

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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, DynMcDermott operates with an Environmental Management System certified against the ISO 14001 standard by a third party registrar. 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, 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. The TNRCC changed its name to the Texas Commission on Environmental Quality (TCEQ) effective September 1, 2002.

Executive Orders (E.O.)

The SPR follows and operates in conformance with numerous Executive Orders applicable to its operation. Six 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), Developing and Promoting Bio-based Products and Bio-energy (E. O. 13134), 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 2001. 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. By rearranging and consolidating job tasks by function into new job descriptions and titles, a dedicated Chemical Management Specialist position and a NEPA Specialist 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.

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, 2001 THROUGH DEC. 31, 2001)

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 ninety-five 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 2001 the SPR submitted five 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 2000 as required and the NPDES permit was renewed in 1999. 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. These permits were renewed in 1999.

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 Title 40 CFR 112 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 2001, six 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 (FRP) were 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 were approved by the appropriate federal and state regulatory agencies. Since their approval, the FRPs have been combined with the site emergency response procedures (ERP) in accordance with the EPA one plan scheme. The Texas sites maintain their individual OSPRA certifications to present and respond to oil spills within the state.

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 2001 Annual Report Form OR-1 was completed and submitted on schedule to the LDNR.

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. Early in 2001, these ground water recovery reports ended and were replaced with quarterly reports for a yearlong post-recovery-pumping period. All of the recovery pumping ceased at the end of March and on April 1st the yearlong evaluation began. 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 freeze plug 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 2001. In June 2001 the former sinkhole No. 1 reappeared after substantial thawing of the subsurface freeze plug had occurred. The sinkhole claimed (destroyed) the centermost freeze plug well (4270) by August while routine monitoring at all other locations continued.

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, the Prevention of Significant Deterioration (PSD) permitting program regulates it. 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.

During 2001 the SPR conducted a conformity review of its emergency draw down operations and found them to be excluded from the SIP conformity provisions of the CAA. This position was presented to and concurred by the U.S. EPA, LDEQ, and TNRCC.

Pollution Prevention Act of 1990 (PPA)

Each SPR site operates in accordance with a Storm Water Pollution Prevention Plan prepared in accordance with the EPA renewed multi-sector general storm water permits and similar Louisiana requirements. This multimedia document consolidates these regulatory agency requirements with the more general DOE Order 5400.1 and E.O. 13148, which require a 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 criteria. 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. During CY 2001 there were no activities at the SPR that would have required the submittal of a TRI Form R.

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. SPR Texas sites fall under the jurisdiction of the RCT, 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 have in the past been typically classified as

either Conditionally Exempt Small Quantity Generators (CESQG) in Texas, or Small Quantity Generators (SQG) in Louisiana. During CY 2001 the LDEQ amended its generator status regulations to match that of the Title 40 Environment Codified Regulations. This allowed the SPR Louisiana facilities to operate under CESQG status and take advantage of less stringent regulatory requirements. Hazardous wastes are not treated, stored, or disposed at the SPR sites and therefore, they 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.

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 2001, the SPR manifested hazardous waste from the Bayou Choctaw, Bryan Mound, Big Hill, and West Hackberry sites to an offsite hazardous waste incinerator or bulb recycler. The hazardous wastes consisted primarily of paint solvent and solids, laboratory wastes, and fluorescent bulbs (in Texas only). The SPR

submitted notification forms of regulated waste activity to the EPA for all SPR sites. In 2001, all SPR sites averaged hazardous waste generation rates well within the CESQG limits.

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. Procedures are in place to preclude or prohibit purchase of equipment containing either friable asbestos or PCBs.

National Environmental Policy Act (NEPA)

Three thousand and ninety one design reviews, scopes of work, and purchase requests were evaluated for NEPA review in 2001. Out of these documents, only 125 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 2001.

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

All pesticides and herbicides were used in accordance with manufacturers' labels. No restricted use pesticides were applied.

The SPR encompasses 841 ha (2,078 ac) and the separate sites combined used approximately 3,493 kg (7,700 lbs.) of herbicides and pesticides to control weeds, insects, and rodents. Much of the SPR property is developed with buildings, piping, cable trays, and other structures requiring some sort of pest control. During CY 2001 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 2001 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. A monument commemorates the historical significance of this location.

Federal Facilities Compliance Act (FFCA)

During CY 2001 none of the SPR sites generated any waste considered to be hazardous and radioactive (mixed waste). Therefore, this act does not apply to the SPR.

Atomic Energy Act of 1954

There are currently no DOE owned or maintained radioactive material sources at the SPR sites.

Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds and the Migratory Bird Treaty Act

The active storage facilities comprising the Strategic Petroleum Reserve are located in a variety of environs and migratory pathways along the Gulf Coast of Texas and Louisiana. As such, a variety of waterfowl and other nesting birds frequent our sites during a typical

Photo Source: Recreation.Gov
Date: 09/27/2002
URL: http://www.recreation.gov

year. Environmental awareness of the migratory bird issues commences at the site level. Each ES&H Site Manager implements site wide surveillance through others in the conduct of normal operations. Nests when discovered are flagged in the field for the season (ex. Least Terns); equipment has been designated for limited/restricted use on occasion (ex. Mockingbird and Shrike nests); and utility poles slated for replacement/repair were deferred until woodpecker nesting had concluded. Each of these activities is an example of the close coordination maintained with local Fish & Wildlife representatives at our sites.

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 coastal management 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 E.O. 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 (AP); the purchasing of EPA-designated items (54 items in all falling under 8 categories) that contain recovered material. The DOE Affirmative Procurement Program ensures that items composed of recovered materials will be purchased to the maximum extent practicable, consistent with Federal Law and Procurement Regulations (RCRA 6002 and Federal Acquisition Regulations (FAR)). The SPR is committed to meeting the Secretary of Energy's goal of achieving 100 percent success in purchasing of AP products and has shown considerable progress during 2001, restricting its procurement and tracking processes for purchase of affirmative procurement materials. Affirmative Procurement success was 95 percent for the FY 2001 and 98 percent for the last calendar quarter of 2001. This is a significant improvement over the FY 2000 success rate of 82 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 2001 the SPR reduced hazardous waste generation by 92 percent, down to 0.62 mt (0.68 tons). This reduction is continuing into 2002. The reduction is due, in part, to increased awareness, surveillance, management participation, and waste minimization efforts on the part of all SPR employees. Figure 2-1 illustrates how the waste generation rate decreased below the target of 2000 lbs by the end of FY 2001.

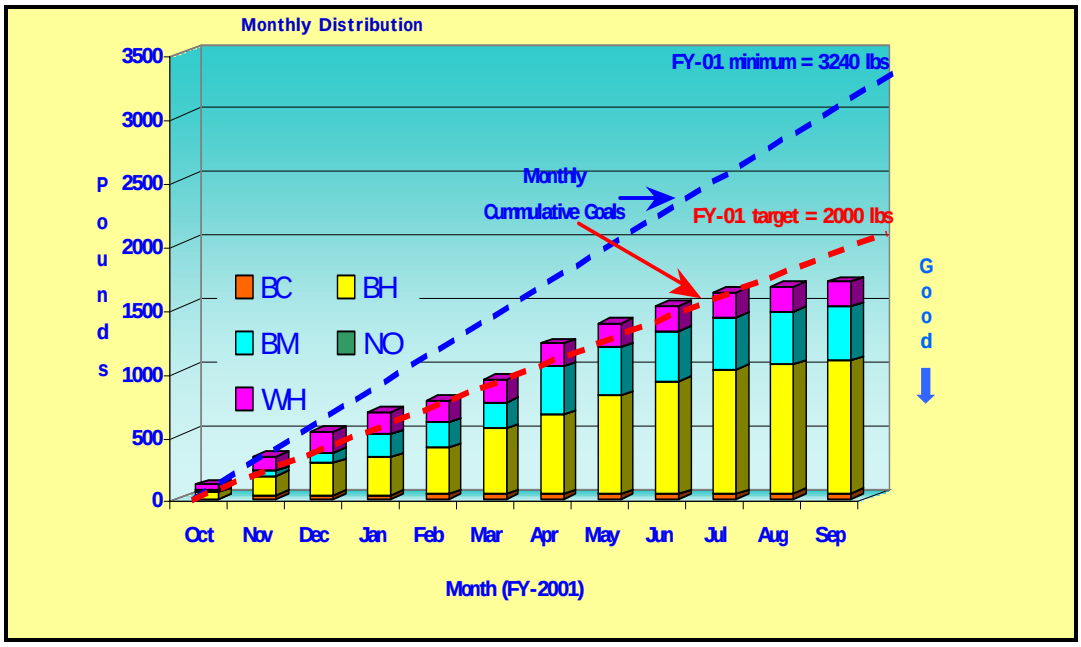

Figure 2-1. FY 2001 Monthly Hazardous Waste Generation

The New Orleans site met the 2001 site hazardous waste goal. In fact, during CY 2001 the SPR also met its increasingly stringent goals for 2002 and 2003. If current trends continue the SPR will achieve the Secretary of Energy's stringent 2005 goal by 2003 as illustrated in Figure 2-2. All sites met their 2001 non-hazardous sanitary waste goals.

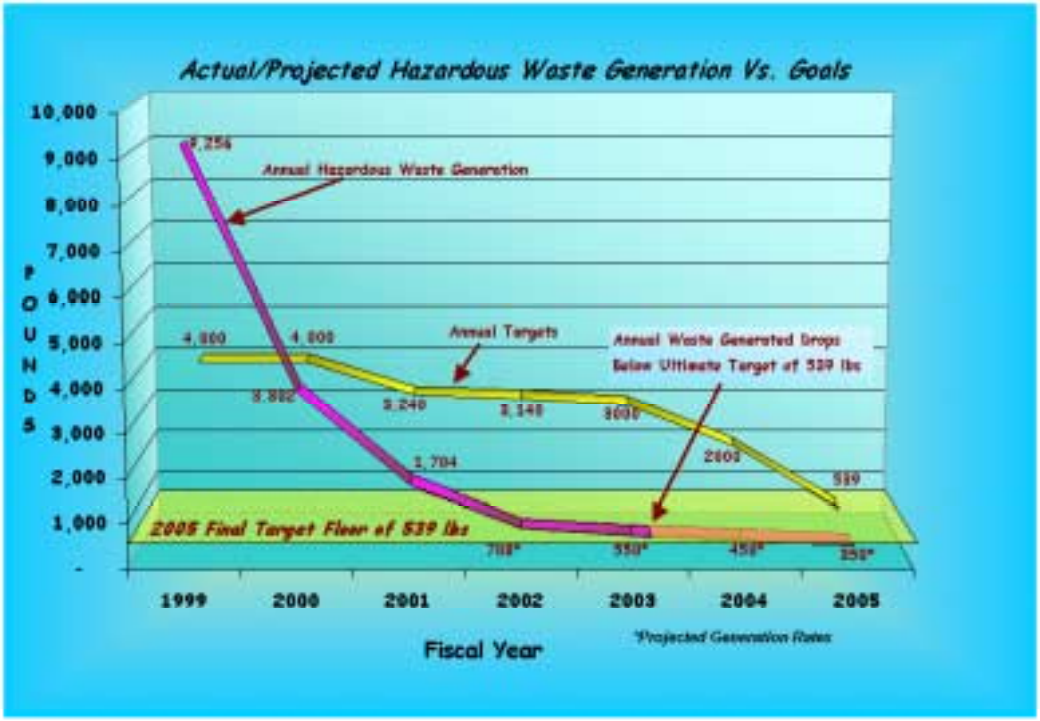

Figure 2-2. 2005 Hazardous Waste Generation Goal

The SPR takes an environmental leadership role by striving 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. Although the SPR typically maintains the minimum regulatory waste generation limits, these two waste streams periodically contributed to an SPR facility exceeding the minimum limit.

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. Winning a DOE National Pollution Prevention Award in the Waste/Pollution Prevention category recognized the team, and the project was selected to represent DOE in the White House Closing the Circle award program. Paint and paint-related waste volumes decreased by 51 percent from CY 2000 to CY 2001with even greater reduction anticipated in CY 2002.

The amount of office paper recycled during CY 2001 was 111 percent versus the CY 2000 success rate of 125 percent of the amount purchased- (white and mixed paper / paper purchased.) The major contributing factor for the percentage to be greater than 100 percent is shift from paper documentation to electronic media at the SPR. The SPR expanded the recycling program to include more cardboard, file stock and newspaper. Therefore, the total of all paper products recycled in CY 2001 achieved a success rate of 135 percent. A decrease in paper purchased combined with an increase of all paper recycled indicates progress in increasing source reduction and recycling efforts.

The Texas General Land Office presented the SPR Bryan Mound 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. The two SPR sites in Texas have won this award a total of four times since the award’s inception in 1998.

In CY 2001, the SPR received a Certificate of Recognition from the EPA White House for the Closing the Circle competition. The White House sponsors this competition and the winner is selected from applications representing the entire federal government. It also received the DOE Pollution Prevention Award for Runner-up for the Vehicle Replacement Pilot Program Project.

These awards recognize the SPR's dedication to reducing pollution through replacement of the gasoline fueled small vehicle fleet with alternative fuel vehicles (electric).

An aggressive vehicle replacement team successfully integrated pollution prevention into the site and GSA fleet vehicle replacement program, achieving almost a 10-ton reduction in air pollutants. DOE Headquarters selected this application from the pool of pollution prevention award applications to represent DOE nationwide in the Pollution Prevention category.

Pollution prevention is integrated into the SPR mission through policies, procedures, instructions, 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 2001, DM organized a local SPR sponsorship of the Federal America Recycles Day Poster Contest as part of an initiative to involve children in pollution prevention. DM arranged local prizes and certificates of participation for all SPR participants in this highly successful outreach initiative.

More than 3,000 documents consisting of design reviews, scopes of work, and purchase requests were reviewed during CY 2001. Of these, approximately 2,541 received pollution prevention review through the purchase request (PR) system. These purchase requests were screened against the SPR Qualified Products List and the Affirmative Procurement guidelines to assure that products purchased met environmental criteria established to reduce waste, toxicity and ensure purchasing of EPA-designated and environmentally friendly products.

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 to review elimination or reduction of paint waste across the SPR concluded in 2001 and was successful in achieving a 51% reduction in paint and paint related wastes. A Pollution Prevention Opportunity Assessment (PPOA) was conducted in the fall of 2001 that resulted in findings and recommendations to further reduce hazardous waste. • The Pollution Prevention Specialist position was consolidated from various other job descriptions, recruited and filled at the end of Dec. 2000. • Awareness of Pollution Prevention was increased and integrated with Energy Efficiency through the E2P2 committee. • 1993 baseline = 5390 lbs or 2.44 metric tons.
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, no TRI Report was required.

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

	SPR POLLUTION PREVENTION AND ENERGY EFFICIENCY LEADERSHIP GOALS	ACTION TO REACH TARGETED GOALS
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 reduce sanitary waste through implementation of Goal 4: improved recycling. • Continued to recycle paper and expanded the New Orleans recycling program to include cardboard, cans, plastic, and other mixed papers. • Proposed a trash compaction project through the Cost Reduction Program. It did not meet the criteria but is a viable project that will be budgeted in future years. • Proposed improved monitoring and better calculation of solid waste generation. • 1993 baseline = 6,816,508 lbs or 3,090 metric tons.
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. A Pollution Prevention Opportunity Assessment (PPOA) was conducted to determine opportunities for reducing sanitary waste through improved recycling. Findings and recommendations were presented to DOE and projects will be developed in 2002 based on the study. • Sanitary waste generated and recycled waste is reported monthly. The SPR anticipates expanding recycling programs where the market permits. • Cardboard balers were proposed for BH, BM, and NOLA based on the findings of the PPOA. This will remove cardboard from the waste stream and show a cost savings in 2002.
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.

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

	SPR POLLUTION PREVENTION AND ENERGY EFFICIENCY LEADERSHIP GOALS	ACTION TO REACH TARGETED GOALS
6	Increase purchases of EPA-designated items with recycle content to 100%, except when not available competitively at reasonable price or 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 that have a MSDS are included on the Qualified Product List that is used for daily purchases. • A Guidance and vendor list was developed in 2001 that assists the buyer in achieving AP purchases. An AP library is established in public folders for users to access. • A success rate of 95% was achieved in 2001. Work Authorization Directive (WAD) targets were increased to a minimum of 95% and a maximum target of 100%. • Advanced Affirmative Procurement Training was provided to all owners of the procurement process.
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 performed on New Orleans buildings during FY 2000 resulted in projects to conserve energy. These include the ceiling tile replacement and lighting sensors project. • Air conditioning (HVAC) systems were replaced at some sites. • As part of the new security enhancement program, window film was installed at SPR buildings. This protection should reduce building energy consumption and the film is rated with a 2.7 year return on investment Note: 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 draw down oil, fill with oil, redistribute oil,

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

	SPR POLLUTION PREVENTION AND ENERGY EFFICIENCY LEADERSHIP GOALS	ACTION TO REACH TARGETED GOALS
		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 continue.
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 that are approved by 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.
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. Halon was removed from WH in 2001. Removal of the Halon will be scheduled for 2002 at BM. The removal of the Halon system could result in savings of approximately 30% of the cost of annual and semiannual preventive maintenance and will also result in a significant reduction in Halon 1301 inventory on the SPR. There are no other ozone depleting substances on the SPR.

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

	SPR POLLUTION PREVENTION AND ENERGY EFFICIENCY LEADERSHIP GOALS	ACTION TO REACH TARGETED GOALS
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. In 2001, a vehicle replacement team successfully integrated pollution prevention into the on site utility vehicle replacement program, achieving a 100% reduction in air pollutants generated from replacing nine onsite gasoline vehicles with electric units. • There are 118 GSA gasoline vehicles assigned to DM as of January 29, 2001, compared with 141 as of year's end 1999. This is a 23-vehicle reduction, or 16% reduction in vehicles. Assuming no change in average mileage and fuel consumption, this represents a 16% decrease. We will tabulate actual fuel consumption at year-end in order to more accurately measure the fleet's petroleum consumption.
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 approved program is underway to replace existing gasoline vehicles with alternate fuel vehicles. The approved plan achieves 75 percent of vehicle replacements as alternate fuel vehicles (LPG2 ½ ton pick up trucks) over the next five years. As of October 2001, 23 vehicles were ordered from the (GSA) General Service Administration office. Of those 23 vehicles, we requested 12 dual fuel pickup trucks and the 5 mid-size station wagons could use either an ethanol-blend or gasoline. This will achieve a 74% for AFVs ordered in the first half of FY 2002.
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 proposed implementation of LPG2 vehicles will meet the 75% objective for increasing usage of alternative fuel. The installation of fueling stations was proposed in the 2002 budget. However, in the interim, a propane truck makes weekly deliveries of LPG for vehicle fill up.

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 agreed to make the following four performance commitments 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 percent (based on CY 2000 generation figures).
4. Reduce emissions of greenhouse gases, VOCs, NO_X, SO_X, PM_{10}, and CO through elimination/replacement of 16 gasoline fleet vehicles.

Performance Track members must complete an annual performance report that documents their progress toward meeting

the performance commitments. The report for CY 2001 is available to the public at the EPA website www.epa.gov/performancetrack. It includes information on facility assessments and inspections, corrective actions taken as a result of assessments and inspections, community outreach, and success in meeting the four commitments during the first year of the program. Success in meeting the commitments is discussed as follows.

The commitment for reducing hazardous waste was surpassed during the first year of this three-year program. Hazardous waste generation was reduced to 1364 pounds in CY 2001, 636 pounds below the target of 2000 pounds. Great effort was made in reducing paint waste, the primary contributor to hazardous waste generation.

There was no activity scheduled for reducing Halon 1301 in CY 2001. Plans for its removal will be developed in CY 2002.

Solid waste (excluding exploration and production wastes) recycling increased from 47.2 percent in CY 2000 (recycled material comprised 370 tons of the CY solid waste total of 782 tons) to 68.3 percent in CY 2001 (781 tons of 1143 tons). The increase is attributed to identifying and segregating significant waste streams that can be recycled, such as cardboard, concrete, asphalt, and dirt. Solid waste disposed of decreased from 413 tons to 383 tons from 2000 to 2001.

Emissions of greenhouse gasses were reduced with the replacement of nine gasoline powered scooters with electric equivalents at all site and eight gasoline-powered trucks with dual fuel capability

(gasoline and propane) at the Big Hill site. Assuming equivalent use of the electric scooters as the gasoline ones they replaced, almost 10 tons of air emissions (NO_X, CO, SO_2, PM_{10}, and VOCs) were eliminated at the sites. Both gasoline and propane were burned in the dual fuel trucks. A propane delivery truck fuels the trucks weekly. When the propane is completely consumed, the driver switches to gasoline until the truck could be re-fueled with propane. Reduction in emissions (CO and VOC) from these vehicles by using propane was minor (0.027 tons) compared to that of the electric scooters.

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 2001 SARA reporting for each site. Offsite SPR pipelines in Louisiana containing crude oil were reported separately from SPR sites (Table 2-7). There were no extremely hazardous substances in excess of the Threshold Planning Quantity (TPQ) in 2001, negating the possibility of reportable releases under that category.

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, as SIC code 5171 facilities to report when placing sufficient quantities of product in

commerce. During CY 2001 the SPR did not conduct any activities that would require submission of the TRI form R and forwarded appropriate notification correspondence to the TNRCC to ensure compliance.

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. Certification continued through 2001 and was verified during two semi-annual surveillance audits conducted by the registrar. Three minor non-conformances found during the audits were closed within the calendar year.

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 order does not apply.

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

The SPR does subcontract work where radioactive sources are used in monitoring activities. This topic is addressed in Section 4 of this report.

Table 2-2. 2001 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, Flammable storage cabinet, High Pressure Pump Pad
FC-203CF Lightwater Brand AFFF	1,000 - 99,999	Foam deluge building
Gasoline	10,000 - 99,999	Property tank # 1, Flammable storage cabinet, High pressure pump pad
Motor Oil	1,000 - 9,999	Bench stock, Flammable storage building, Flammable storage cabinet, High pressure pump pad, Maintenance bay, Property flammable cabinet, Work over rig yard
Paints, flammable or combustible	100 – 999	Flammable storage building,
Sodium Chloride	1,000 - 9,999	Potable water building
Sodium Hypochlorite Solution	100 - 999	Potable water building, Building 413
Sponge –Jet Silver Media	9999	Maintenance Bay

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

Table 2-3. 2001 Texas SARA Title III Tier Two Summary at Big Hill

Chemical Name (Category)	* Max Daily Amt (lbs.)	Location
Ammonium Bisulfite 50% solution	10,000 - 99,999	Brine pad, 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, BHT-51, Work over Rig, Raw Water Injection Structure (BHT-50, BHT-4 (Fire Pump House), BHSE-46-1-Workover Portable tank
FC-600 3M Lightwater ATC/AFFF	10,000 - 99,999	Boat Shed (Bldg. 805), ERT Shed, Foam Building (BHT-16), Fire Truck
Gasoline	10,000 - 99,999	BHT-52 (Fuel Station)
Motor oil	10,000 - 99,999	Equipment Pad, Drum Storage (Raw Water Injection), Equipment Pad, Raw Water Intake Structure, Bench stock Flammable storage Bldg. 802, 817, I&C Shop, Raw Water Intake Structure Flammable Cabinet Work over Rig Yard Bench stock

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

Table 2-4. 2001 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, Work over Rig
FC-203CF 3M Light Water Brand AFFF	100,000 - 999,000	AFFF Fixed systems, Storage and Mobil units
Gasoline	10,000 - 99,999	Fuel Tank Area
Hydrochloric Acid Solution	10,000-99,999	Diked Area
Motor Oil	10,000 – 99,999	Bldg 235T (cabinet outside), Bldg. 243 paint shed & crude oil retain storage, Bldg. 210 Bench stock & Env. Lab, Bldg. 244 I&E shop, C storage lay down yard, diked area, Work over Rig

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

Table 2-5. 2001 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	East Wall of Warehouse
Diesel fuel #2	1,000 – 9,999	Test pad
Motor Oil	1,000 – 9,999	Fire Cabinet, East Wall of Warehouse,

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

Table 2-6. 2001 Louisiana SARA Title III Tier Two Summary at West Hackberry

Chemical Name (Category)	*Max Daily Amt (lbs.)	Location
Bromotrifluoromethane	1,000 - 9,999	Building 301
Calcium Amendment, Liquid	1,000 – 9,999	Warehouse D
Crude oil, petroleum	> 1 billion	Warehouse E, Site tanks, piping, underground caverns, Lake Charles meter station piping
Diesel fuel #2	10,000 - 99,999	Fuel Pump Tank, Work over Rig, LSW Lay down Yard, Emergency Generator Diesel Tank, Fire Pump Tank, Maintenance Lay down Yard
FC-600 Lightwater Brand ATC/AFFF	10,000 - 99,999	Foam Storage Building, Site Fire Systems
Gasoline	10,000 - 99,999	Fuel Pump Tank, Maintenance Lay down Yard LSW Lay down Yard
Motor Oil	10,000 - 99,999	Work over Rig, Flammable Storage Building, Slop Oil Pad, Flammable Storage Cabinet, Warehouse D, Work over Rig Yard, OCB 5KV Substation
Paints, flammable or combustible	1,000 – 9,999	Flammable Storage Building, Work over Rig Yard, LSW Lay down Yard, RWIS Flammable Storage Cabinet
Propane Liquefied Petroleum Gas	1,000 – 9,999	Lake Charles Meter Station Propane Tank
Purple K Dry Extinguishing Agent	1,000 – 9,999	Building 303, Building 301
Silica, crystalline-quartz	1,000 - 9,999	Paint Lay down Yard

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

Table 2-7. 2001 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

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 release stripping regulated pollutants (VOC) into the atmosphere. Also, the 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 draw down in order to minimize the impact to air quality. The SPR contracted for separation and removal of 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. The contractor was selected in 2001. Design of the new degas unit has begun with construction to begin in 2002.

St. James Soil Clean-Up

A due diligence inspection was conducted at St. James Terminal in February 1997 by Shell Pipeline in preparation for leasing the site from DOE. 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 was 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 in 1997. Bailing at the booster pump station area, via three geotechnical boreholes, was implemented due to the impracticability of excavation there.

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 2001 a total of an additional 3.8 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 were reduced, but still exceeded the RECAP standards. Subsequently additional bioremediation material was applied to the contaminated site followed by

confirmation sampling. Results indicated continued progress with some numbers below RECAP standards.

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. All seven environmental findings identified in CY 2000 were closed in CY 2001. Six findings were identified in CY 2001, and four were closed by the end of the year. None of these findings were associated with significant environmental impacts or EMS non-conformances.

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 2001.

Assessors independent of the sites assessed also conducted Management/organizational assessments at all sites. Top management chose topics for review based on the departmental performance evaluations and current management concerns. Environmental concerns of top management for 2001 were primarily the performance of the EMS. Compliance was evaluated through EMS review. Findings (compliance and EMS related) are tracked to completion in the Consolidated Corrective Action Plan (PMO) and the Assessment Tracking System (contractor).

The M&O contractor identified six compliance findings and seven EMS non-conformances during 2001. All were classified as Category III, minor deviations from environmental policies and regulations. Table 2-8 is a tabulation of 2001 findings by site.

Regulatory Inspections/Visits

There were ten inspections or visits by regulatory agencies to SPR facilities in 2001. There were no findings associated with any of these inspections. Table 2-9 is a summary of the inspections/visits.

Table 2-8. 2001 M&O Contractor Independent Assessment Environmental Findings

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

Table 2-9. Summary of Regulatory Inspections/Visits During 2001

Site	Regulatory Agency	Remarks
BC	LDHH	District Water Programs Supervisor for the Louisiana Department of Health and Hospitals conducted a Sanitary Survey of the site water supply. No concerns or deficiencies were identified.
	EPA, LDEQ	NEAT (National Environmental Achievement Track Membership) Visit to NO and BC by four personnel from the Environmental Protection Agency and two personnel from the Louisiana Department of Environmental Quality to confirm SPR meeting of the NEAT application requirements and to determine SPR progress in the four commitments for improvement. EPA and LDEQ were completely satisfied.
	COE	Not an audit - DM requested wetlands determination for site perimeter clearing
BH	TNRCC	Three inspectors were investigating oil spilling into the Mayhaw Bayou on Wilber Road. No SPR involvement and no findings.
	TGLO	Annual site inspection/audit for facility compliance with OSPRA -no findings
	RCT	The Railroad Commission of Texas inspected BH in conjunction with a request for minor permit to use spent sand blast media onsite for fill. The material had tested clean and was found suitable for beneficial reuse. Everything was found to be in order with no findings resulting from the inspection.
BM	GLO	Annual site inspection/audit for facility compliance OSPRA -no findings
NO	EPA, LDEQ	NEAT (National Environmental Achievement Track Membership) Visit to NO and BC by four personnel from the Environmental Protection Agency and two personnel from the Louisiana Department of Environmental Quality to confirm SPR meeting of the NEAT application requirements and to determine SPR progress in the four commitments for improvement. EPA and LDEQ were completely satisfied.
WH	LDEQ	Air Inspection - No non-compliances. Minor differences in descriptions to be corrected upon next permit application.
	COE	Not an audit - DM requested wetlands determination for site perimeter clearing

Non-Routine Releases

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. In 2001, the SPR sites reported only two oil spills and one brine spill 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. The two reportable oil spills occurred at West Hackberry during 2001 with a volume totaling 10 bbls shown in Table 2-10. The one on-site 10 bbl spill was fully contained on site and the other off-site spill resulted in a small sheen on a navigable waterway. Neither spill resulted in any environmental damage. The one reportable brine spill occurred offsite of West Hackberry with a volume of at least five gallons released (Table 2-12). Corrosion/erosion has been the leading cause of brine spills over the past few years. Other types of failures such as (gasket/flange/other equipment) have contributed somewhat. The second major factor is operator error.

During CY 2001, the SPR moved (received and transferred internally) 9.8 million m^3 (61.7 mmb) of oil and disposed of 3.39 million m^3 (21.33 mmb) of brine. Additional spill information is listed in Tables 2-10 through 2-13.

The long-term trend for spills and releases has declined substantially from 26 in 1990 to three in 2001 as depicted in Figure 2-3.

Table 2-10. 2001 Reportable Oil Spills

Date	Location	Amount	Cause/Corrective Action
5/8/01	WH	10 Bbls	The slop oil tank overflowed during depressurization operations of the crude oil header. One-half gallon of crude was released onto the ground and 10 Bbls were contained.
1/4/01	WH	Sheen	The West Hackberry crew boat, enroute to the Raw Water Intake Structure, slowed to pass a smaller vessel. Upon attempts to throttle up, the boat could not gain speed and it began to take on water. Separation of the cooling system discharge hose flooded the engine hold at 105 gpm. The operator was unable to beach the vessel completely before the vessel capsized on the starboard side. Leaking transmission fluid resulted in a sheen on the east side of Salt Ditch. Sorbent pads were utilized to recover the sheen from the surface of the water. No negative impact to the environment occurred.

Table 2-11. 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
2001	2	1.6 (10)	0.0000163

Table 2-12. 2001 Reportable Brine Spill

Date	Location	Amount	Cause/Corrective Action
6/24/01	WH	~ 5 Gal	Offsite brine spill caused from leaking flange on the brine disposal pipeline. The landowner noticed salt crystals on the ground and approximately 5 gals of brine in a depression in the ground. The free brine liquid was vacuumed, and the contaminated soil was excavated. The amount of brine released is at least 5 Gal.

Table 2-13. 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
2001	1	0.019 (0.12)	5.60×10^{-7}

2.3 SUMMARY OF PERMITS (JAN. 1, 2001 THROUGH DEC. 31, 2001)

General

Permits in effect during 2001 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.

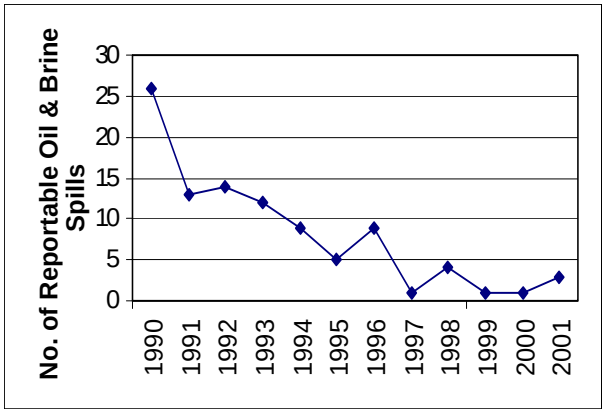

Figure 2-3. Number of Reportable Spills 1990-2001

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. 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 (daily, 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 on time.

Noncompliances

Five discharge permit noncompliances occurred out of a total of 5311 permit-related analyses performed in 2001. Four of the five were the result of a sample being outside of the permit parameter limits with the remaining one resulting from operator oversight error. All noncompliances were of short duration and immediately resolved, causing no observable adverse environmental impact.

The five non-compliances produced an overall project-wide 99.9 percent compliance rate for 2001. Summary information of NPDES exceedances and noncompliances is contained in Section 5.4, Tables 5.7 and 5.9.

Notice of Violation (NOV)

During 2001, 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 in Figure 2-4.

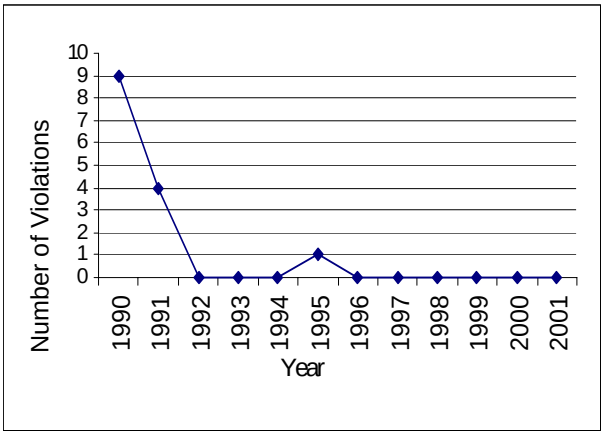

Figure 2-4. Number of Violations 1990-2001

2.4 SUCCESS IN MEETING PERFORMANCE MEASURES

General

Twenty performance measures were tracked in CY 2001. Nineteen of these are identified as Work Authorization Directives (WADs). WADs are jointly developed for each fiscal year by DOE and DM and tracked for success.

WADs that measure environmental success originate from several departments. In FY 2001 twelve of the WADs tracked were from the Environmental Department, and eight of these were included in the environmental management system since are related to significant environmental aspects of SPR activities. Seven other WADS originated from other departments and all were included in the EMS. WADs that are part of the EMS are identified as "objectives". Two metrics are used to determined success in meeting each WAD – a "minimum" (level all DOE contractors should meet as a minimum) and a more challenging "target".

The twentieth performance measure is not a WAD and was developed for the Performance Track Program. It is also included in the EMS.

Success in Meeting Performance Measures Objectives

The measures and targets, and success in meeting them are delineated in Table 2-14. Data are provided for performance measures developed for FY 2001 only.

Of 20 performance measures tracked in CY 2001, 5 met or surpassed the minimum target and 14 met or surpassed the more challenging "target" level. Only one performance measure, reduction of Halon 1301 fire suppressant, was not achieved either at the minimum or target level. Halon was removed during CY 2001 from the West Hackberry site. Plans for removing Halon 1301 will be developed in CY 2002.

Performance trends were analyzed from FY 2000 to FY 2001, for 13 performance measures that were tracked for both years. Data are provided in Table 2-15. Performance improved in four objectives, remained steady in eight, and decreased slightly in one.

Table 2-14. Performance Measures and Success FY2001

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: Reduce number of cited environmental violations received under the Clean Water or Clean Air Acts	Not Applicable	0/yr	Met target (0)
*1.J.1.c: Reduce 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%) with only 3 reportable occurrence
*1.J.2.a: Reduce generation of hazardous waste	3,240 lbs.	2,000 lbs.	Surpassed target (1,704 lbs.)
*1.J.2.b: Reduce generation of sanitary waste	3.3 million lbs.	1 million lbs.	Surpassed target (0.6 million lbs.)
*1.J.2.c: Increase the recycling of sanitary waste	10%	20%	Surpassed target (27.2%)
1.J.2.d: Reduce number of cited waste management violations received	Not Applicable	0/yr	Met target (0/yr)
*1.J.2.e: Increase purchase of EPA-designated recycled content products	80%	95%	Met target (95%)

Table 2-14. Performance Measures and Success FY2001 (continued)

Performance Measure Objective	Minimum	Target	Success
*1.J.3.a: Maximize the number of documents that are not delinquent in submission to DOE or regulatory agencies due to timeliness and quality	Not Applicable	100% on time	Met target (100%)
1.J.3.b: Perform annual environmental independent assessments at each site	Five	Eight Non-Scheduled	Surpassed target (conducted 4 scheduled assessments and 19 unscheduled visits)
1.J.3.c: Maintain certification of EMS to ISO 14001 standard	Not Applicable	100%	Met target (100%)
1.J.4.a: Meet environmental actions on or before the milestone (level 3) date	Not Applicable	100%	Surpassed minimum and approached target (97%)
*1.L.B.2.a: Complete Level 3 milestones associated with performance, accurate, and timely reporting of cavern integrity tests	95%	100%	Met minimum (95%) with 40 out of 42 milestones completed. Operational constraints delayed one test.
*1.M.1.a.2: Achieve 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 met target (98%)
*1.M.3: Complete sampling and testing motor oil as scheduled.(determines when oil needs changing – minimizes waste oil)	90% of quarterly samples	100% of all samples	Surpassed minimum and approached target (96.5%)
*1.T.4.a: Review publications for environmental input by due date, tabulated bimonthly	95% by due date	98% by due date	Surpassed target (100%)

Table 2-14. Performance Measures and Success FY2001 (continued)

Performance Measure Objective	Minimum	Target	Success
*1.T(ATSM-HR)4.b: Complete community outreach activities, using annual plan as a baseline	90%	100%	Met target (100%)
*1.L.4.b(1): Introduce energy efficient projects, either into detailed design or completed	5 projects	8 projects	Surpassed minimum (6 projects)
*1.L.4.b(2): Complete review of alternative fuel vehicle site utilization and have at least 10 reduced energy consumption vehicles in use.	By end of FY 2001	By July 1. 2001	Surpassed target (9 electric scooters) and (8 gasoline/propane trucks)
*Decrease the amount of Halon 1301 (Class 1 ozone depleting substance) on the SPR	10%	Not Applicable	Not met. Action deferred to FY 2002.

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

Table 2-15. Performance Trends, FY 2000 through FY 2001

Performance Measure Objective	CY 2000	CY 2001	Performance
Reduction in hazardous waste	3,802 lbs	1704 lbs	Improved
Reduction in sanitary waste	0.653 million lbs	0.607 million pounds	Improved
Meeting environmental actions on/before milestone dates	90%	97%	Improved
Reviewing publications by due dates	97.6%	100%	Improved
Reducing environmental permit exceedances	4	5	Measure Performance
Reducing violations to the Clean Air and Water Acts	0	0	Measure Performance
Reducing the number of reportable occurrences of releases	99.4%	99.0%	Measure Performance
Submitting quality documents to DOE and regulators on time	100%	100%	Measure Performance
Maintaining certification to ISO 14001 EMS standard	100%	100%	Measure Performance
Achieving high MPAR score for maintenance program	97.3%	97.6%	Measure Performance
Sampling and testing equipment motor oil	95.6%	96.5%	Measure Performance
Completing planned community outreach projects	100%	100%	Measure Performance
Completing milestones associated with cavern integrity testing	100%	95%	Decreased slightly

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 relative to the baseline 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 2001 are discussed in sections 5 and 6.

3.1 ASSOCIATED PLANS AND PROCEDURES

Associated plans that support the SPR environmental program include site specific Emergency Response Procedures with spill reporting procedures; the site-specific Spill Prevention, Control, and Countermeasures Plans (SPCC); the Environmental Monitoring Plan (EMP) which incorporates the Ground Water Protection Management Program (GWPMP) plan; and the Pollution Prevention Plan (PPP). The GWPMP document and the EMP were originally published as separate documents. The GWPMP was incorporated into the EMP in 2000. The EMP was revised and published early in CY 2001. The PPP is reviewed and updated annually.

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

Site Emergency Response Procedures 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 through the SPR contractor management reporting system New Orleans contractor and DOE management. 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 sites are submitted after cleanup, unless otherwise directed by the DOE or appropriate regulatory agency.

3.2.2 Discharge Monitoring Reports

Wastewater and storm water 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. The reports are prepared and submitted in accordance with site-specific permit requirements. 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
Clean Water Act as amended (FWPCA) (continued)		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 $\geq$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 F&WS)	Right-of-way for Construction and Maintenance	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
Coastal Zone Management Act	Wetlands construction within state coastal management zones	Louisiana Dept. of Natural Resources (LDNR), Texas General Land Office (GLO)	Federal project consistency determinations	None
DOE Order 5400.1	Environmental Planning and Monitoring	DOE	Environmental Protection and Implementation Plan	Annual revision
DOE Order 5400.1 (continued)			Ground Water Protection Management Program Plan	Annual review (revision every 3 yr.)
			Environmental Monitoring Plan	Annual revision
			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 F&WS	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	Emergency Response Procedures, Oil Spill Response Cert.	None
		U.S. Dept. of Transportation (DOT)	Pipeline Response Plan	None
Oil Spill Prevention & 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, Storm water 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

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)	Hazardous waste generation and disposal (continued)	RCT	TX Uniform HW Manifest	Complete and submit form with disposal
			Oil and Gas Waste Report	Annotate Report to Agency
			Texas Notification of hazardous waste activity	New waste stream or change in generator status
	Used oil burned for recovery	LDEQ, RCT	Uniform HW Manifest (Recycling)	Complete and submit form with disposal
	Non-hazardous oilfield waste disposal (exploration and production)	LDNR	Non-Hazardous Oilfield Waste Shipping Control Ticket (UIC-28)	Complete and submit form with disposal
	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 Work over Permit (WH-1)	Well Work over 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

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
Safe Drinking Water Act (continued)		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
Superfund Amendment Reauthorization Act	Reporting of inventories of hazardous 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 Auth. 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 the 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.

LDEQ issued new general storm water permits to the two active Louisiana sites that were made effective at the beginning of 2001.

Since the RCT does not have primacy for the NPDES program, Big Hill and Bryan Mound completed Notices of Intent (NOI's) and operated under the EPA Multi-sector General Permit (MSGP) for storm water.

The air permits for the SPR facilities are administered by the LDEQ in Louisiana and the TNRCC in Texas. During CY 2001 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 work over performed. State inspectors periodically visit the site to observe SPR operations. Bayou Choctaw operates under the water and air programs delegated to Louisiana by EPA.

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)
LAR05M557	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)
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 2001, the site appropriated 97,965m^3 (79 acre-feet) of water from the Intracoastal Waterway exclusive of water for fire protection. This represents only 0.3 percent of the recently revised total allowable withdrawal for a year. The certified affidavit and annual report of water usage was forwarded to the TNRCC as required in 2001.

The NPDES renewal application, forwarded to Region VI EPA in November 1993 and accepted as administratively complete on December 22, 1993, still was not acted upon in 2001. A letter was sent to Region VI as a reminder of the anniversary of this outstanding renewal action.

The Railroad Commission of Texas renewed the state TPDES water discharge permit for Big Hill.

Big Hill 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. Two maintenance notifications were made to the U. S. Army Corps of Engineers Galveston District (GALCOE) during 2001; one was sent for the repair and replacement of a traveling screen on the permitted RWIS and the other for work performed over water involving sandblasting and painting at the same RWIS. The forms T-4C were forwarded to the appropriate branch of the Railroad Commission of Texas (RCT) in early November 2001, for the Big Hill crude oil pipeline distribution system.

Due to the operational status of the brine line and scheduling overlap three brine line integrity test results were provided EPA Region 6 during the calendar year 2001. These tests are typically conducted on six-month intervals when operating the brine line.

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	- dredging clause to 12/2008	(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. Modifications are on file.
(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. Maximum Diversion Rate 175 cfs.

3.3.3 Bryan Mound

Table 3-4 lists the permits for the Bryan Mound site. The Bryan Mound site has a second TNRCC permit for the appropriation of state waters for the leaching program, site utility, and fire protection systems. The permit requires a yearly report of the quantity of water used. In 2001, the site used a total of 276,741 m^3 (224 acre-feet) of water from the Brazos River Diversion Channel. The water appropriation permit was successfully amended in 2001

to accommodate a 130 cfs Maximum Diversion Rate and to allow water usage until the declared life of this project. The certified affidavit and annual report of water usage was forwarded as required in 2001.

Two dredging notifications and a maintenance notification for traveling screen removal and repair were made for COE permit 12347 (as amended in 1995). The renewal application for the expired NPDES permit TX0074012 forwarded and accepted as administratively complete in 2000 was not acted upon in 2001. Required reporting for 2001 involved requirements for semi-annual brine line integrity tests to Region 6 EPA (3 tests overlapped and were sent in 2001); wastewater operators' reports to TNRCC; and crude oil pipeline system operations renewal.

The RCT issued a revised permit to DOE reflecting the changes in operator status of the crude oil pipeline system due to the SPRPMO leasing portions of the permitted system at Bryan Mound. The forms T-4C were forwarded to the appropriate branch of the RCT in early November 2001.

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 draw down and refill would be treated as a variance from the permitted emission limitations.

Table 3-4. Permits at Bryan Mound Table 3-4.

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	Constr & Maintain	02/22/78	-dredging clause open to 12/2006	(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)
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)
6176B	TNRCC	Air	01/11/95	02/23/02	(16)

(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 construction 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.
(16) Air permit renewal application submitted to TNRCC on 11/14/01.

Modification of the TNRCC air permit was made in accordance with permit provisions in support of exchange 2000 and was mailed to TNRCC on 11/14/01.

3.3.4 St. James

The SPRPMO successfully completed a long-term leasing arrangement for use of the St. James site by the private corporation Shell Pipeline in 1997. Shell 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.

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 monitoring implemented for the SDS-8 supplement continued on a quarterly basis in 2001. No findings or anomalies were discovered or encountered. The former sinkhole No. 1, held in abeyance by maintenance of a subsurface freeze plug, reappeared in June 2001, as the freeze plug neared dissolution from thawing. The reactivation is being closely monitored and does not appear to threaten the long-term closure of the decommissioned mine. Long term ground water and geotechnical monitoring will continue on a quarterly basis through 2004.

3.3.6 West Hackberry

A closure-complete report was prepared and filed with LDNR in February 2000 for the decommissioning work for the anhydrite ponds 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 yearlong ground water evaluation period was proposed prior to resumption of routine site wide ground water monitoring. The report was not acted upon in 2001, however, the recovery pumping was authorized to cease and a yearlong evaluation commenced in April 1 2001.

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	1/31/2004	(1)
LAR05M559	LDEQ	NPDES	01/24/01	09/2005	(2)
LMNOD-SP (LTCS) 26	COE	Constr.& Maintain	02/08/79	-	(3)
LMNOD-SP (Black Lk)31	COE	Constr.& Maintain	10/26/82	-	(4)
LMNOD-SP (Black Lk)43	COE	Constr.& Maintain	07/26/84	-	(5)
LMNOD-SP (Gulf of Mexico) 2574	COE	Constr.& Maintain	08/11/80	-	(6)
LMNOD-SE (LTCS)40	COE	Constr.& Maintain	05/25/88	-	(7)
LMNOD-SP (Cameron Parish Wetlands) 162	COE	Constr. & Maintain	03/09/78	-	(8)
None	LDNR	Injection	08/07/79	Open	(9)
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	-

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

PERMIT NUMBER	ISSUING AGENCY	PERMIT TYPE	EFFECTIVE DATE	EXPIRATION DATE	COMMENTS
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)
WN20-000-3972-0	COE	Constr. & Maintain	8/31/00	-	(15)
D-11596 (Nationwide permit)	Galveston COE	Constr. & Maintain	9/01/00	-	(16)

(1) LDEQ obtained primacy and issued and LPDES permit with former NPDES number.
(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 riprap 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) For 42" crude oil pipeline crossings of waters & waterways in Texas
(13) For brine disposal wells, well pads, and brine disposal pipelines, (12", 20", & 24")
(14) For well pads, levees, and access roads (Wells 110, 111, 112, 113, 114, & 115)
(15) Category I programmatic general permit. Repair exposed 42-inch crude oil pipeline.
(16) Placement of protective cover on exposed pipeline

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 2001. The SPR sent 0.3 metric tons mt (674 lbs.) of hazardous waste off site for disposal during 2001. The SPR also sent 259.8 mt (571,039 lbs.) of sanitary waste off site for disposal during 2001. The SPR met their hazardous and non-hazardous sanitary waste generation targets of 2,000 and 1,000,000 lbs respectively.

The SPR paper recycling goals are based on a fiscal year reporting period. Paper recycled during CY 2001 was 111 percent versus the CY 2000 success rate of 125 percent of the amount purchased (white and mixed paper / paper purchased.) However, the SPR expanded the recycling program to include more cardboard, file stock and newspaper. Therefore, the total of all paper products recycled in CY 2001 achieved a success rate of 135 percent. Other materials and respective amounts recycled or reclaimed during FY 2001 are delineated in Table 3-7.

Table 3-7. 2001 Materials Recycled from all SPR Sites

Recycled Material	**Amount Recycled/Reclaimed**
Aluminum Cans	0.054 mt (119 lbs.)
Antifreeze	0.127 mt (280 lbs.)
Asphalt	467.200 mt (280 lbs.)
Binders	0.640 mt (1,412 lbs.)
Bulbs	0.311 mt (685 lbs.)
Cardboard	6.203 mt (13,675 lbs.)
Dirt	122.470 mt (270,000 lbs.)
Fuel Filters	0.039 mt (85 lbs.)
Gasoline contaminated water	0.044 mt (96 lbs.)
Heat Exchanger Residue	5.901 mt (13,010 lbs.)
Lead Batteries	2.290 mt (5,048 lbs.)
Lithium Batteries	0.001 mt (3 lbs.)
Mardi Gras Beads	0.043 mt (94 lbs.)
Nickel-Cadmium Batteries	0.004 mt (8 lbs.)
Oil Filters	0.075 mt (165 lbs.)
Paper	39.898 mt (87,959 lbs.)
Pig Solids	0.980 mt (2,160 lbs.)
Plastic Bottles	0.023 mt (50 lbs.)
Scrap Metal	44.107 mt (97,240 lbs.)
Slop Oil	0.093 mt (205 lbs.)
Spirals	0.010 mt (21 lbs.)
Styrofoam	0.013 mt (29 lbs.)
Toner Cartridges	0.737 mt (1,624 lbs.)
Used Oil Burned for Energy Recovery	2.688 mt (5,927 lbs.)
Wood	0.703 mt (1,550 lbs.)
Total	694.652 mt (1,531,445 lbs.)

Note: This does not include an additional 90 metric tons of material recycled through reuse by the Property Excess Program.

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 and the SPR electronic banner. Minutes are published on the outlook public folders, which are 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 percent of sanitary waste by year 2005. P2E2 Goal # 6: Increase purchases of EPA-designated items with recycle content to 100 percent 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 quarterly 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)

The Environmental Management System (EMS) is the environmental leg of ISM. The EMS provides the umbrella management system to the environmental program in a manner integrated throughout all SPR activities. The SPR ISM utilizes the EMS to infuse ISM principles throughout the environmental program. In the same regard EMS elements are directed up through the overreaching ISM system.

3.7 ENVIRONMENTAL MANAGEMENT SYSTEM (EMS)

An EMS is the environmental component of ISM. Environmental considerations are interwoven into management and work programs and practices at all levels so as to achieve DOE's mission while achieving prevention of pollution, continuous improvement, and compliance with requirements. In the process protection of the public and the environment is achieved. Thus, by employing an EMS, the SPR enhances protection of the environment and manages its environmental obligations in a safe and effective manner.

The SPR patterns its EMS in accordance with the ISO 14001 EMS standard. There is a top-down commitment to full implementation of this EMS. 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, Emergency Response Procedures, 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 hone spill management strategies, practice spill cleanup methodologies, 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 also 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 which provide an overview of the environmental program including individual responsibilities under the program. SPCC and Hazardous Waste Handling training is mandatory and provided to the applicable site personnel annually.

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

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4. ENVIRONMENTAL RADIOLOGICAL PROGRAM INFORMATION

At the SPR sites there are no radioactive process effluents or radioactive sources that are owned or maintained by DOE. The only radioactive materials at any SPR site are those brought on site for the purpose of performing radiography and cavern wire-line type logging operations. Procedures are in place to protect personnel from exposure during these operations.

4.1 SEALED SOURCES

At the SPR sealed sources of radiation are used for monitoring activities related to the physical properties of crude oil, brine, and cavern dimensions. All DOE owned sealed sources have been removed from service and returned to the licensee.

Currently there are two nuclear density meters at the Bayou Choctaw site on leased pipelines that are operated and maintained by the lessee.

During the fall of 2001, a vendor performing a casing depth check and interface survey of a cavern at the Big Hill site encountered mechanical difficulties which resulted in the loss of a 125 millicurie Cesium 137 sealed source. The incident was reported to the Nuclear Regulatory Commission (NRC) authorities and the wellhead was labeled according to standards set forth by the Bureau of Radiation Control, Texas Department of Health.

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 ground water 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

As addressed in previous sections of this report, the SPR does not maintain radioactive processes and thus there is not a requirement to monitor radioactive doses in the surrounding biota. The SPR does however take steps in accordance with the DM Environmental Policy (Appendix B) and standards established by DOE, to ensure that the surrounding wildlife population is not impacted.

In addition, SPR site personnel received training on wildlife rescue and rehabilitation techniques. DM employees attended an Oiled Wildlife Response Workshop at the Audubon Zoo in New Orleans, LA on November 9, 2001, presented by Wildlife Rehab & Education, Inc. (WR&E). An oil spill in this area could affect large numbers of protected migratory birds and wildlife requiring many trained and certified responders. The workshop was held to certify and train personnel in 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 (NOx), sulfur dioxides (SO_2), carbon monoxide (CO), and particulate matter (PM_{10}). The

quantity of these pollutants emitted is minor relative to other facilities in the respective air quality regions.

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 which may release VOCs 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 (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 air quality regions. Even though the results of monitoring for Bayou Choctaw and West Hackberry are not reported, they are used to determine ongoing 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 be 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 non-attainment 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 emissions inventory summary to report its annual emissions.

Although Bayou Choctaw is exempt from reporting emissions, effluent monitoring was conducted in 2001 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 2001. Table 5-1 is a summary of the permitted limits 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 non-attainment 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 2001 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 2001. Table 5-2 is a summary of the permitted limits 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 non-attainment 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 2001 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 2001. Table 5-3 is a summary of the permitted limits 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 2001 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 2001. Table 5-4 is a summary of the permitted limits 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 states 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 2001. 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 from piping or tanks (LA only).

The SPR disposed of 3.4 million m^3 (21.3 mmb) of brine (mostly saturated sodium chloride solution with some infrequent discharges of lower salinities than normally attributed to brine) during 2001. Approximately 87.4 percent of the brine was disposed in the Gulf of Mexico via the Bryan Mound (57.5 percent of the total) and the Big Hill (29.9 percent of the total) brine disposal pipelines. The remainder was disposed in saline aquifers via injection wells at the Bayou Choctaw (1.8 percent of the total) and West Hackberry (10.8 percent of the total) sites.

During 2001, 5311 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 99.9 percent of the analyses performed. A total of five permit non-compliances were reported during CY 2001. (Tables 5-7 and 5-9).

All non-compliances 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 2001 is discussed in separate sections by site.

5.4.1 Bayou Choctaw

Bayou Choctaw personnel performed a total of 103 measurements on permitted outfalls and reporting stations to monitor LPDES and state permit compliance during 2001. Table 5-5 provides the permit required monitoring parameters and limits for the Bayou Choctaw outfalls. There were no non-compliances in 2001 resulting in a 100 percent site compliance performance record for the year.

Most monitoring is related to water discharges regulated under the Louisiana Department of Environmental Quality (LDEQ) Office of Water Resources LPDES permit. 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 col./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

Table 5-5. Parameters for the Bayou Choctaw Outfalls (continued)

Location/Discharge	Parameter	Frequency*	Compliance Range
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.

5.4.2 Big Hill

During 2001, 2,642 measurements were performed to monitor NPDES and state discharge permit compliance. Table 5-6 provides the permit required monitoring parameters and limits for the Big Hill outfalls. There was one noncompliance during 2001 (Table 5-7) 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, hydro clone blow down into the Intracoastal Waterway, effluent from the sewage treatment plant and storm water from well pads and pump pads. There were no discharges during 2001 from the hydro clone blow down system.

Although the state permit renewed during 1999 revised sampling frequencies for various outfalls site wide, the older expired but administratively extended, federal permit (which remains enforceable until Region VI reissues) now controls all of the "Daily" testing requirements found below, with the exception of DO on outfall 001.

Table 5-6. Parameters for the Big Hill Outfalls

Location/Discharge	Parameter	Frequency*	Compliance Range
Brine to Gulf	Flow	Continuously	0.27 million m3/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)
Recirculated Raw Water	Flow	1/mo	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.
Hydro clone Blow down (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 5-7. 2001 Permit Noncompliance at Big Hill

Date	Outfall Location	Permit Parameter	Value (Limit)	Cause
4/17/02	001 (Brine to Gulf)	Oil and Grease	No Sample	During oil receipt from Equilon, brine disposal was placed on line. During the operation, a failure to obtain a required oil and grease sample occurred. Lack of communication between Operations and site laboratory personnel was identified as the cause.

5.4.3 Bryan Mound

Bryan Mound personnel made 1956 measurements on permitted outfalls for the purpose of monitoring NPDES and state discharge permit compliance during 2001. Table 5-8 provides the permit-required parameters and limits for the Bryan Mound outfalls. There were five noncompliances during 2001 (Tables 5-7 and 5-9) 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 5-8. 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	< 50 mg/l (RCT)
		1/mo	<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 5-9 2001 Permit Noncompliances at Bryan Mound

Date	Outfall Location	Permit Parameter	Value (Limit)	Cause
11/21/01	Cavern 110	TOC	94.4 mg/l (50 mg/l)	TOC analysis for storm water discharged from Cavern 110 (94.4 mg/l) exceeded the state's permit limit of 50 mg/l resulting in a permit noncompliance. This was attributed to an excessive amount of dead vegetation at the south end of the containment moat. Maintenance personnel have been notified to remove the dead vegetation from this location to preclude a possible recurrence.
5/21/01	Caverns 104 & 105	TOC	72.6 mg/l & 55.5 mg/l (50 mg/l)	TOC analysis for storm water discharged from caverns 104 (72.6 mg/l) and 105 (55.5 mg/l) exceeded the state's permit limit of 50 mg/l resulting in two noncompliances. This was apparently a transient condition that righted itself at or near the end of the discharge. Consideration will be given to minimal herbicide use on these locations and sampling of storm water when the moats are at or near capacity to allow for more water per concentration of organics.
1/9/01	Sewage Treatment Plant	TSS	47 mg/l (45 mg/l Daily) 32 mg/l (20 mg/l Monthly Average)	On 01/09/01 TSS analysis of 47 mg/l for the sewage treatment plant exceeded federal and state daily limit of 45 mg/l. On 01/31/01, due to the above noncompliance, the TSS monthly average of 32 mg/l also exceeded federal and state limit of 20 mg/l. Possible infiltration of inert solids into the plant from a 2" main influent line was the probable cause of the noncompliance. Testing verified a leak in the main line that was taken out of service until the leak was located and repaired.

5.4.4 West Hackberry

West Hackberry personnel performed 610 measurements on permitted outfalls to monitor LPDES compliance during 2001.

Table 5-10 provides the permit-required parameters and limits for the West Hackberry outfalls. There were no noncompliances during 2001; therefore, the site compliance level was 100 percent.

The water discharges at the West Hackberry site were regulated under the EPA (NPDES) permit administered by the state of Louisiana under the LPDES permit program. Since the issuance of the current LPDES permit in 1999 the site has no reporting requirements for the former offshore brine line that has been removed from active service.

Table 5-10. Parameters for the West Hackberry Outfalls

Location/Discharge	**Parameter**	**Frequency****	**Compliance Range**
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	$\leq$50 mg/l $\leq$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) $\leq$15 mg/l $\leq$ 50 mg/l 6.0 - 9.0 s.u. no presence
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

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

5.5 SURFACE WATER QUALITY SURVEILLANCE MONITORING

During 2001, 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 5-11 through Table 5-14. 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 six 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 5-11). 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 7.3 to 7.6 s.u. which is consistent with the ambient conditions of surrounding waters. The complete range for all measurements at all stations for 2001 is 7.0 to 8.5 s.u. 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 10.8 ºC to 29.6 ºC. 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 2001, average annual salinities ranged from 0.5 ppt (indicating below detectable limits) to 1.0 ppt (Station B). Both wetland stations E and F revealed below detectable limits throughout the year in their respective databases for 2001. It is believed these values are a response to the return of rainfall and a break of the drought experienced during a large portion of last year. The largest measurement occurred at Station C this year. No explicable

activities relating to salinity occurred upstream of the point. The spike was very short term as 9 of the 12 measurements were BDL. None of the measured values are expected to produce any discernible physical impacts.

5.5.1.4 Oil and Grease (O&G)

Oil and grease levels were below detectable levels (<5 mg/l) at all stations throughout 2001 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 0.6 and 0.7 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 11.5 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. This same trend is also evident in comparison with the previous year.

5.5.1.6 Total Organic Carbon (TOC)

Average annual TOC concentrations ranged from 5.4 to 14.7 mg/l. This range of TOC is indicative of biologically stable surface waters. High TOC readings correlate with high organic loading that is usually found in stagnant or sluggish water bodies of limited volume, such as an evaporating pool of water. Stations A and B both produced the higher CV percentages indicating wider variability during the year. The highest value measured was only 28.8 mg/l occurring at Station A and is believed to reflect the somewhat erratic and intermittent flows of run-off entering the site from above Cavern Lake during the year. The relatively low values observed around the site sampling locations as well as the peaks produced no discernible physical impacts and are not out of line with the natural setting or system receiving episodic rainfall.

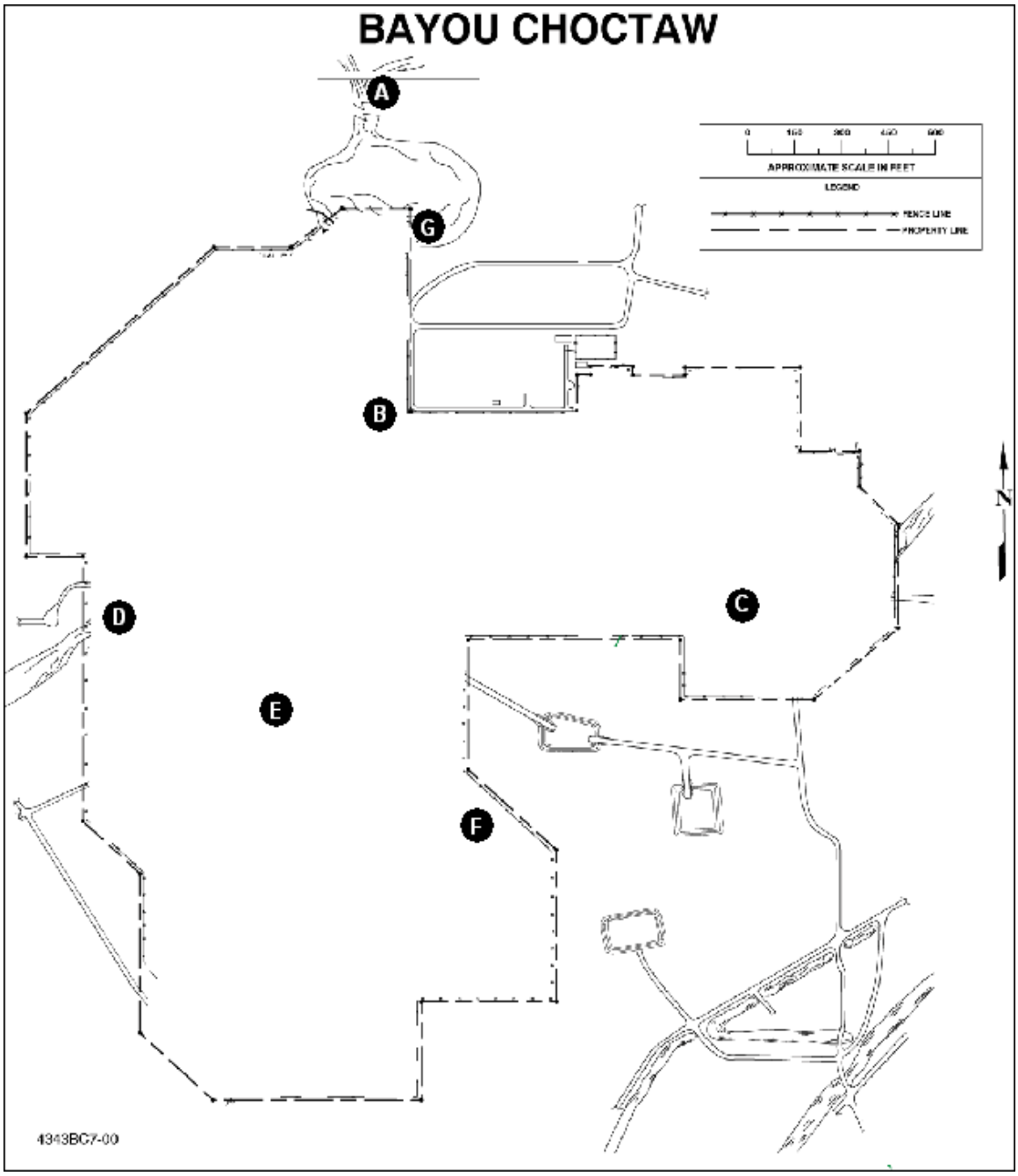


Figure 5-1. (Sheet 1 of 2) Bayou Choctaw Environmental Monitoring Stations

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
E. Wetland Area
F. Wetland Area
G. Near Raw Water Intake

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

Table 5-11. 2001 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	12	4	0	0
	Maximum	8.0	28.1	0.5	2.5	7.2	28.8
	Minimum	7.0	11.2	0.5	2.5	1.3	3.2
	Mean	NV	20.5	0.5	2.5	4.5	9.4
	Median	7.4	19.4	0.5	2.5	4.8	8.8
	Standard Deviation	NV	4.6	0.0	0.0	1.5	6.5
	Coefficient of Variation	NV	22.6	0.0	0.0	32.2	69.1
B	Sample Size	10	10	10	4	10	10
	Number of BDL	0	NV	5	4	0	1
	Maximum	7.6	25.3	1.7	2.5	11.5	11.0
	Minimum	7.1	12.8	0.5	2.5	1.7	0.5
	Mean	NV	20.0	1.0	2.5	5.4	5.4
	Median	7.3	21.1	0.8	2.5	5.0	5.2
	Standard Deviation	NV	4.5	0.5	0.0	2.9	3.2
	Coefficient of Variation	NV	22.3	53.0	0.0	54.0	58.7
C	Sample Size	12	12	12	4	12	12
	Number of BDL	0	NV	9	4	0	0
	Maximum	7.5	28.2	2.9	2.5	7.8	18.3
	Minimum	7.0	12.0	0.5	2.5	1.3	4.0
	Mean	NV	20.7	0.8	2.5	3.9	10.8
	Median	7.3	19.9	0.5	2.5	3.6	10.6
	Standard Deviation	NV	4.8	0.7	0.0	1.9	4.3
	Coefficient of Variation	NV	23.2	86.7	0.0	48.4	39.9
D	Sample Size	12	12	12	4	12	12
	Number of BDL	0	NV	11	4	0	0
	Maximum	7.6	28.4	1.3	2.5	7.4	14.7
	Minimum	7.0	11.4	0.5	2.5	1.8	2.7
	Mean	NV	20.8	0.6	2.5	4.6	9.3
	Median	7.4	20.0	0.5	2.5	4.6	10.4
	Standard Deviation	NV	5.1	0.2	0.0	1.7	3.5
	Coefficient of Variation	NV	24.3	40.8	0.0	36.5	37.6
E	Sample Size	12	12	12	4	12	12
	Number of BDL	0	NV	12	4	0	0
	Maximum	7.6	28.9	0.5	2.5	7.2	17.0
	Minimum	7.0	11.2	0.5	2.5	0.7	4.7
	Mean	NV	20.5	0.5	2.5	3.3	10.2
	Median	7.3	19.5	0.5	2.5	2.8	9.6
	Standard Deviation	NV	5.2	0.0	0.0	2.0	3.8
	Coefficient of Variation	NV	25.4	0.0	0.0	61.1	37.5

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

Table 5-11 2001 Data Summary for Bayou Choctaw Monitoring Stations (continued)

Station	Statistical Parameters	pH (s.u.)	Temperature (deg. C)	Salinity (ppt)	Oil & Grease (mg/l)	Dissolved Oxygen (mg/l)	Total Organic Carbon (mg/l)
F	Sample Size	12	12	12	4	12	12
	Number of BDL	0	NV	12	4	0	0
	Maximum	7.8	29.6	0.5	2.5	8.9	23.2
	Minimum	7.0	12.5	0.5	2.5	0.6	5.8
	Mean	NV	21.3	0.5	2.5	4.2	14.7
	Median	7.4	20.8	0.5	2.5	4.2	14.2
	Standard Deviation	NV	5.1	0.0	0.0	2.4	6.1
	Coefficient of Variation	NV	24.1	0.0	0.0	58.5	41.6
G	Sample Size	12	12	12	4	12	12
	Number of BDL	0	NV	12	4	0	0
	Maximum	8.5	29.0	0.5	2.5	7.4	11.9
	Minimum	7.0	10.8	0.5	2.5	1.4	2.3
	Mean	NV	20.5	0.5	2.5	5.7	7.3
	Median	7.6	19.4	0.5	2.5	5.8	7.7
	Standard Deviation	NV	5.6	0.0	0.0	1.5	3.0
	Coefficient of Variation	NV	27.4	0.0	0.0	27.2	40.3

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

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. No spikes either high or low are evident in this year's dataset.

b. Observed salinity measurements remained generally low and within the historical range. Many stations reflected evidence of at least a temporary break in the longstanding drought as 4 of 7 stations reported no measurable salinity at all.

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 nondetectable 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 5-12.

5.5.2.1 Hydrogen Ion Activity (pH**)**

The 2001 Data show the pH of site and surrounding surface waters remained between 6.2 and 8.2 s.u. The annual median values of pH for each of the monitored stations ranged from 7.5 to 7.8 s.u.

5.5.2.2 Temperature

Temperatures observed in 2001 ranged from 10ºC to 35ºC exhibiting the characteristics expected from seasonal meteorological changes. Temperature fluctuations were very similar among all stations.

5.5.2.3 Salinity (SAL)

Annual average salinities were generally quite low and fresher this year, ranging from fresh on the site throughout the year to a

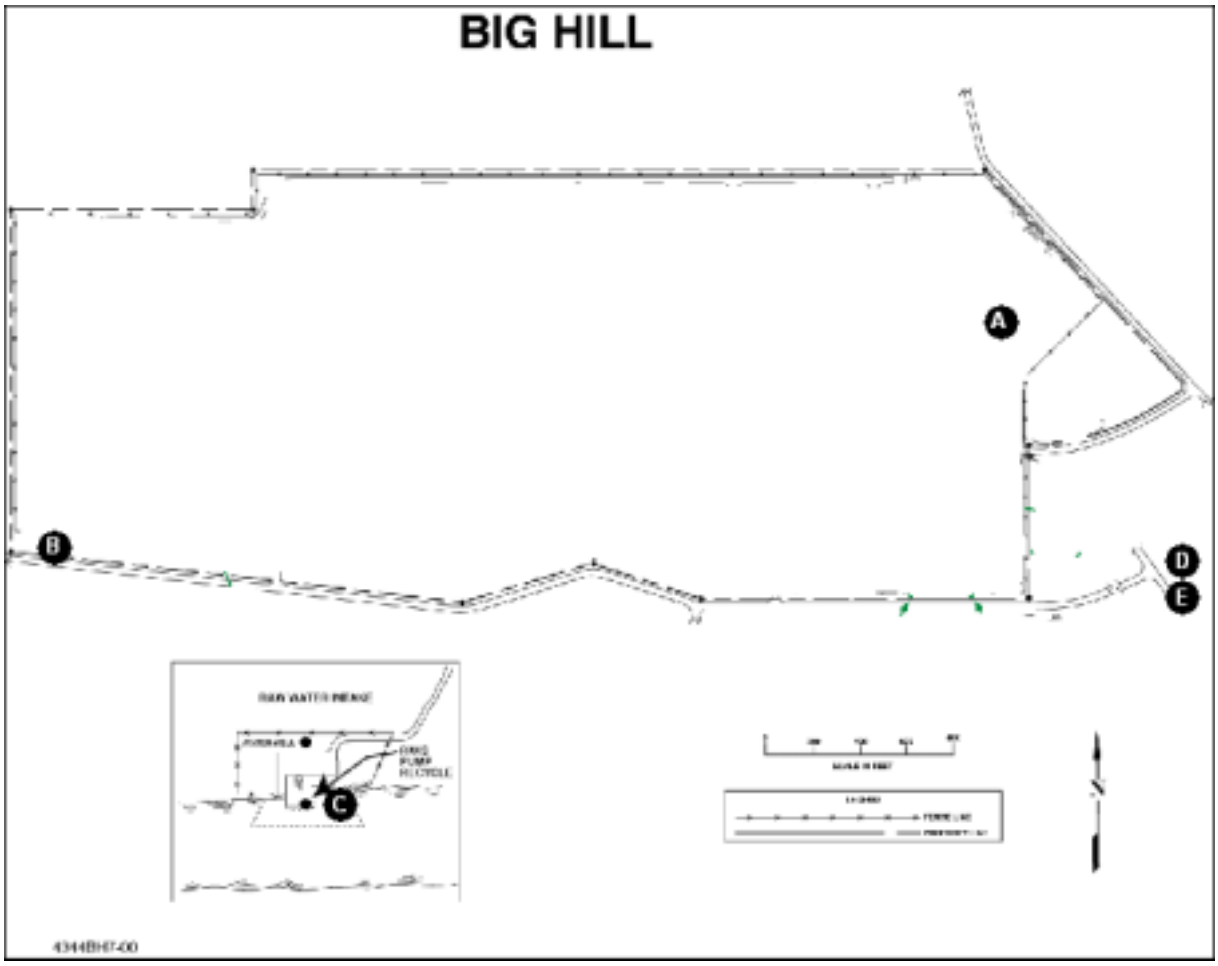
maximum of only 2.6 ppt at the Gator Hole location some 3 miles from the site in the marsh nearer the Gulf. Several stations recorded large CV's this year indicative of the low quantifications determined in a dataset predominated by values below the detectable limits. No brine releases or chronic impacts are indicated.

5.5.2.4 Oil and Grease (O&G)

With the exception of one O&G reading of 10.1 mg/l at Station D, the results for all stations were below the detectable limit. 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 were observed in the month of February and the lowest values were determined in October this year. The lowest variability was found at the RWIS where the greater flow and depth of the ICW provides a more constant dissolved oxygen level.



Water Quality Monitoring Stations

A Pond receiving effluent from site sewage treatment plant (STP)
B Wilbur 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. Big Hill Environmental Monitoring Stations

Table 5-12. 2001 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	3	3	3	3	3	3
	Number of BDL	0	NV	3	3	0	0
	Maximum	8.2	21.0	0.5	2.5	9.3	9.5
	Minimum	7.4	17.0	0.5	2.5	3.6	7.1
	Mean	NV	18.3	0.5	2.5	6.2	8.2
	Median	8.2	17.0	0.5	2.5	5.5	8.0
	Standard Deviation	NV	2.3	0.0	0.0	2.9	1.2
	Coefficient of Variation	NV	12.6	0.0	0.0	47.2	14.3
B	Sample Size	11	11	11	11	11	11
	Number of BDL	0	NV	7	11	0	0
	Maximum	8.1	34.0	7.5	2.5	11.2	17.0
	Minimum	6.6	14.0	0.5	2.5	0.7	7.1
	Mean	NV	24.9	1.7	2.5	4.6	13.2
	Median	7.6	24.0	0.5	2.5	4.4	12.8
	Standard Deviation	NV	7.0	2.4	0.0	2.7	3.2
	Coefficient of Variation	NV	28.3	142.6	0.0	58.4	24.0
C	Sample Size	10	10	10	10	10	10
	Number of BDL	0	NV	7	10	0	0
	Maximum	8.2	32.0	8.3	2.5	7.7	13.7
	Minimum	6.2	10.0	0.5	2.5	0.9	6.6
	Mean	NV	22.9	1.6	2.5	5.2	10.6
	Median	7.7	23.5	0.5	2.5	5.6	10.1
	Standard Deviation	NV	7.4	2.5	0.0	2.0	2.4
	Coefficient of Variation	NV	32.5	150.5	0.0	39.1	23.2
D	Sample Size	11	11	11	11	11	11
	Number of BDL	0	NV	8	10	0	0
	Maximum	8.1	35.0	4.6	10.1	13.8	33.1
	Minimum	6.8	15.0	0.5	2.5	0.6	10.6
	Mean	NV	24.7	1.1	3.2	6.1	19.2
	Median	7.9	24.0	0.5	2.5	4.6	18.4
	Standard Deviation	NV	7.4	1.3	2.3	4.0	7.7
	Coefficient of Variation	NV	30.0	117.7	71.8	64.7	40.1
E	Sample Size	11	11	11	11	11	11
	Number of BDL	0	NV	4	11	0	0
	Maximum	8.1	33.0	8.5	2.5	12.4	20.5
	Minimum	6.3	14.0	0.5	2.5	0.7	7.5
	Mean	NV	23.8	2.6	2.5	5.0	13.3
	Median	7.5	24.0	1.4	2.5	3.8	12.3
	Standard Deviation	NV	6.6	2.8	0.0	3.6	4.1
	Coefficient of Variation	NV	27.8	106.1	0.0	73.3	30.7

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

The station with the most DO variability during the year was the Wilbur Road (ditch) sampling station B, southwest from the site. The overall range in DO was found to be 0.7 to 13.8 mg/l with a range of 4.6 to 6.2 mg/l in mean values from all sites tested during the year.

5.5.2.6 Total Organic Carbon (TOC)

Average annual TOC concentrations varied from 8.2 to 19.2 mg/l over the year at the five monitoring stations, ranging from 6.6 to 33.1 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 nearly neutral pH, but pH was generally found to be higher in brackish water as expected.
b. The observed salinity measurements were low on the site and increased in natural fashion from fresh water at the site to an intermediate brackish and highly variable water regime 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 2001. 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, which is 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 5-13).

Area-wide drought conditions affected the annual sampling routine by lowering lake levels beyond the established sample points for about half the year.

5.5.3.1 Hydrogen Ion Activity (pH)

In 2001 the pH of Blue Lake and Mud Lake was slightly basic, ranging from 7.7 to 10.2 s.u. for the dataset and from 7.8 to 9.6 s.u. for the control points in both waters. All stations in Blue Lake were found more basic throughout the sample year than those in Mud Lake. 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.

The pH fluctuations measured in these drought-affected Bryan Mound surface waters are comparable to the normal range of variability seen at this site historically.

5.5.3.2 Temperature

Temperatures observed in 2001 ranged from 16.5º C to 33.8º C and reflect only a partial year of testing when water was available for sampling. The deduction can be made that fluctuations can be attributed to meteorological events.

5.5.3.3 Salinity (SAL)

Observed salinity fluctuations ranged from below the detection limit <1.0 to 10.6 ppt in Blue Lake and from <1.0 to 31.3 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 and J varied consistently with those found along 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 limited partial year sampling period afforded by the limited episodic rainfall.

5.5.3.4 Oil and Grease (O&G)

All of the O&G measurements made during the course of the 2001 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)

During 2001, DO was measured six times from all stations occurring in the last half of the year. Sufficient water was available for measurement in both Blue and Mud Lakes from summer through to the early winter season. Generally speaking Blue Lake was found to be slightly more oxygenated than Mud Lake perhaps owing to its somewhat fresher condition. All measurements reflect adequate ambient DO throughout the period samples were available and indicate “no apparent impact” from SPR operations.

5.5.3.6 Total Organic Carbon (TOC)

In 2001 the observed TOC values in Blue Lake ranged from 7.0 to 34.3 mg/l. Observed TOC in Mud Lake was lower (range: 3.9 to 10.1 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. Of the two receiving waters, Blue Lake was consistently found the more basic this year.
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 measured in both Blue Lake and Mud Lake was within typical ranges indicative of seasonal meteorological and biological influences for such a setting and environment.

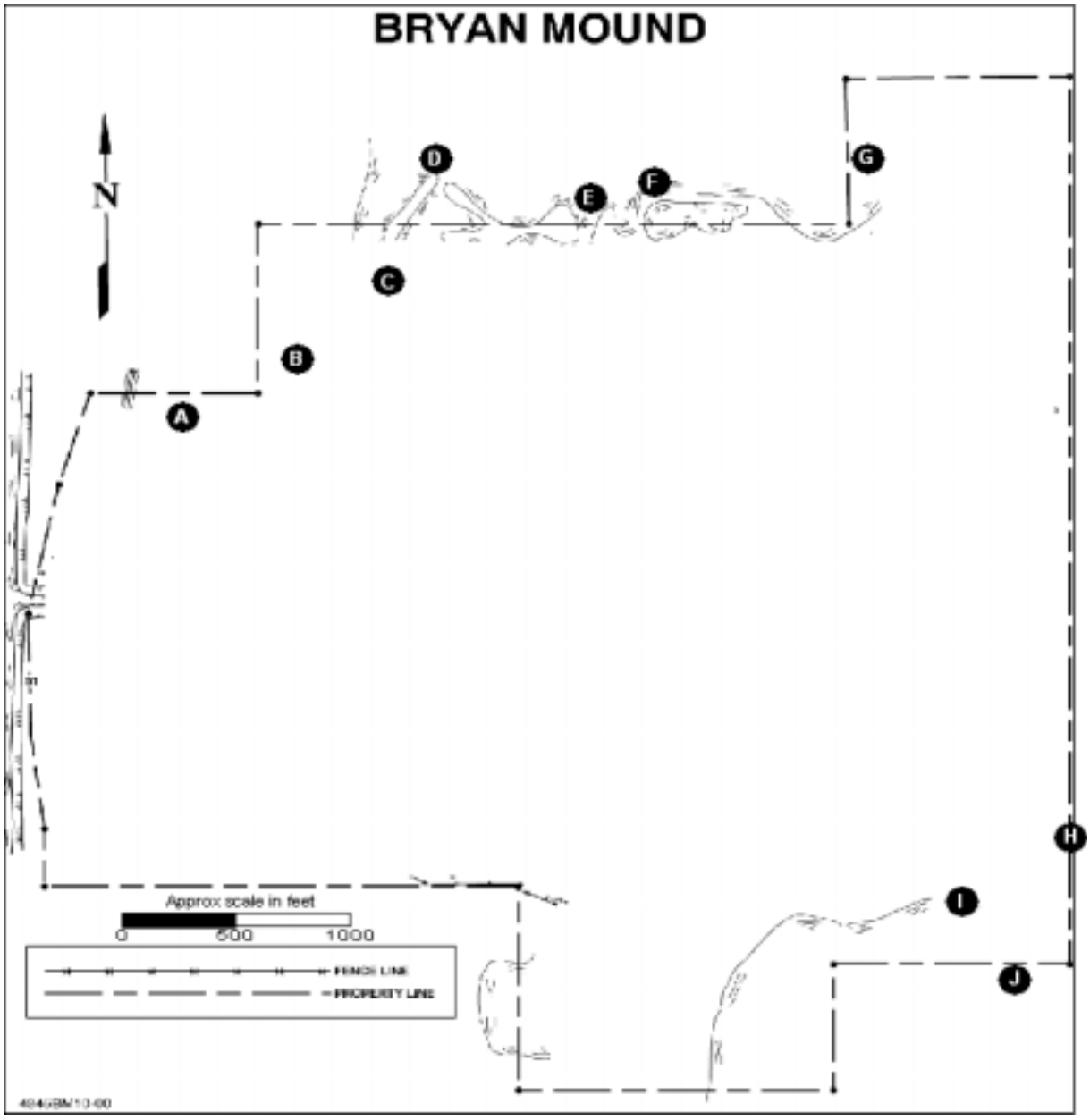


Figure 5-3. (Sheet 1 of 2) Bryan Mound Environmental Monitoring Stations

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 5-13. 2001 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	7	7	7	3	6	7
	Number of BDL	0	NV	0	3	0	0
	Maximum	10.2	33.8	4.0	2.5	15.4	14.4
	Minimum	8.7	20.0	2.8	2.5	7.9	7.1
	Mean	NV	27.0	3.4	2.5	12.0	10.9
	Median	9.4	27.1	3.5	2.5	12.7	10.9
	Standard Deviation	NV	5.0	0.4	0.0	3.4	2.6
	Coefficient of Variation	NV	18.4	10.7	0.0	28.2	24.3
B	Sample Size	7	7	7	3	6	7
	Number of BDL	0	NV	0	2	0	0
	Maximum	9.9	31.9	3.9	2.5	12.1	14.6
	Minimum	8.6	20.4	2.9	2.5	4.6	7.2
	Mean	NV	26.1	3.4	2.5	9.3	10.2
	Median	9.5	27.0	3.4	2.5	11.1	10.2
	Standard Deviation	NV	4.2	0.3	0.0	3.4	2.4
	Coefficient of Variation	NV	16.2	8.9	0.0	36.2	23.6
C	Sample Size	7	7	7	3	6	7
	Number of BDL	0	NV	0	2	0	0
	Maximum	9.7	32.7	10.6	2.5	12.7	13.7
	Minimum	8.8	20.0	3.0	2.5	4.3	7.0
	Mean	NV	26.2	4.5	2.5	9.5	10.2
	Median	9.5	26.8	3.5	2.5	10.6	10.2
	Standard Deviation	NV	4.4	2.7	0.0	3.4	2.3
	Coefficient of Variation	NV	17.0	61.0	0.0	36.2	22.7
D	Sample Size	7	7	7	3	6	7
	Number of BDL	0	NV	0	2	0	0
	Maximum	9.6	32.7	3.7	2.5	13.6	14.8
	Minimum	8.7	20.9	3.3	2.5	5.4	8.1
	Mean	NV	26.1	3.5	2.5	8.9	11.3
	Median	9.3	27.0	3.5	2.5	9.1	11.8
	Standard Deviation	NV	4.4	0.2	0.0	2.9	2.4
	Coefficient of Variation	NV	16.7	4.8	0.0	32.7	21.5
E	Sample Size	7	7	7	3	6	7
	Number of BDL	0	NV	0	2	0	0
	Maximum	9.8	32.8	3.7	2.5	12.4	14.4
	Minimum	8.6	19.7	3.3	2.5	5.6	7.9
	Mean	NV	26.2	3.5	2.5	8.7	11.2
	Median	9.1	27.9	3.5	2.5	8.9	12.1
	Standard Deviation	NV	4.9	0.2	0.0	2.3	2.4
	Coefficient of Variation	NV	18.6	4.9	0.0	26.0	21.8

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

Table 5-13 2001 Data Summary for Bryan Mound Monitoring Stations (continued)

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	7	7	7	3	6	7
	Number of BDL	0	NV	1	2	0	0
	Maximum	9.5	32.4	3.7	2.5	12.5	14.4
	Minimum	8.6	21.0	0.5	2.5	6.0	7.4
	Mean	NV	26.0	3.1	2.5	8.6	11.4
	Median	9.2	26.7	3.5	2.5	8.5	12.5
	Standard Deviation	NV	4.6	1.2	0.0	2.2	2.6
	Coefficient of Variation	NV	17.6	37.3	0.0	25.1	23.2
G	Sample Size	7	7	7	3	6	7
	Number of BDL	0	NV	1	2	0	0
	Maximum	9.5	32.0	3.7	2.5	12.5	34.3
	Minimum	8.6	21.1	0.5	2.5	6.7	7.8
	Mean	NV	26.1	3.1	2.5	8.8	14.2
	Median	9.2	27.6	3.5	2.5	8.9	12.1
	Standard Deviation	NV	4.3	1.2	0.0	2.1	9.1
	Coefficient of Variation	NV	16.6	37.3	0.0	23.6	64.2
H	Sample Size	6	6	6	2	6	6
	Number of BDL	0	NV	1	1	0	0
	Maximum	8.0	30.6	29.4	2.5	9.7	8.8
	Minimum	7.9	16.8	0.5	2.5	3.8	3.9
	Mean	NV	24.3	14.2	2.5	5.9	6.8
	Median	7.9	24.6	12.5	2.5	5.6	7.1
	Standard Deviation	NV	5.6	13.0	0.0	2.2	1.7
	Coefficient of Variation	NV	22.9	91.5	0.0	37.6	24.9
I	Sample Size	6	6	6	2	6	6
	Number of BDL	0	NV	1	1	0	0
	Maximum	8.3	30.8	26.5	2.5	10.3	9.1
	Minimum	7.7	16.6	0.5	2.5	5.6	4.8
	Mean	NV	24.6	14.2	2.5	7.7	7.4
	Median	8.0	24.9	16.9	2.5	7.7	7.9
	Standard Deviation	NV	5.1	10.0	0.0	1.8	1.6
	Coefficient of Variation	NV	20.7	70.9	0.0	23.7	21.7
J	Sample Size	6	6	6	2	6	6
	Number of BDL	0	NV	1	1	0	0
	Maximum	8.6	29.9	31.3	2.5	11.5	10.1
	Minimum	7.8	16.5	0.5	2.5	4.7	4.6
	Mean	NV	24.5	16.4	2.5	8.1	8.3
	Median	7.8	26.0	18.3	2.5	7.5	8.8
	Standard Deviation	NV	4.9	12.2	0.0	2.9	2.1
	Coefficient of Variation	NV	19.9	74.4	0.0	36.4	24.9

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

5.5.4 West Hackberry

In 2001, 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 5-14).

5.5.4.1 Hydrogen Ion Activity (pH)

The pH of site and surrounding waters ranged between 6.0 and 9.1 s.u., and annual median values ranged from 7.0 to 7.7 s.u. from all stations.

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 2001 were consistent with observations at other sites and were indicative of regional climatic effects. No off-normal measurements were observed. Recorded temperatures ranged from 9.0º C to 32.0º C and were found very consistent among stations.

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 (1.8 to 9.7 ppt in Black Lake) (<1 to 4.5 ppt in the ICW) are more conducive to supporting euryhaline organisms and those with sufficient mobility to avoid salinity stresses that occur with seasonal changes. Mean annual salinity observed at the ICW (1.2 ppt) was lower than that

of Black Lake (4.8 to 4.9 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 1.2 ppt. Ten of the twelve monthly measurements, however, were BDL during the year that 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 2001. 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 high pressure pump pad retention pond (Station E) were sufficient to provide some aeration throughout 2001. These main site run-off stations produced the greatest variability as would be expected.

5.5.4.6 Total Organic Carbon (TOC)

The range of TOC concentrations for 2001 was from 1.9 to 17.2 mg/l with Station D experiencing the highest single value of 17.2

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. The average annual TOC concentrations by station ranged from 7.8 to 12.2 mg/l with main site station E experiencing the most variability throughout the year. Because the variation is so consistent among the remaining stations, it is indicated that these measurements reflect a return of consistent rainfall to Black Lake and the surrounding environs.

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 salinity measurements made throughout 2001 were consistent with the ambient and only slightly brackish receiving water environment, reflective of the return of rainfall to the area.
c. Oil and grease levels were below the detectable limit at all stations throughout 2001, which is indicative of good housekeeping.
d. Dissolved oxygen levels at site and Black Lake stations were consistently high and did not appear adversely affected by site operations.
e. Total organic carbon concentrations were quite similar at all stations throughout the year suggesting no substantial transient bio-contamination or ecological events.

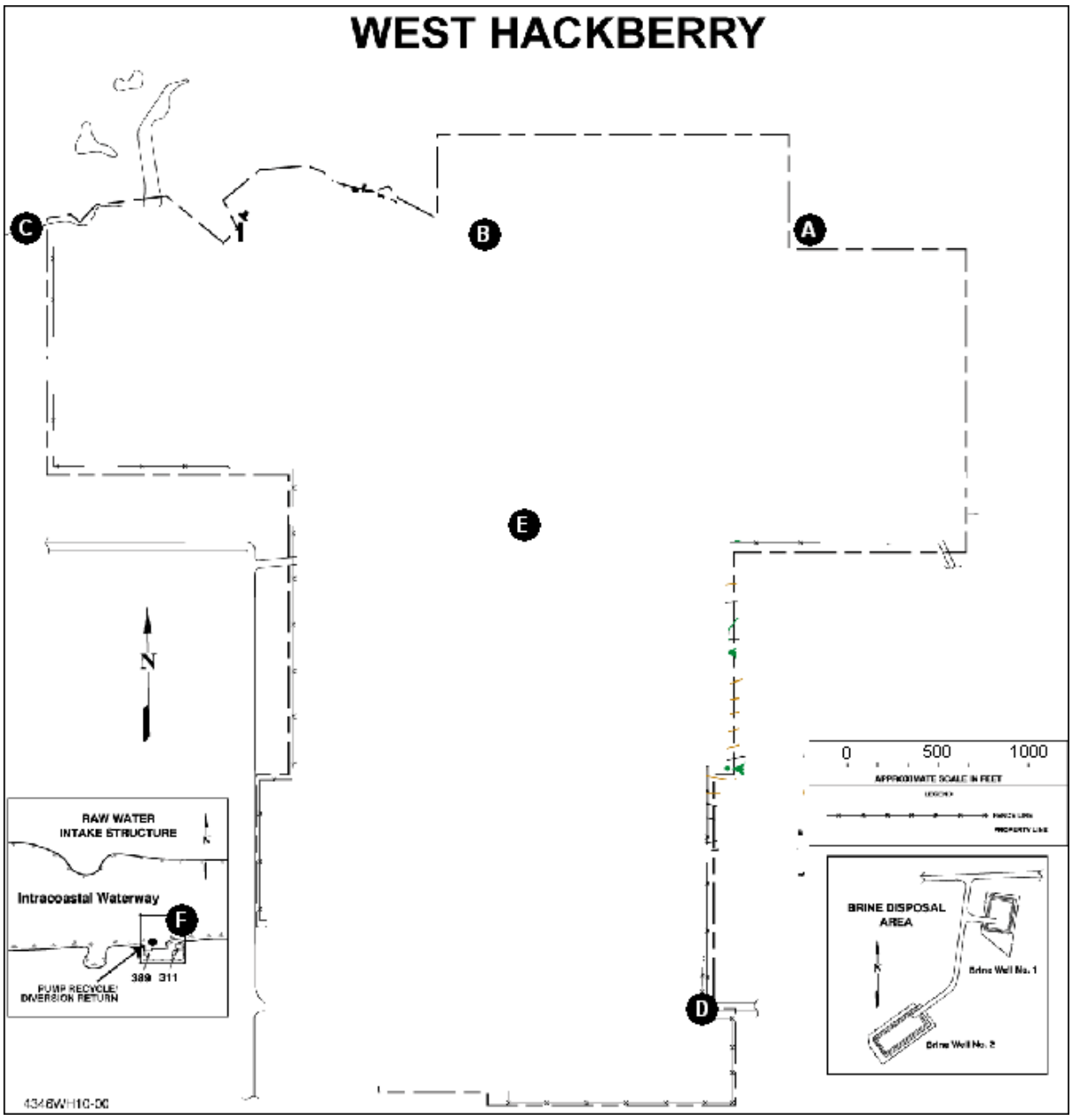


Figure 5-4. (Sheet 1 of 2) West Hackberry Environmental Monitoring Stations

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 5-14. 2001 Data Summary for West 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	6	7	12
	Number of BDL	0	NV	0	6	0	0
	Maximum	7.9	29.0	9.6	2.5	9.9	11.5
	Minimum	6.7	9.0	1.8	2.5	6.4	7.5
	Mean	NV	20.9	4.8	2.5	8.1	9.3
	Median	7.6	23.0	4.7	2.5	8.0	9.6
	Standard Deviation	NV	7.1	2.0	0.0	1.3	1.3
	Coefficient of Variation	NV	34.0	41.7	0.0	16.2	13.7
B	Sample Size	12	12	12	6	7	12
	Number of BDL	0	NV	0	6	0	0
	Maximum	8.0	29.0	9.6	2.5	9.4	14.2
	Minimum	6.4	9.0	1.8	2.5	6.3	7.5
	Mean	NV	20.9	4.9	2.5	8.0	10.0
	Median	7.7	23.0	4.8	2.5	8.1	10.1
	Standard Deviation	NV	7.1	2.0	0.0	1.2	2.1
	Coefficient of Variation	NV	34.1	41.3	0.0	14.4	20.5
C	Sample Size	12	12	12	6	7	12
	Number of BDL	0	NV0	0	6	0	0
	Maximum	7.7	29.0	9.7	2.5	10.3	11.8
	Minimum	6.0	9.0	1.8	2.5	6.7	7.8
	Mean	NV	20.8	4.8	2.5	7.9	9.9
	Median	7.4	23.0	4.2	2.5	7.8	10.1
	Standard Deviation	NV	7.0	2.1	0.0	1.2	1.3
	Coefficient of Variation	NV	33.8	43.6	0.0	15.3	13.6
D	Sample Size	11	11	11	5	7	11
	Number of BDL	0	NV	11	5	0	0
	Maximum	8.4	30.0	0.5	2.5	10.8	17.2
	Minimum	7.4	11.0	0.5	2.5	5.2	8.4
	Mean	NV	21.5	0.5	2.5	7.6	12.2
	Median	7.9	25.0	0.5	2.5	8.2	11.7
	Standard Deviation	NV	7.8	0.0	0.0	2.0	2.5
	Coefficient of Variation	NV	36.1	0.0	0.0	26.5	20.7

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

Table 5-14 2001 Data Summary for West Hackberry Monitoring Stations (continued)

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	6	7	12
	Number of BDL	0	NV	10	6	0	0
	Maximum	9.1	32.0	1.2	2.5	11.2	15.8
	Minimum	7.5	11.0	0.5	2.5	4.8	1.9
	Mean	NV	22.4	0.6	2.5	7.7	7.8
	Median	7.7	25.0	0.5	2.5	7.4	7.8
	Standard Deviation	NV	7.1	0.3	0.0	2.3	3.2
	Coefficient of Variation	NV	31.8	44.2	0.0	30.2	41.1
F	Sample Size	12	12	12	6	7	12
	Number of BDL	0	NV	9	6	0	0
	Maximum	7.3	29.0	4.5	2.5	8.0	11.2
	Minimum	6.2	9.0	0.5	2.5	6.4	6.6
	Mean	NV	21.7	1.2	2.5	7.3	9.6
	Median	7.0	23.0	0.5	2.5	7.0	9.9
	Standard Deviation	NV	6.9	1.3	0.0	0.7	1.5
	Coefficient of Variation	NV	31.8	112.3	0.0	9.2	15.4

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

6. SITE HYDROLOGY, GROUND WATER MONITORING AND PUBLIC DRINKING WATER PROTECTION

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 2001. 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. Wells enclosing the operating interconnected brine storage and disposal pond system at Big Hill are monitored as part of permit required leak detection. The St. James terminal has undergone a thorough remediation to satisfy state criteria for some limited crude oil leakage. During 2001, follow-on studies taken have indicated the presence of only trace quantities of remnant crude oil contamination in a limited area of backfill soils. Because of this, there are no permanent ground water monitoring stations located there although the crude oil attenuation continued throughout 2001.

Ground water salinity data collected for the past five years are presented graphically, as available for the historic site well nets and for the more recently installed Periphery Well (PW) series. These data are then discussed within each site-specific section and any gaps in data for the graphs are noted. The graphs' Y-axes have been standardized with few noted exceptions at either the 0–10 ppt or 0–100 ppt as the baseline dependent upon the historical range. This allows for an easier to follow comparisons among the monitoring stations at all 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) circumscribing the brine storage pond at Bayou Choctaw (Figure 6-1). These wells were drilled roughly 9 m (30 ft) below land surface (bls) generally at the corners of the structure to monitor potential impact from the brine storage pond and any other potential nearby 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 near a selected brine disposal well pad.

These periphery 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 are presented for the first time in this report because now there are sufficient data to make

representative five-year trending charts as with the historical pond monitoring wells. The CY 1996 Site Environmental Report contains a detailed overview of the Phase II (periphery well) 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 loosely mimicking the ground contours.

Groundwater salinity observed at all of the four historical pond wells (BC MW1 through BC MW4, Figure 6-2) have 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 operational 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 trend at each of these four well locations, however, continues to decrease with time and in a very similar fashion. Two wells BC MW1 and BC MW2 have decreased enough over this time period to warrant reduction of their scales to 1 to 10 ppt this year. The former steep decline observed at well BC MW3 indicative of the passage of small plume is now flattening and appears to be tracking the muted effects of a former impact or time-limited 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 that had been much greater than that of the other three historical wells appears to be returning to the ambient conditions more reflective of background, as observed with wells BC MW1 and BC MW2. Well BC MW4 located down gradient of the site and south of the E-W canal has revealed a somewhat elevated overall salinity concentration, but the long-term time-series trend is decidedly downward. Much of the variability exhibited with the earlier data may have resulted from over purging 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 of BCMW3 indicates that the salinity is 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 down gradient 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 all of the Bayou Choctaw historical and periphery wells indicate decreasing salinity.

At the up gradient well BC MW1 and the immediately down gradient intercept well BC MW2 a continuing general (five-year trend) of decreasing salinity continues into 2001.

The variability evident with the data sets previous to and including 1997 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 now. Well BC MW1 is situated on the up gradient side of the brine pond and well BC MW2 appears to be immediately down gradient of this potential source (see Figure 6-3). Another potential source of subsurface contamination may be residuals from historical activity that occurred along the northwest corner of the pond. Periphery 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 that, 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 remaining stable in salinity over time. The slightly downward sloping five-year salinity trend evident at BC MW3 apparently confirm the ephemeral impact of a former piping leak found and repaired near the low pressure pump pad in 1989/1990. The data now indicate the impact of that piping break has essentially recovered to ambient for this position and the year 1996 reflected the majority of that change.

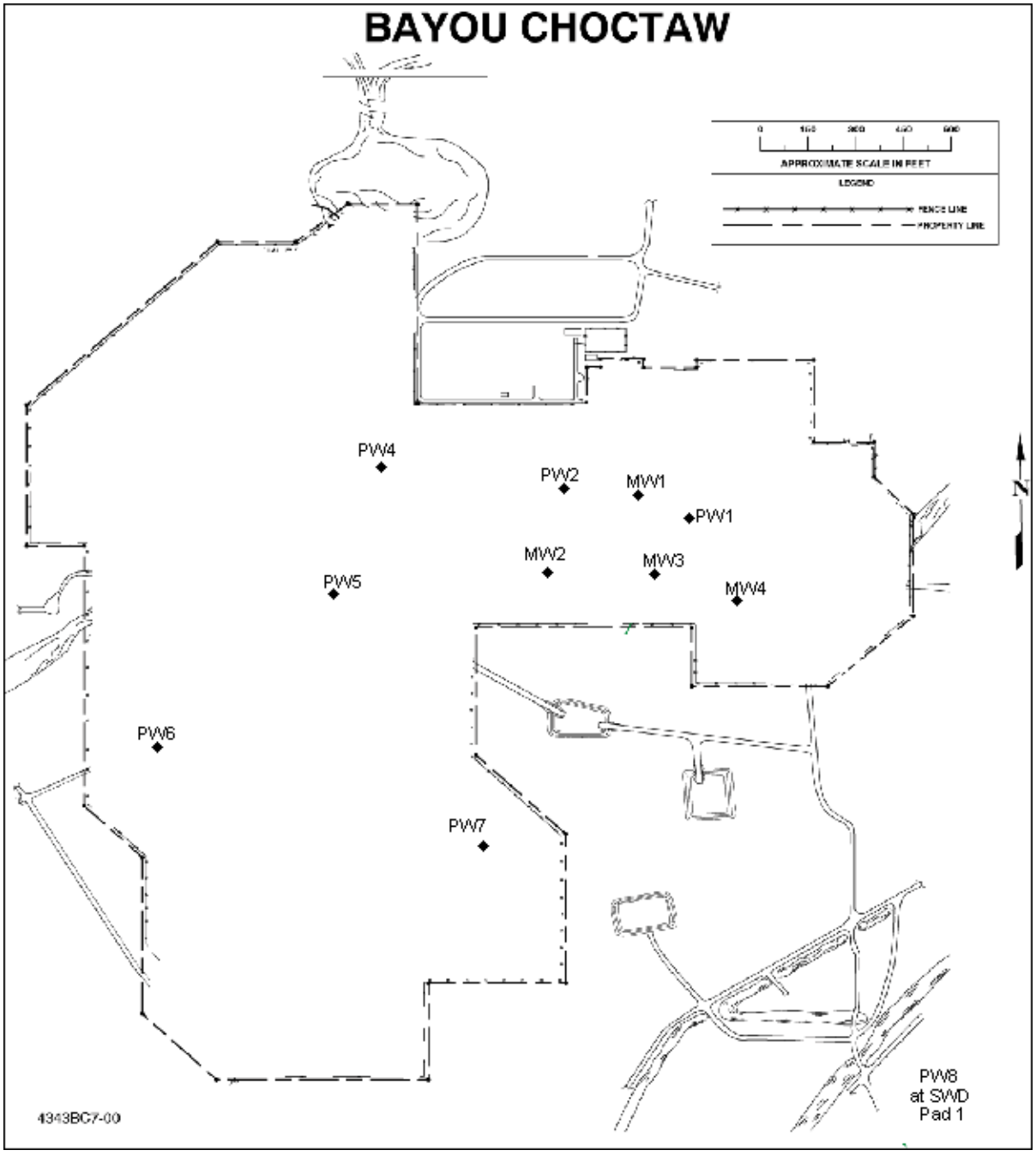


Figure 6-1. Bayou Choctaw Ground Water Monitoring Stations

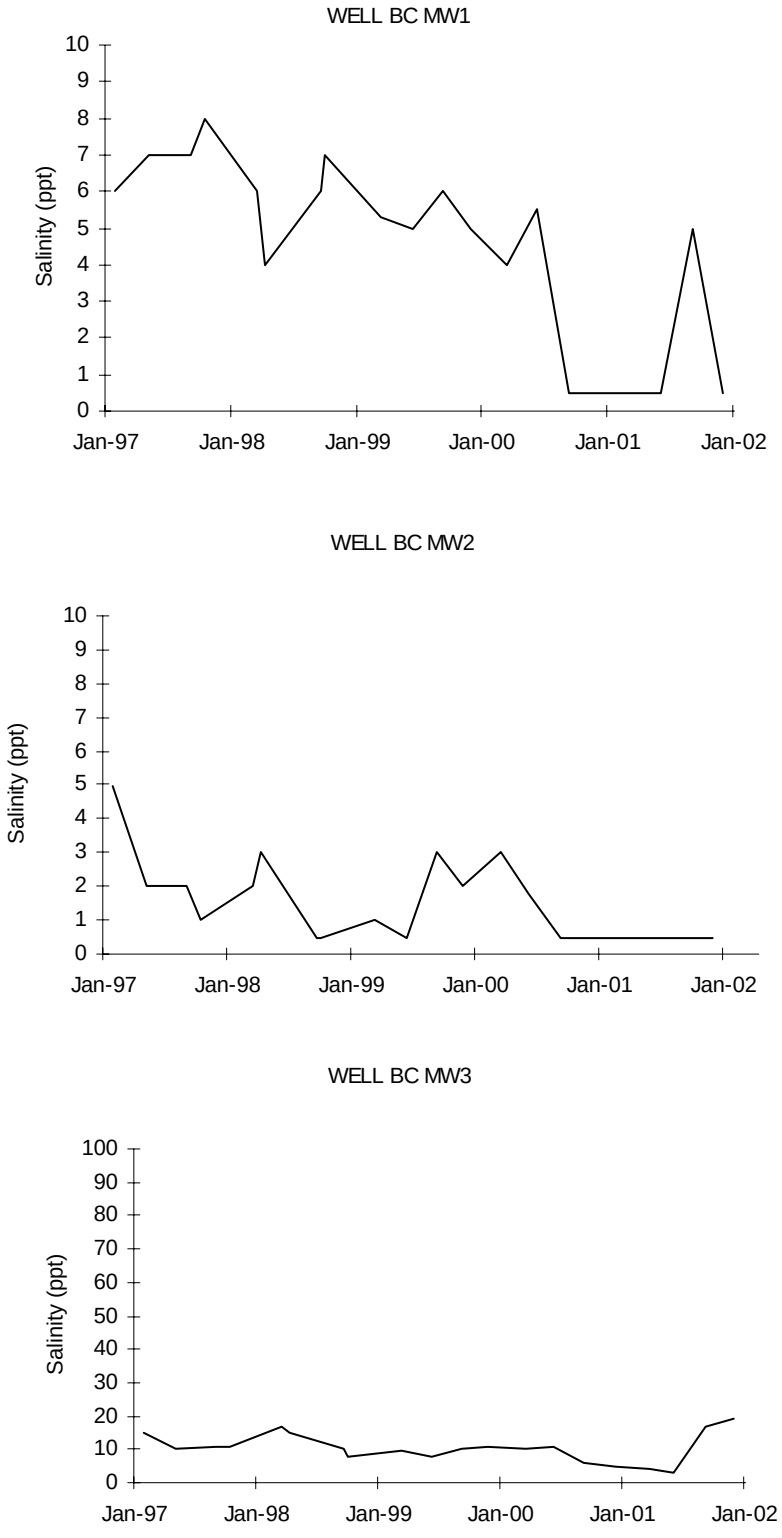


Figure 6-2. Bayou Choctaw Ground Water Monitoring Well Salinities

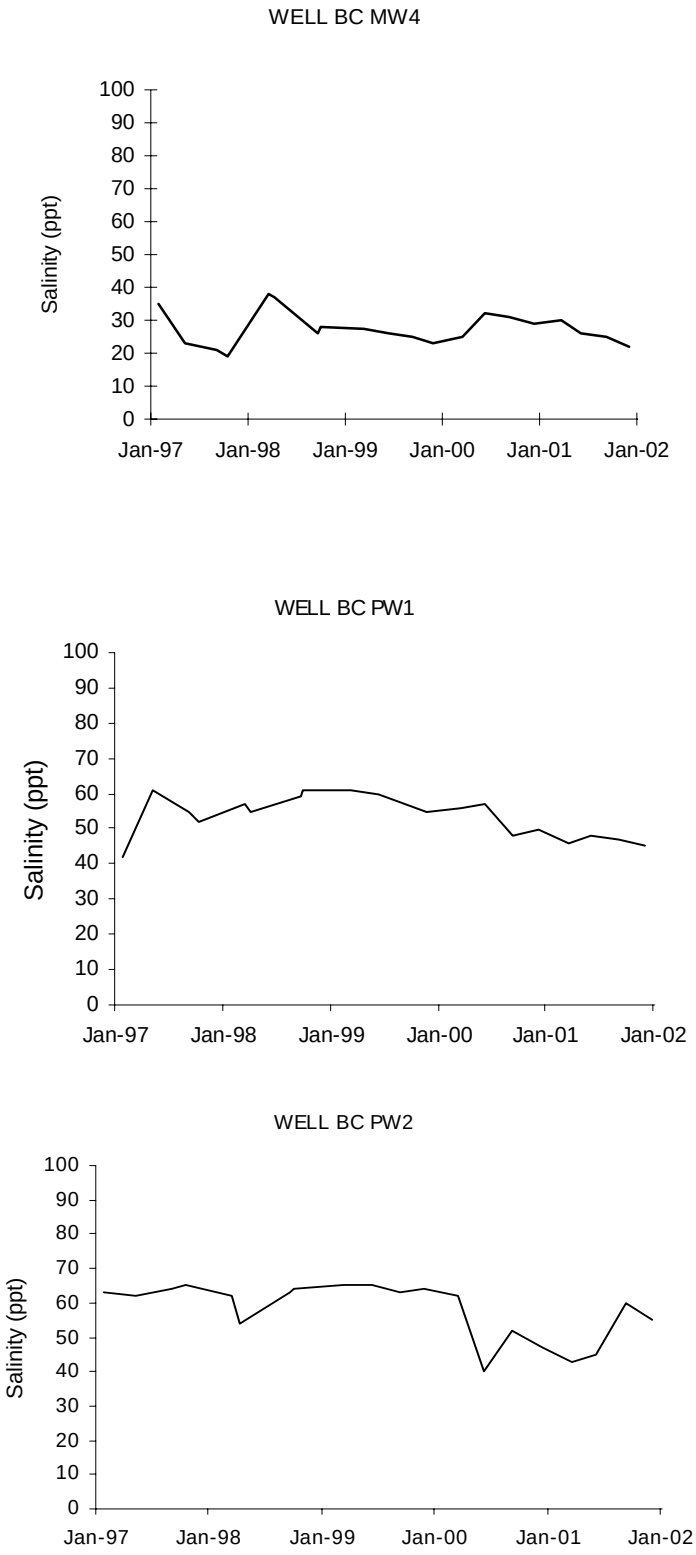


Figure 6-2. Bayou Choctaw Ground Water Monitoring Well Salinities (continued)

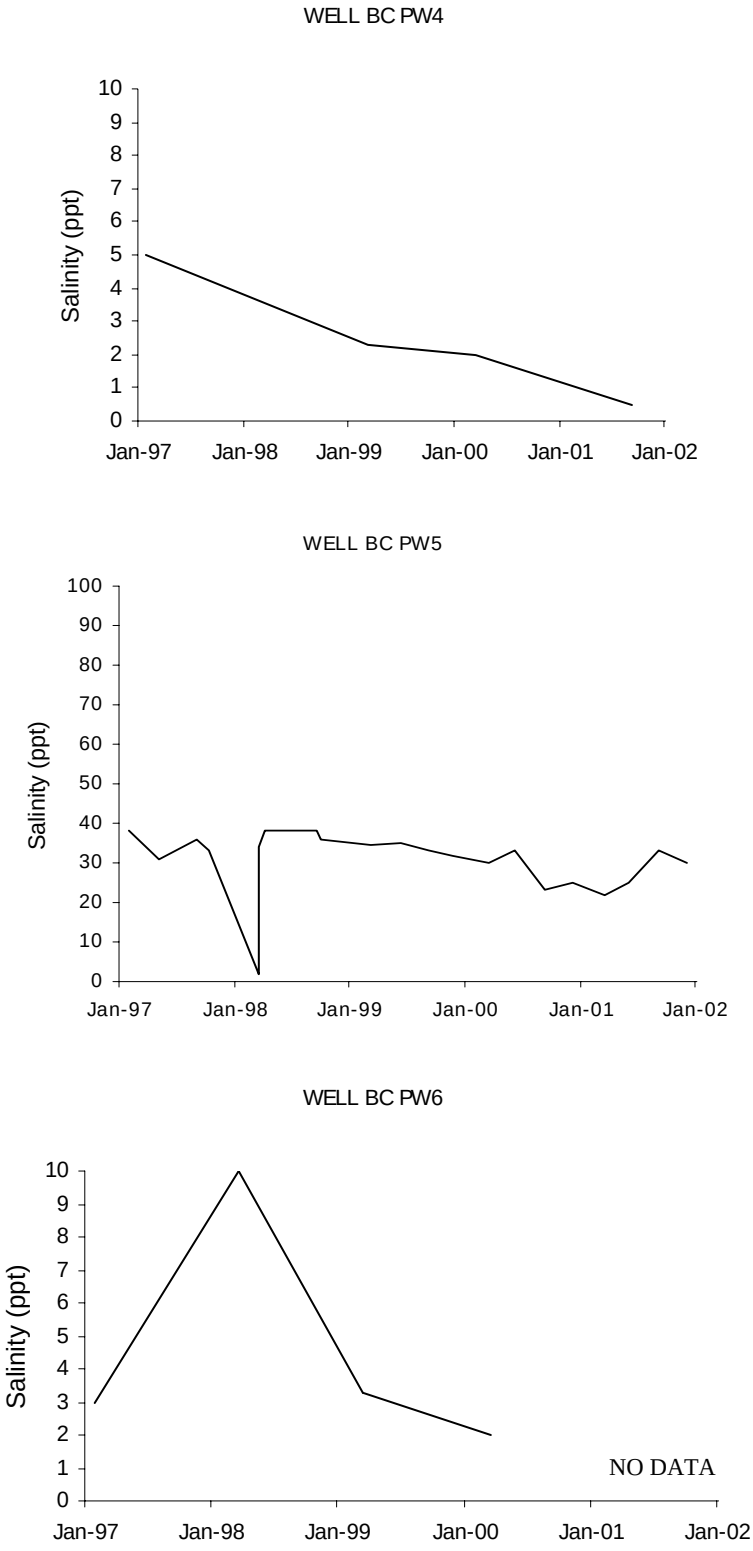


Figure 6-2. Bayou Choctaw Ground Water Monitoring Well Salinities (continued)

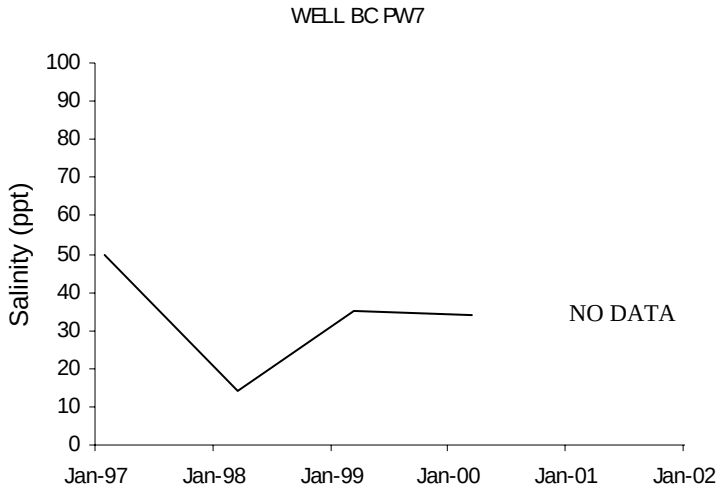


Figure 6-2. Bayou Choctaw Ground Water Monitoring Well Salinities (continued)

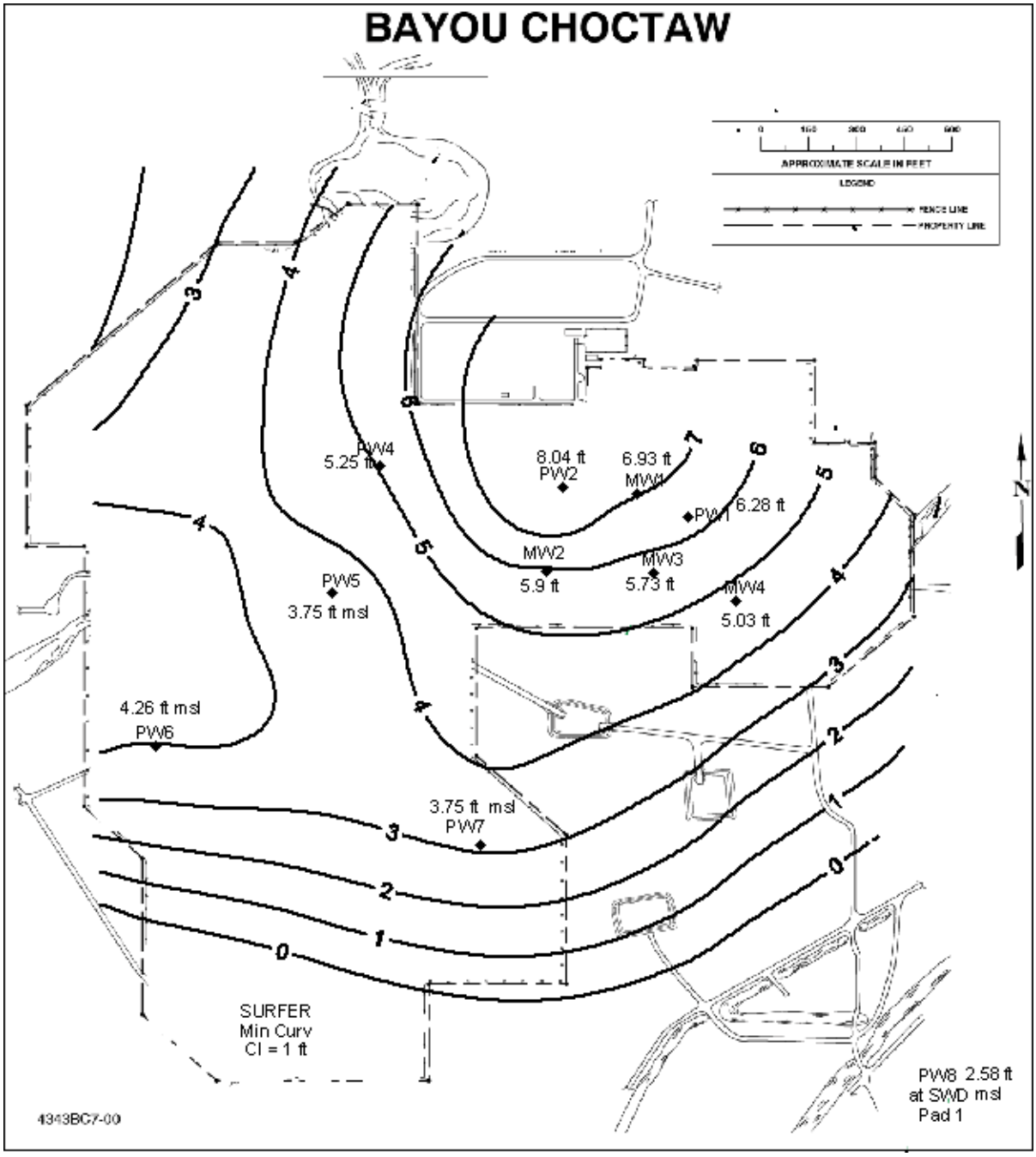


Figure 6-3. Bayou Choctaw Shallow Ground Water Contoured Elevations Summer 2001

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 down gradient of the effects observed near the formerly higher salinity well BC MW3.

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 PW data obtained from the periphery wells maintained beyond the original scope indicate decreasing salinity trends over the limited datasets. All of these monitored locations appear to fluctuate regularly over the period of record, but in general, decreasing trend lines are evident. Future ground water data, including that from the periphery wells added from the Phase II verification studies and ongoing inspections of the brine pond and site piping, will assist in determining if any observed contamination originated from SPR activities. The shallow ground water monitoring well net for this site is adequately placed and sampled to serve as a complete site-wide detection monitoring system.

6.2 BIG HILL

The three major subsurface hydro geological 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 nearby Port Arthur both 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 personnel began sampling these wells by the low-flow method in May 1995.

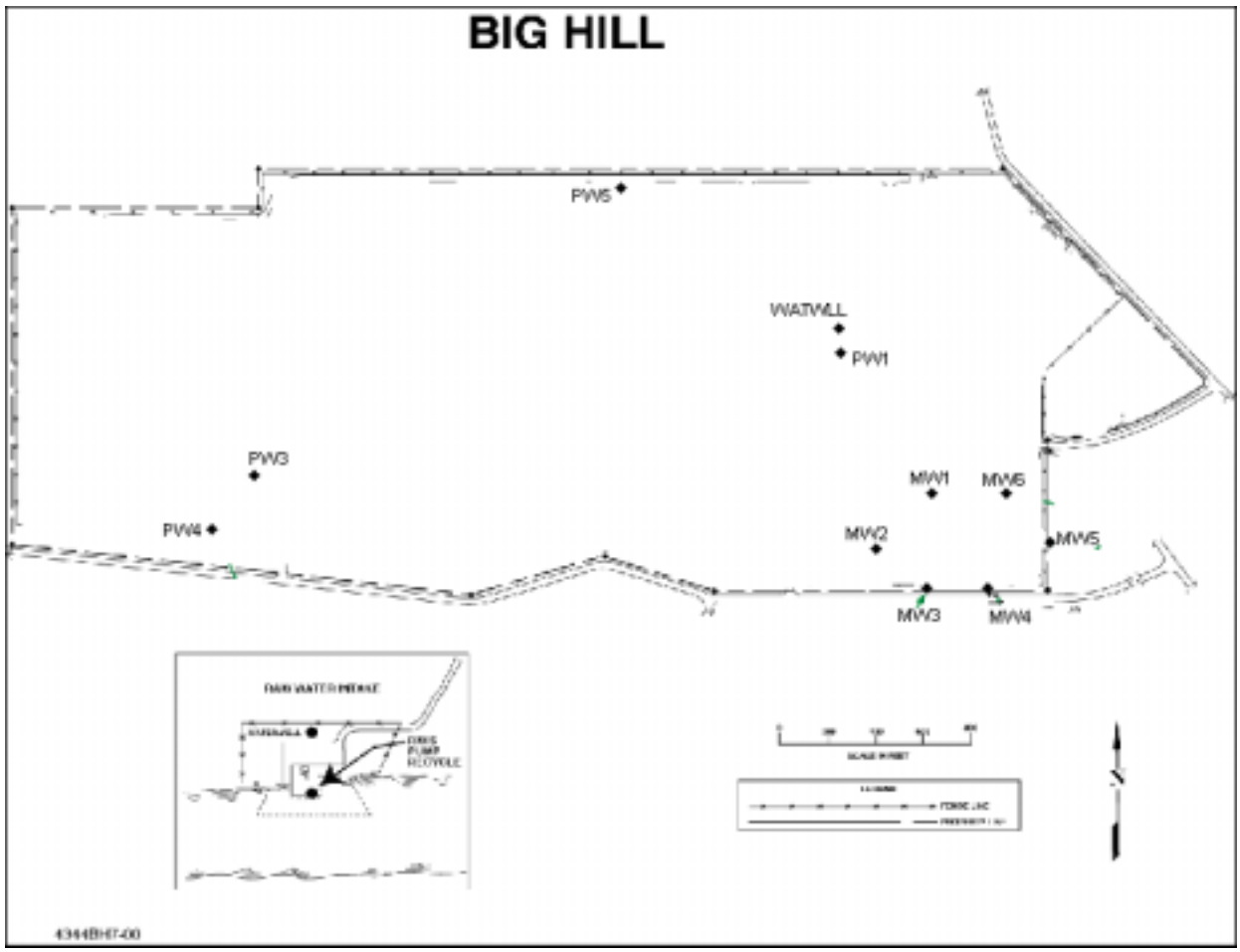


Figure 6-4. Big Hill Ground Water Monitoring Wells

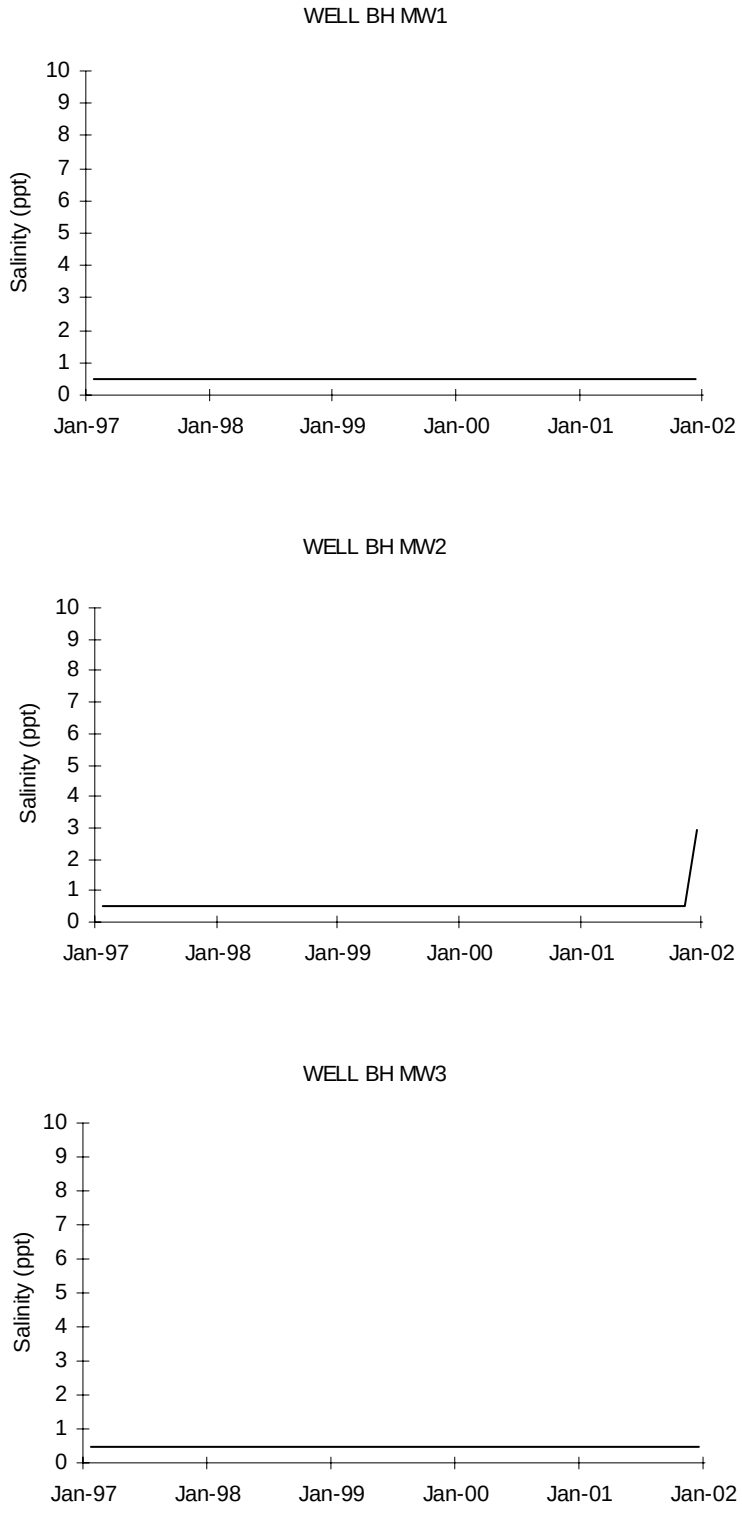


Figure 6-5. Big Hill Ground Water Monitoring Well Salinities

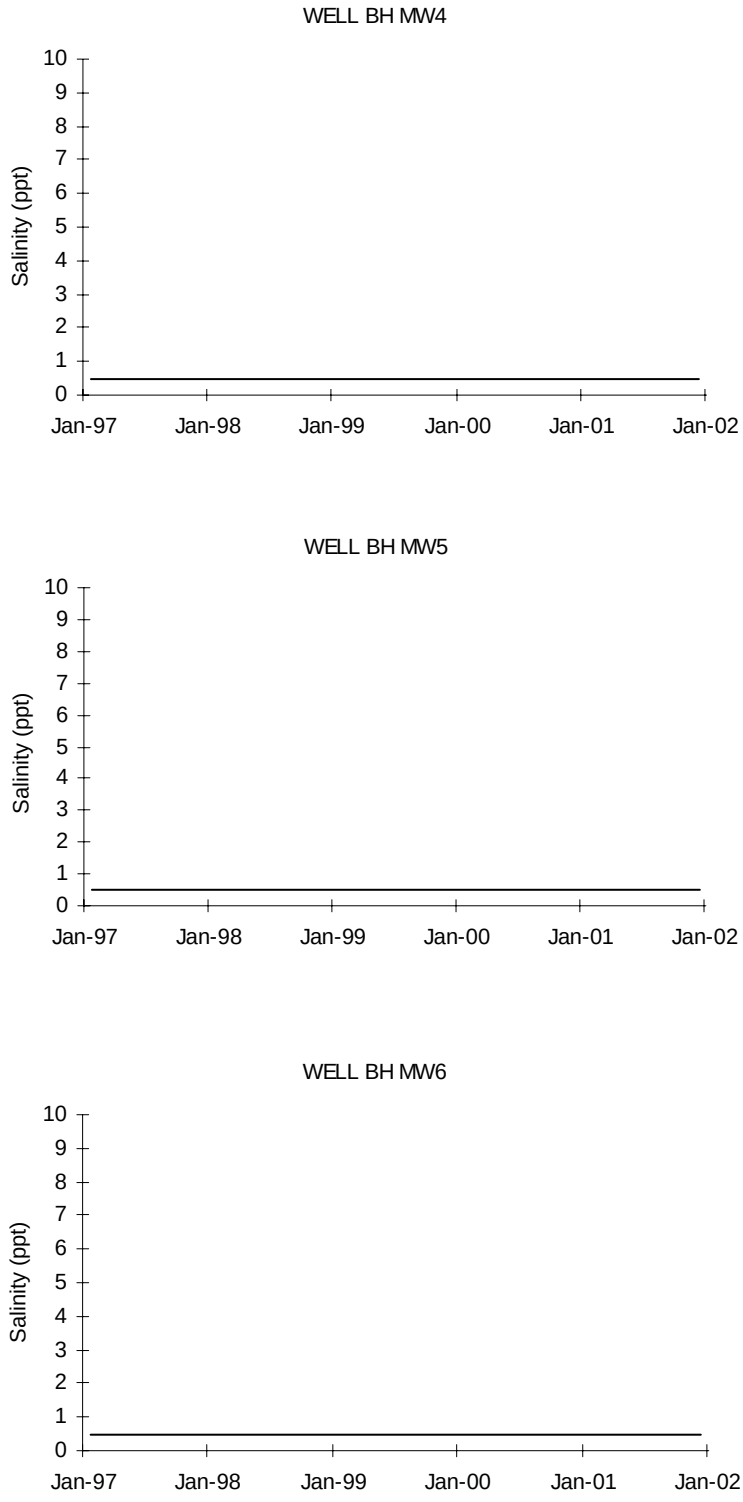


Figure 6-5. Big Hill Ground Water Monitoring Well Salinities (continued)

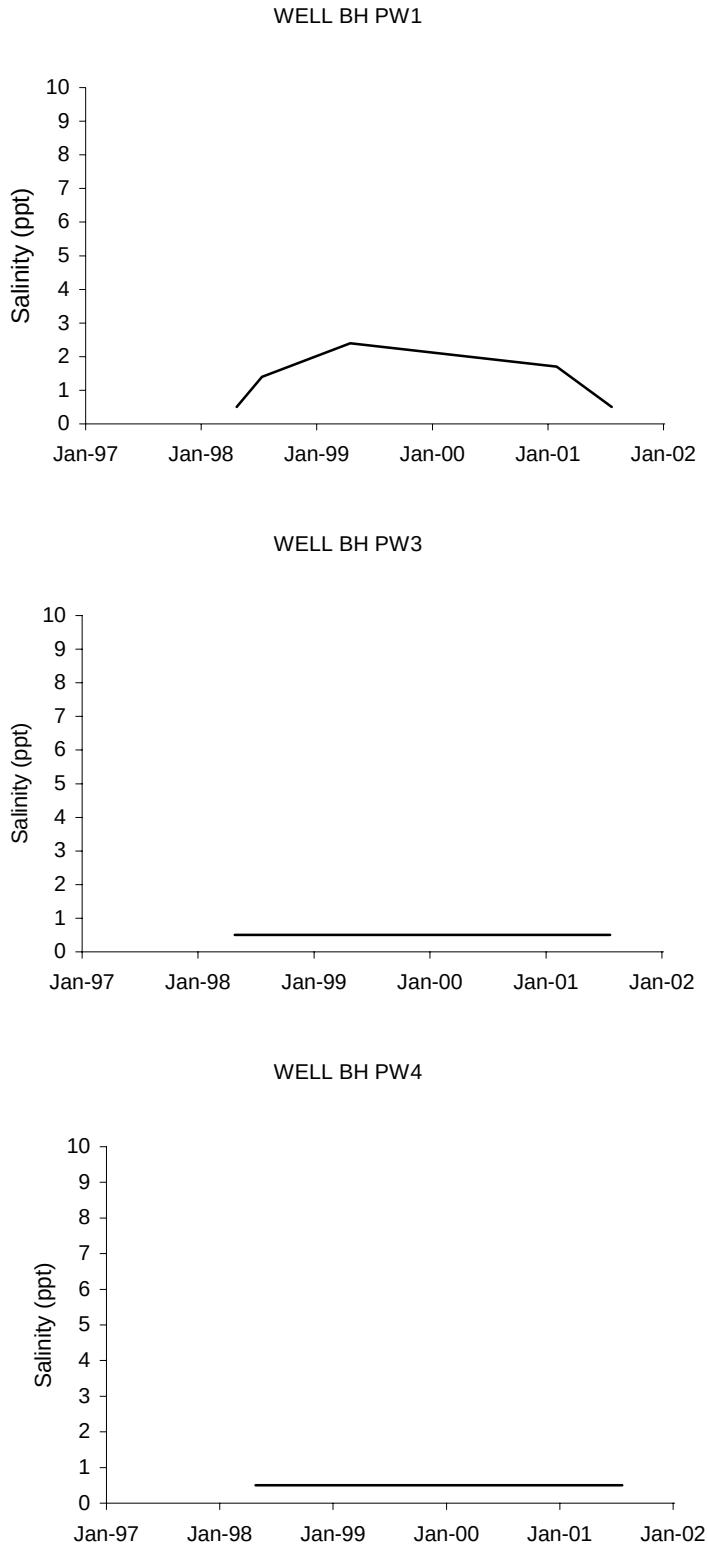


Figure 6-5. Big Hill Ground Water Monitoring Well Salinities (continued)

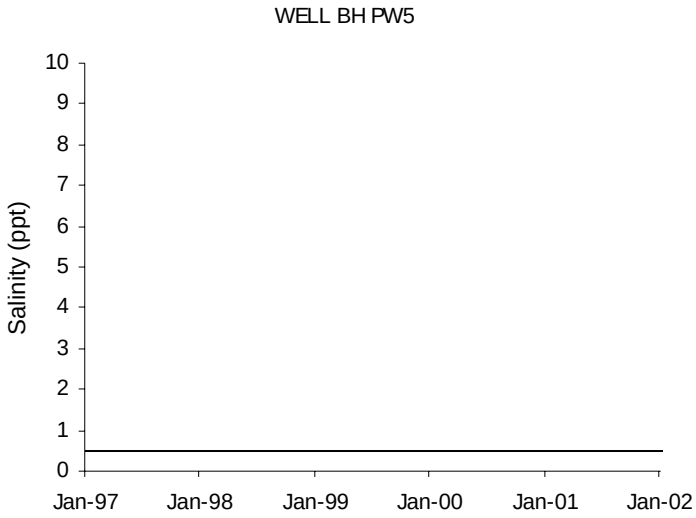


Figure 6-5. Big Hill Ground Water Monitoring Well Salinities (continued)

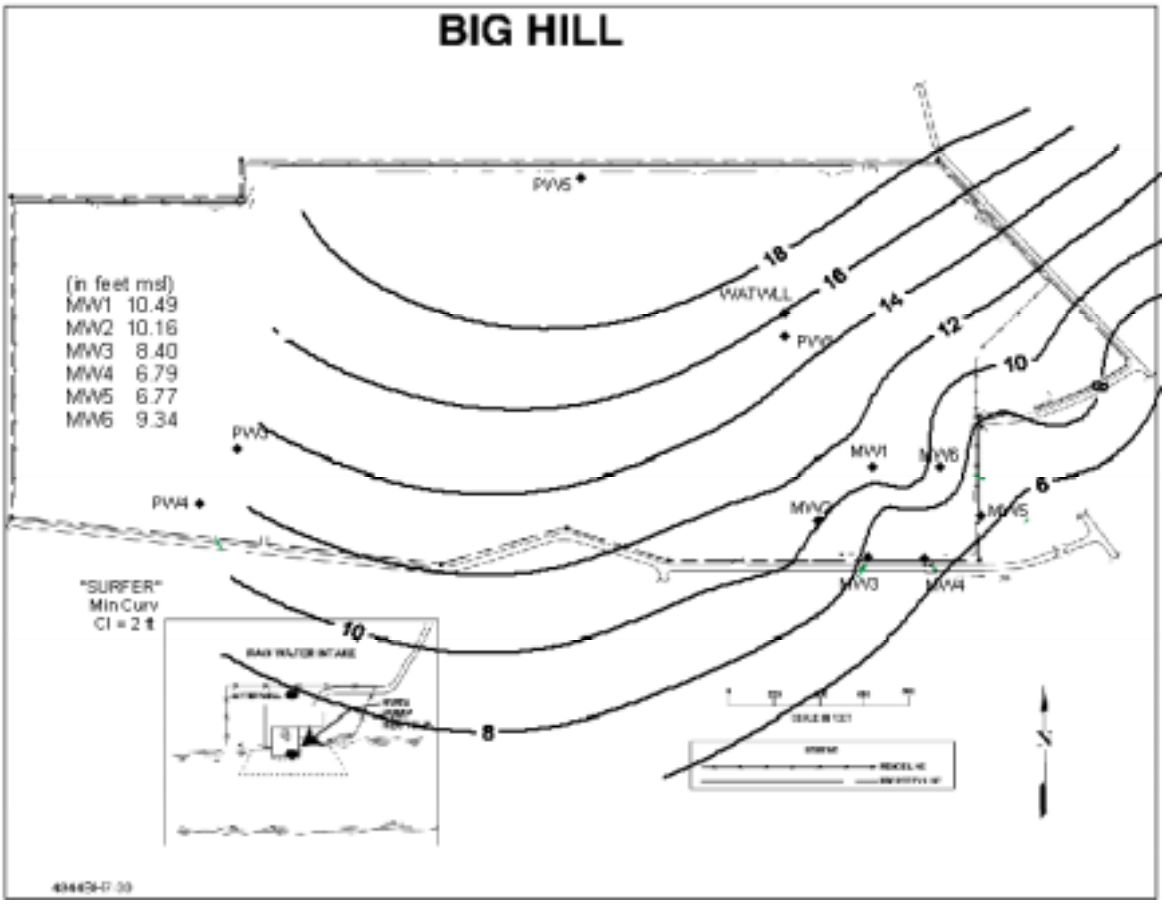


Figure 6-6. Big Hill Shallow Ground Water Contoured Elevations Summer 2001

The interconnected pond system is composed of three contiguous Hypalon-lined ponds, of which two have a protective concrete topcoat. All three have an under drain 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 until the last monthly sample obtained in 2001 for well BH MW2. Salinity of ground water from all wells had remained at or below the detection limit (1 ppt) of the salinity meter used until the 2.9 ppt measured on the sample taken in December for BH MW2.(Figure 6-5). All observed values that are below the established detection limit are evaluated as one-half the detection limit for statistical calculations. With the exception of the 2.9 ppt at BH MW2 discussed below, 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 based on observed gradients and the soil permeability information developed from the Verification Well Study of 1996.

This year we are presenting water level measurements contoured from the summer timeframe. Figure 6.6 presents the contours of data obtained on a date in late July. The gradients and flow direction remain very similar to the spring contours from 2000. In the vicinity of the brine storage pond (wells MW1 through MW6) the flow is southeasterly. The overall basic shallow flow regime mimics the ground surface and appears to moving radially off the underlying salt dome structure.

The single salinity “show” of 2.9 ppt occurring at well BHMW2 may be interpreted as a first arrival of some impact or an ephemeral spurious result. This well is, and has historically remained, on the up gradient flow side of the brine storage operations. A further up gradient source of salinity is indicated and has been located in the form of a below ground pipeline leak that was discovered, reported, and remediated in 1990. This 90-barrel leak was repaired and the salty soils over excavated. Obviously remnant residual salt effects spread into the shallow water-bearing zone from this point source and the travel time closely matches the expected estimated arrival time at BM MW2. This occurrence is to be monitored closely in the field and compared to historical information. Because the pond operations are down gradient from this well and because an historic up gradient brine release had occurred the ongoing brine storage pond operations are not considered the source of the elevating salinity passing this monitored position. In addition, the salinity values measured are too low for saturated brine impacts and the pH measured is much too low for the pond to be considered the source.

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 salt dome.

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.

The wide salinity fluctuations previously observed in the graphs occurring prior to the year 1997 have been moderating due to the implementation of a site-wide sampling methodology change. 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. The current 5-year trending window covering 1997 through 2001 for the first time covers only low-flow method sampling data. The resulting data trending graphs are now believed to more accurately reflect the site’s ground water conditions.

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

After the overall step change in salinity evident back in 1995 at the paired wells BM MW1S and BM MW1D, which was possibly related to the change to a modified low-flow sampling method, a decidedly consistent and similar freshening trend is now noted in both zones at this location.

High salinity measurements (>20 ppt) observed in the shallow zone near the SOC (BM MW5) and in the deep and shallow well pair near the maintenance building (BM MW2S and BM MW2D) appear to be stable or just slightly decreasing over the long term and not indicative of any significant or noteworthy recent releases or events. Salinity observed in the uncontaminated (<20 ppt) deep and shallow well pair at the northwest corner of the site (BM MW4S and BM MW4D) reveal an overall flat or slightly decreasing five year trend below 10 ppt; each showing very minor inconsequential fluctuations for CY 2001.

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 primarily affected by the domal up thrusting 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 has a bit more of an easterly component over the majority of the site

resulting in an overall northeasterly flow direction (see Figure 6-10, Deep Ground Water Zone).

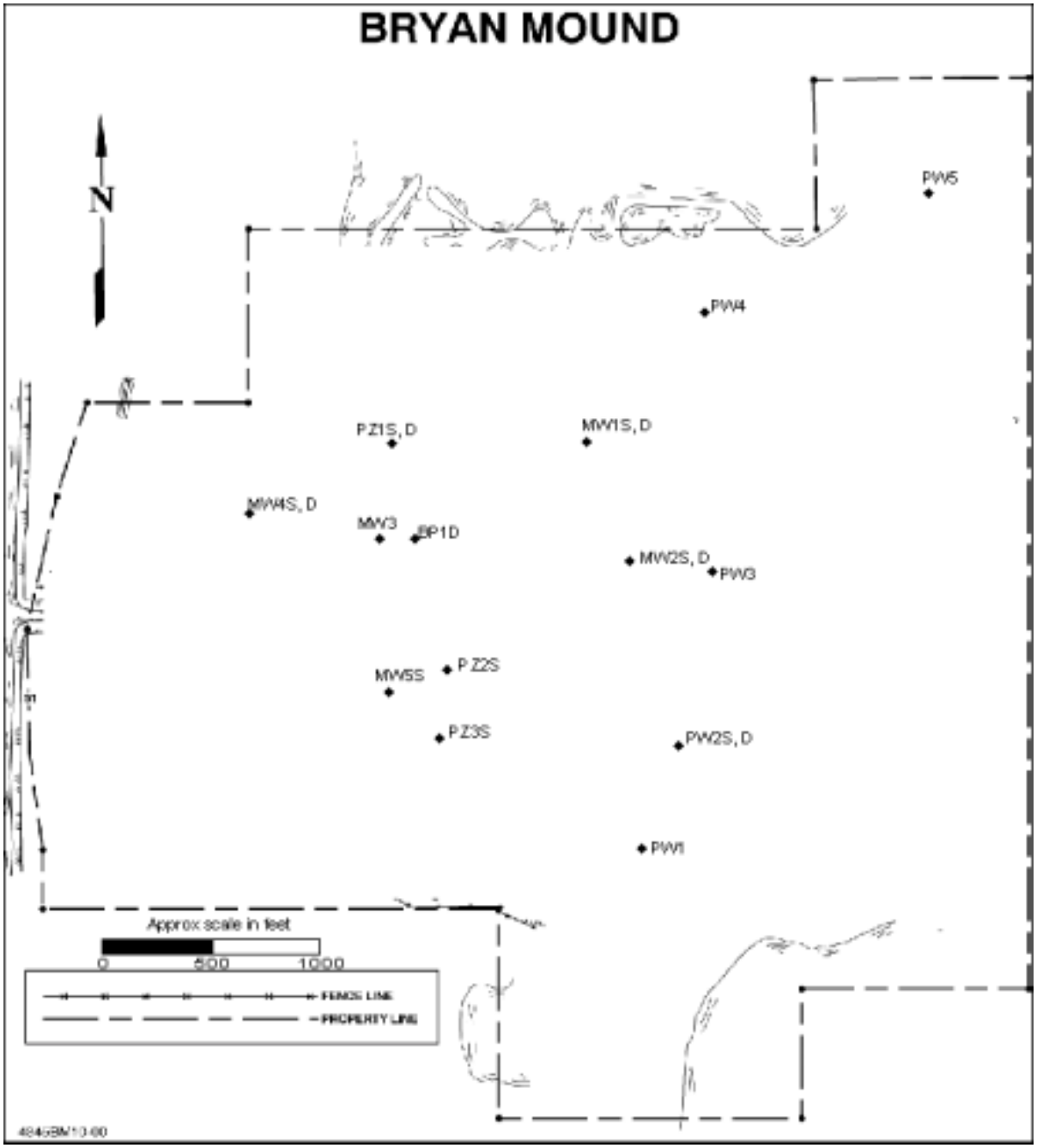
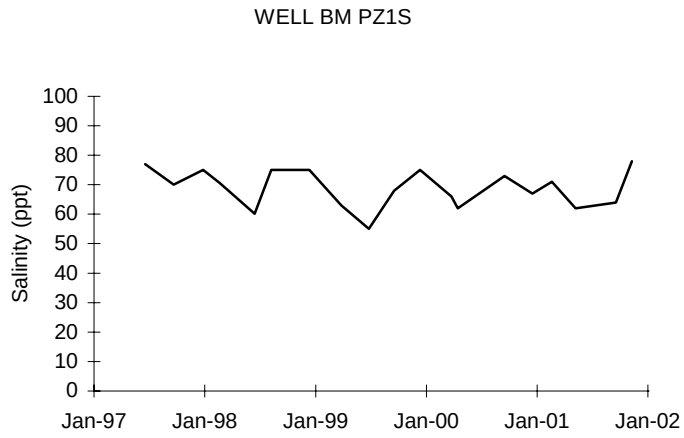
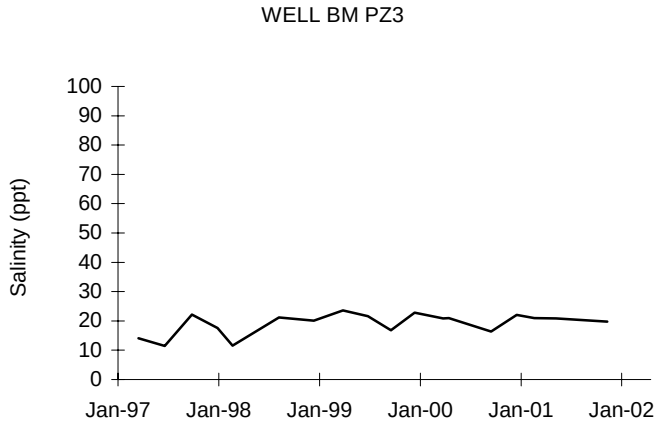


Figure 6-7. Bryan Mound Ground Water Monitoring Wells
(Deep and Shallow Shown)





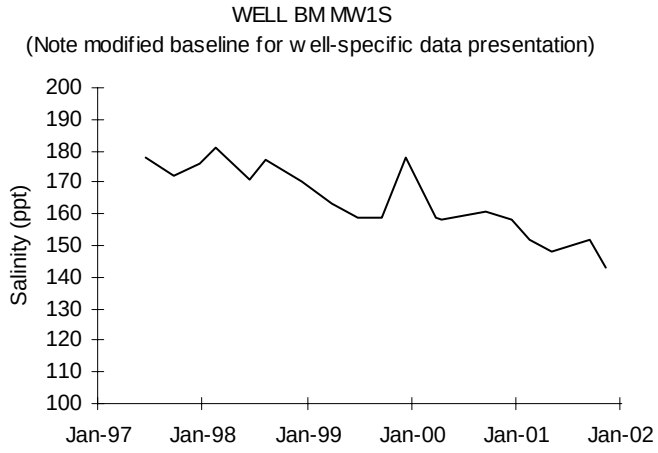


Figure 6-8. Bryan Mound Ground Water Monitoring Well Salinities

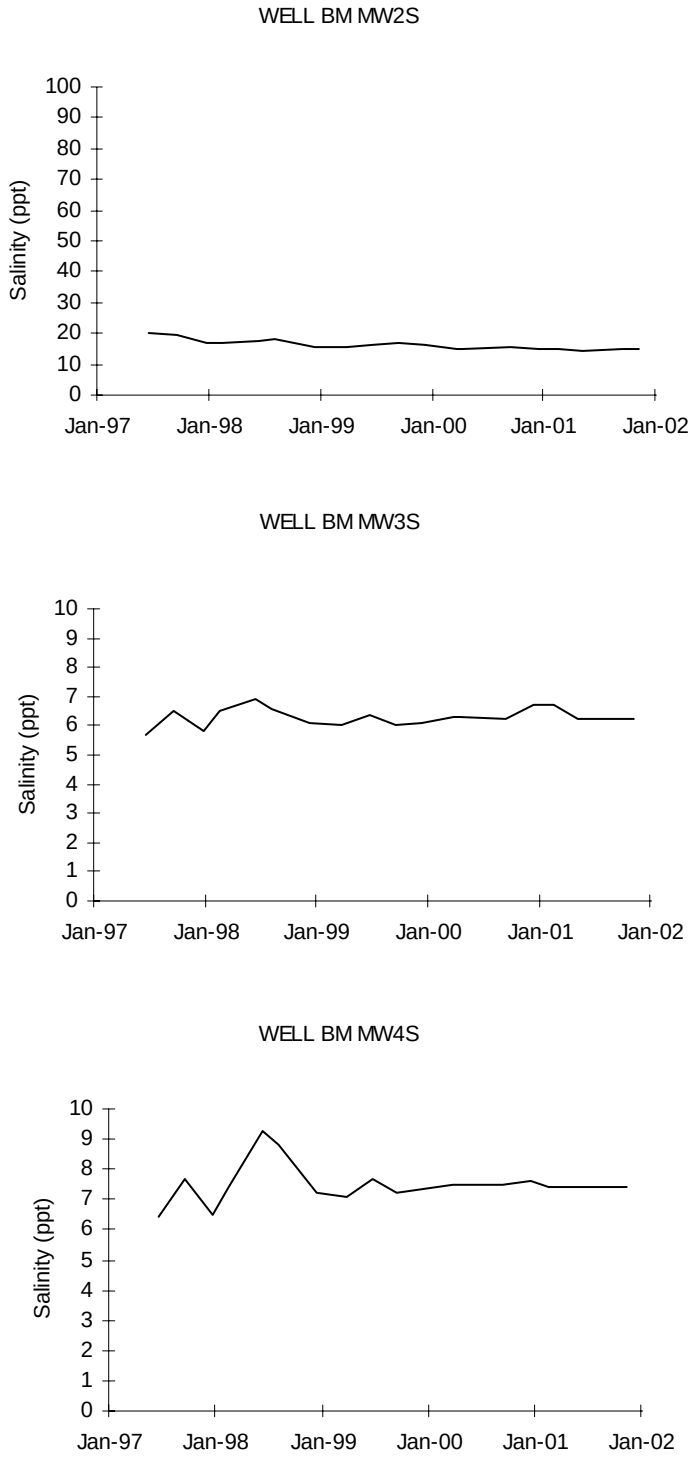


Figure 6-8. Bryan Mound Ground Water Monitoring Well Salinities (continued)

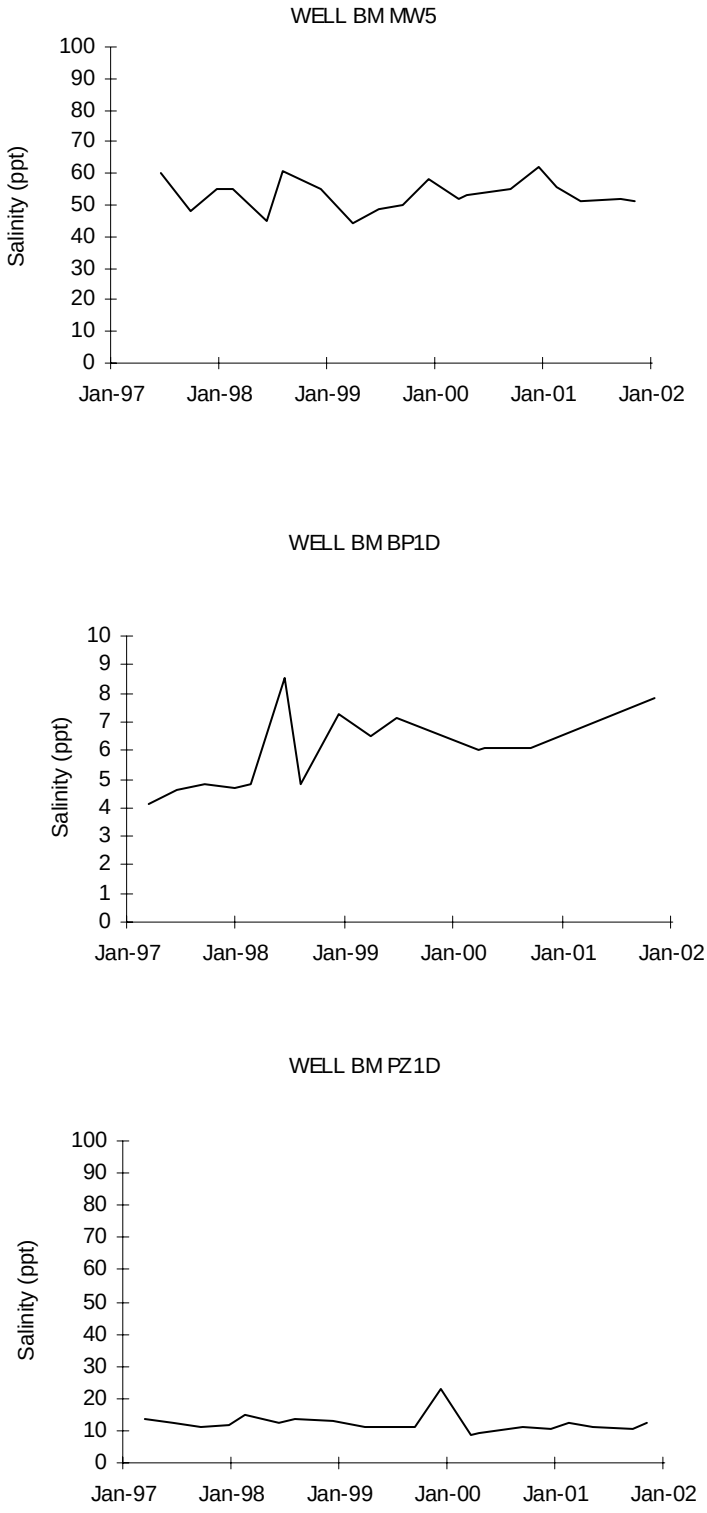


Figure 6-8. Bryan Mound Ground Water Monitoring Well Salinities (continued)

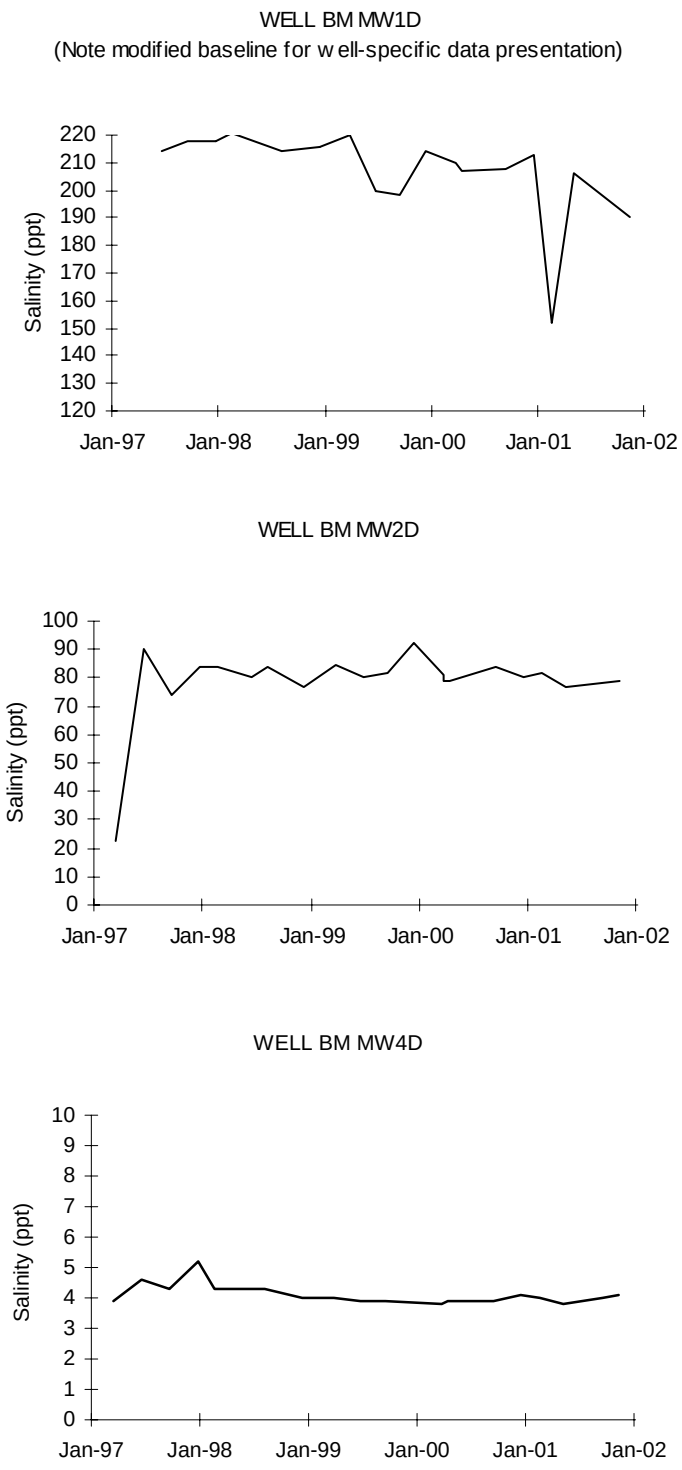


Figure 6-8. Bryan Mound Ground Water Monitoring Well Salinities (continued)

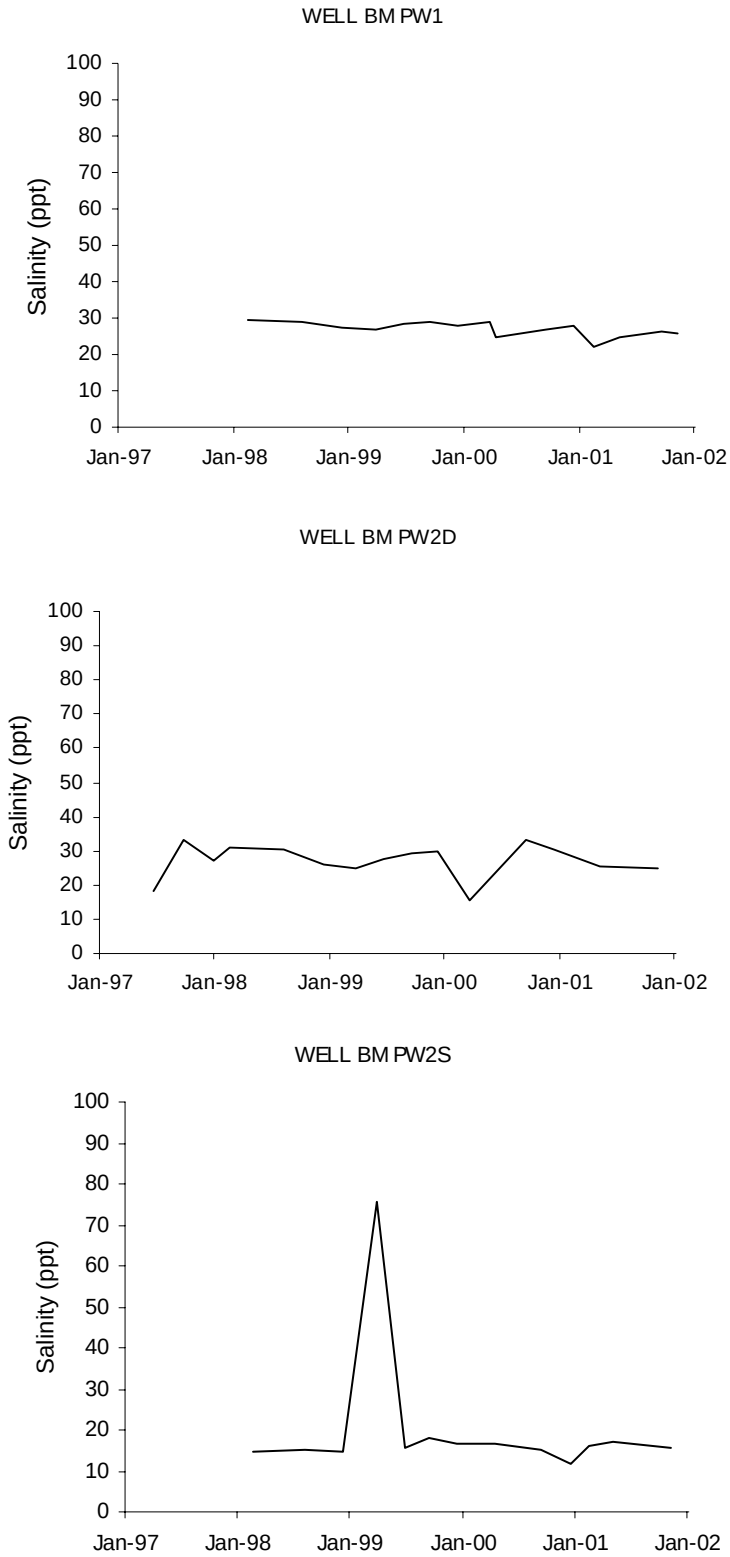


Figure 6-8. Bryan Mound Ground Water Monitoring Well Salinities (continued)

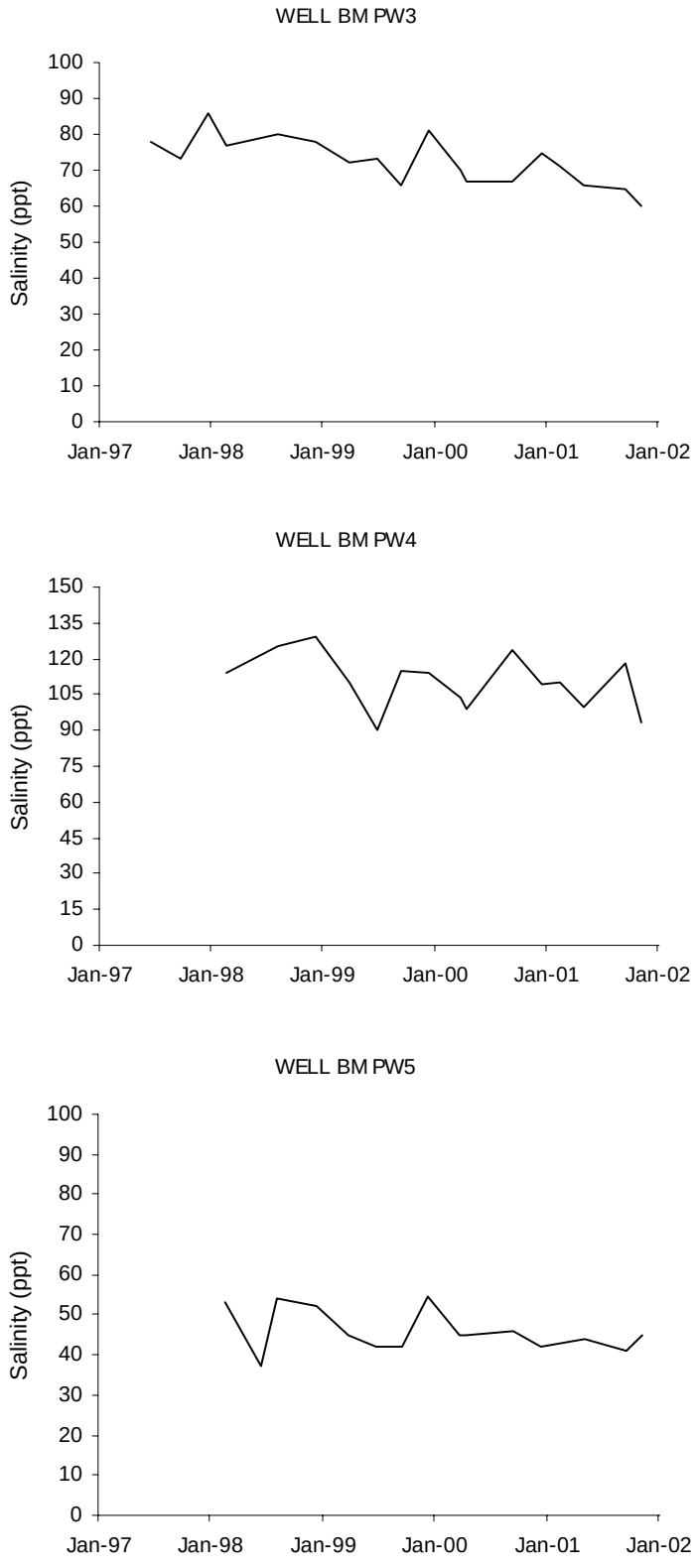


Figure 6-8. Bryan Mound Ground Water Monitoring Well Salinities (continued)

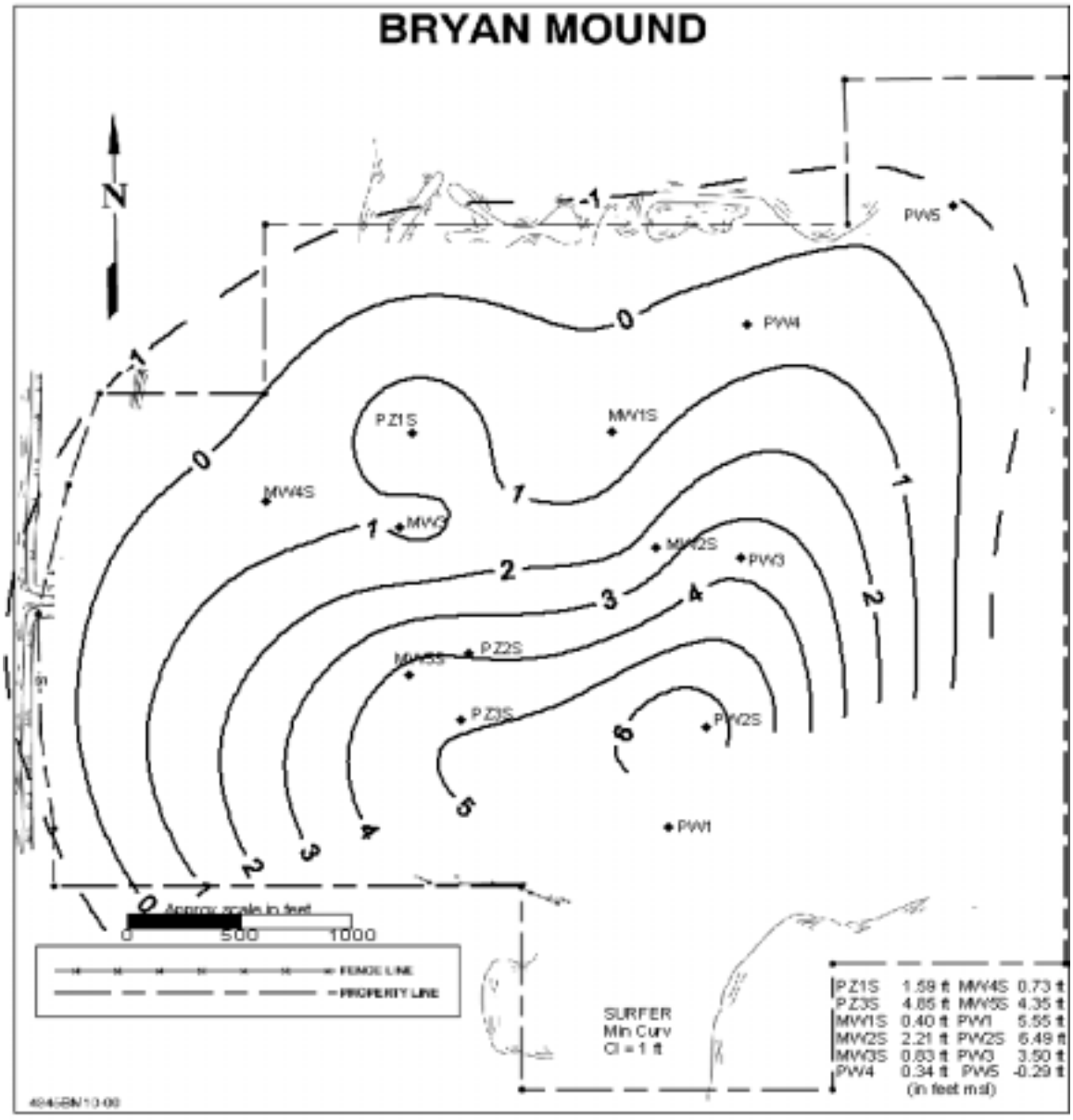


Figure 6-9. Bryan Mound Shallow Ground Water Contoured Elevations
Summer 2001

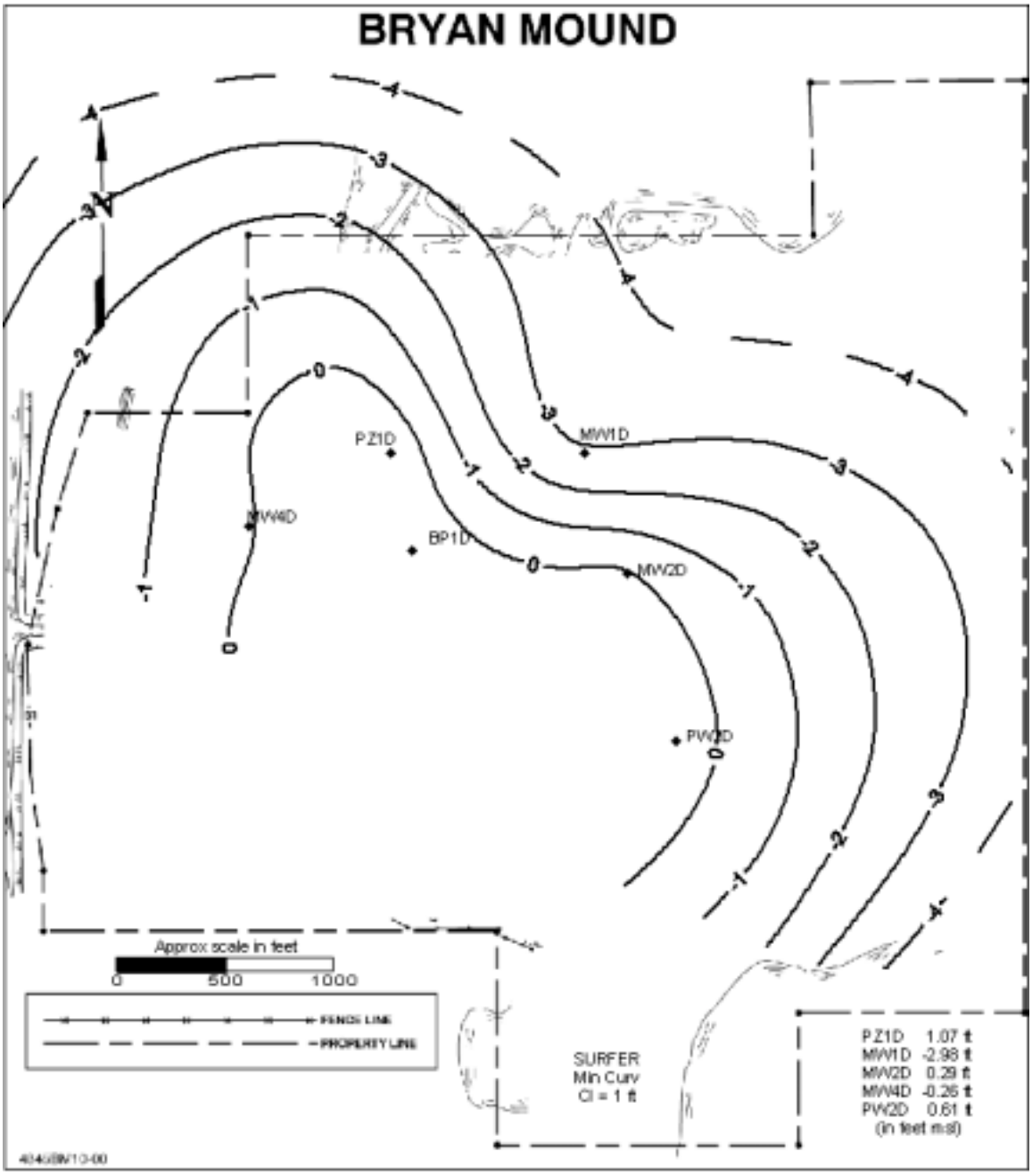


Figure 6-10. Bryan Mound Deep Ground Water Zone Contoured Elevations
Summer 2001

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 water bearing zones known to exist off the flanks of the subsurface dome.

When contoured two major areas emerge where ground water salinity exceeds ambient conditions (>20 ppt) for the Bryan Mound site. 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, and then southward towards the center of the site and below the maintenance building already discussed. 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 and considerably smaller area lies southeast of the security operations center (SOC) adjacent to a closed anhydrite confinement area. The trending lines for the wells at each of these locations reveal a downward slope of freshening conditions (see graphs for BM MW1S; BM MW1D; BM MW2S; BM MW2D; and BM MW 5S.

Elevated salinity observed at shallow monitor wells since their installation, BM PZ1S, BM MW1S, and former BM BP1S, has speculated to be associated with SPR 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 very early (pre-1982 renovations) seepage from the pond, or from proximity to former (pre-SPR) 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. The shallow wells BM PZ1S and BM MW1S also both reveal downward or freshening trends now with the consistent sampling regimen.

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-SPR operations. The high salinity of the deep well may also indicate

limited up gradient 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 SPR 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 20 to 30 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 is a second area where elevated salinity ground water is found, adjacent to an anhydrite disposal area used during early construction and leaching phases of the site which may be a contributory source of brine contamination effects. The limited area of contamination is intercepted in the shallow zone by well BM MW5S and perhaps 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, especially at well BM PZ3S which is somewhat on the up flow side of the anhydrite.

A suspect brine contamination source south of the site’s maintenance building may be producing another area of elevated salinity. A definite source has not been identified or associated

with any known historical SPR operations or incidents, and therefore most likely 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 2001 with continuing improving quality. This area is masked when contoured, falling under the general "blanket" of the effects associated with the pre-SPR brining operations located in the north central portion of the site already described. This area may therefore be considered part and parcel of that historic saltwater release; being affected more by diffusion and dispersion rather than direct flow.

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 down gradient of the anhydrite disposal area and do not reveal any impacts at this time. With the advent of consistent sampling being depicted on the 5-year graphs we now find that only two wells BM PZ3 and BM BP1D reveal from trend lines slightly upward sloping and both are well below the arbitrary ambient 20 ppt cut-off suggested for this site.

6.4 SAINT 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 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 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 and approximately 25 gallons of an oil and water mixture were removed. 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 2001 at the other. Since the inception of the recovery operation, 3.8 gallons of oil have been removed from the monitoring wells.

Remediation efforts toward clean closure through biodegradation under the Risk Evaluation/Corrective Action Program (RECAP) are ongoing. The Risk Evaluation/Corrective Action Program (RECAP) became final on December 20, 1998, allowing site evaluation and corrective action efforts specific for the subject location. Management Option 1 (MO-1) in RECAP appeared to be applicable to this particular site. DOE requested and was granted approval from LDEQ to follow a proposed Corrective Action Plan according to the referenced Management Option. This prompted continued remediation and sampling efforts. In addition LDEQ

recommended the following steps be taken to assist in the remediation of this site.

1. Continue reduction of constituent (crude oil) concentration, toxicity, mobility, mass and volume to acceptable levels by monitored natural attenuation per section 2.12 (Monitored Natural Attenuation) of the RECAP.
2. Continue oil removal (if present) from the three monitoring wells at a frequency of once every six months until remediation goals are met.
3. Conduct total petroleum hydrocarbon (TPH) analyses on soil samples to be taken from the contaminated area once per year until TPH concentrations comply with the RECAP MO-1 limit.
4. Conduct gas chromatography (GC) analyses on oil removed from the three monitoring wells for the presence of light-end hydrocarbons to confirm the presence/absence of fresh oil once per year until TPH concentrations comply with the RECAP MO-1 limit.
5. Submit an annual report delineating oil/water volumes removed, analytical data, and applicable site activities to the LDEQ.

The U.S. Department of Energy (DOE) submitted a FY 2001 progress report for this activity to LDEQ that included results of sampling activities (Tables 6-1 and 6-2), and other site specific information. Based on the results, DOE decided to continue remediation efforts toward clean closure through the (RECAP).

Table 6-1. Parameters and Maximum Concentration Analyzed from the 1997, 2000 and 2001 Soil Sampling Efforts

Pollutant	RECAP MO-1 SOIL REQ (mg/kg)	JUNE' 97 Soil (mg/kg)	JUNE' 00 Soil (mg/kg)	MARCH 01 Soil (mg/kg)	DEC 01 SOIL (mg/kg)
acenaphthlene	39000	ND	ND	10.80	ND
anthracene	250000	ND	ND	18.00	ND
benzo(a) pyrene	0.36	ND	ND	16.50*	ND
chrysene	400	ND	ND	22.90	ND
dibenz(a,h) anthracene	0.36	ND	ND	2.71*	ND
indeno(1,2,3-cd)pyrene	3.6	ND	ND	5.13*	ND
benzo(k) fluoranthene	35	ND	ND	9.670	ND
benzo(a) anthracene	3.6	ND	ND	26.20*	ND
fluoranthene	3600	ND	ND	80.800	ND
fluorene	3100	ND	ND	5.3	ND
naphthalene	44	37.7	4.04	2.460	0.542
pyrene	2,700	ND	ND	63.90	ND
TPH - O	10,000	42,400*	3,120	772	361

* Concentration exceeds current RECAP requirement.
ND-Denotes not detected at or above the adjusted reporting limit

Table 6-2. Parameters and Maximum Concentration Analyzed from the 1997, 2000 and 2001 Ground Water Sampling Efforts

Pollutant	RECAP MO-1 GROUND-WATER REQ (mg/l)	JUNE' 97 Ground Water (mg/l)	JUNE' 00 Ground Water (mg/l)	MARCH 01 Ground Water (mg/l)	DEC 01 Ground Water (mg/l)
acenaphthlene	0.54	46500*	ND	0.250	ND
anthracene	0.11	1680	ND	ND	.00014
benzo(a) pyrene	0.0002	ND	ND	.002	0.002*
chrysene	0.000038	ND	ND	.0031	ND
dibenz(a,h) anthracene	0.01	ND	ND	.0140	ND
indeno(1,2,3-cd)pyrene	0.000091	ND	ND	.00026	ND
benzo(k) fluoranthene	0.00091	ND	ND	.052	0.001*
benzo(a) anthracene	0.00000038	ND	ND	ND	.012*
fluoranthene	0.032	4350	ND	.220	.0041
fluorene	0.078	35,900*	ND	.039	.006
naphthalene	0.22	114,000*	0.483*	.300*	.0725
pyrene	1.4	1,580*	ND	ND	ND
TPH - O	24	ND	160*	223*	83.9*

* Concentration exceeds current RECAP requirement.
ND-Denotes not detected at or above the adjusted reporting limit.

6.5 WEEKS ISLAND

The Chicot formation is the principal aquifer in the Weeks Island area. The aquifer's potentiometric surface is generally at just below sea level upon the domal structure of Weeks Island and is found to slope slightly west southwesterly towards Vermilion and Weeks Bays in the southwest quadrant where the majority of the island is occupied . The fresh water bearing sand layers occurring above the salt provide usable water for the local area.

A sinkhole, found in May 1992 on Morton Salt Property, which could have potentially affected crude oil storage in the underlying mine, prompted further investigation and relocation of the crude oil stores and subsequent decommissioning of the Weeks Island site.

Enlargement of the sinkhole 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 final decommissioning.

The VWS studies here 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 presumably towards off take from a nearby shallow well used for cooling and make-up for the freeze wall chillers while they worked to maintain the subsurface freeze plug and additional current off take located further away to the southwest (see Figure 6-12, WILT 18 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 historical limits of detectability of 5 mg/l. As the former freeze wall was thawing, it was noted that the potentiometric gradient in this portion of the island's subsurface continued to flatten resulting in an incrementally decreasing ground water flow velocity in the sinkhole vicinity.

In February 2001 subsurface movement within the thawing freeze plug apparently pinched the PVC tubing of well 4270 used to obtain the temperature profile data. Later in early May, it was further determined that much, if not all, of the freeze plug’s ice had finally thawed to water (the chillers were shut off in August 1999). Rather abruptly on June 4, 2001, Morton Salt personnel returning

to work for the first Monday morning shift from the weekend, discovered the surface expression of the former sinkhole location.

Upon receiving news of the sinkhole's recurrence, DOE, DM and Sandia personnel were dispatched for closer scrutiny and subsequent field studies. Representatives of the LDNR were quickly notified of the event and a detailed observation program was developed and initiated.

The sinkhole was cordoned-off and backfilled with sand for safety precautions. A weekly program of physical observations of this and the remaining decommissioned DOE facilities on the island was begun which was later altered to bi-weekly and finally monthly frequencies as the year wore on. By the close of 2001, the subsidence rate had stabilized.

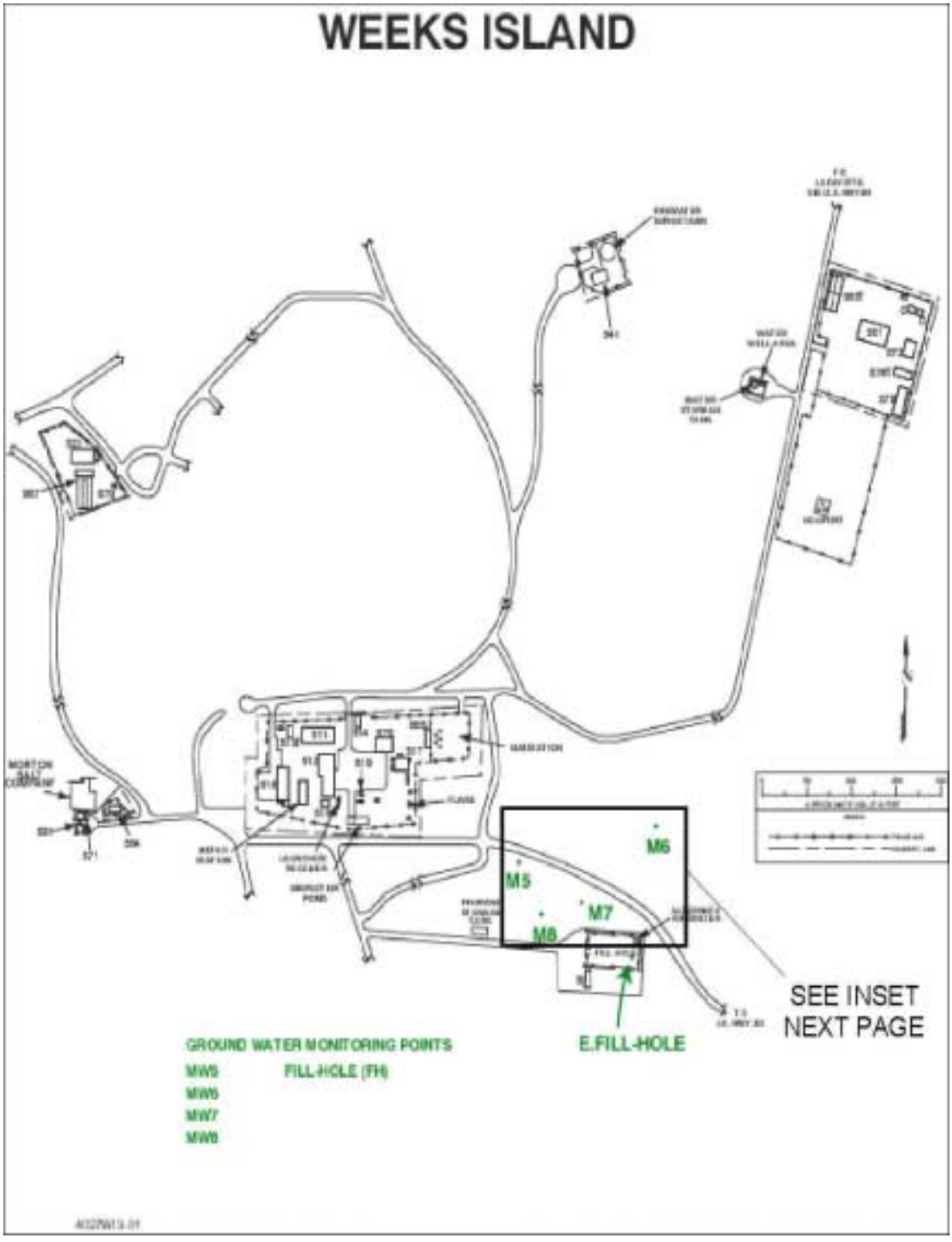


Figure 6-11. Weeks Island Long Term Monitoring

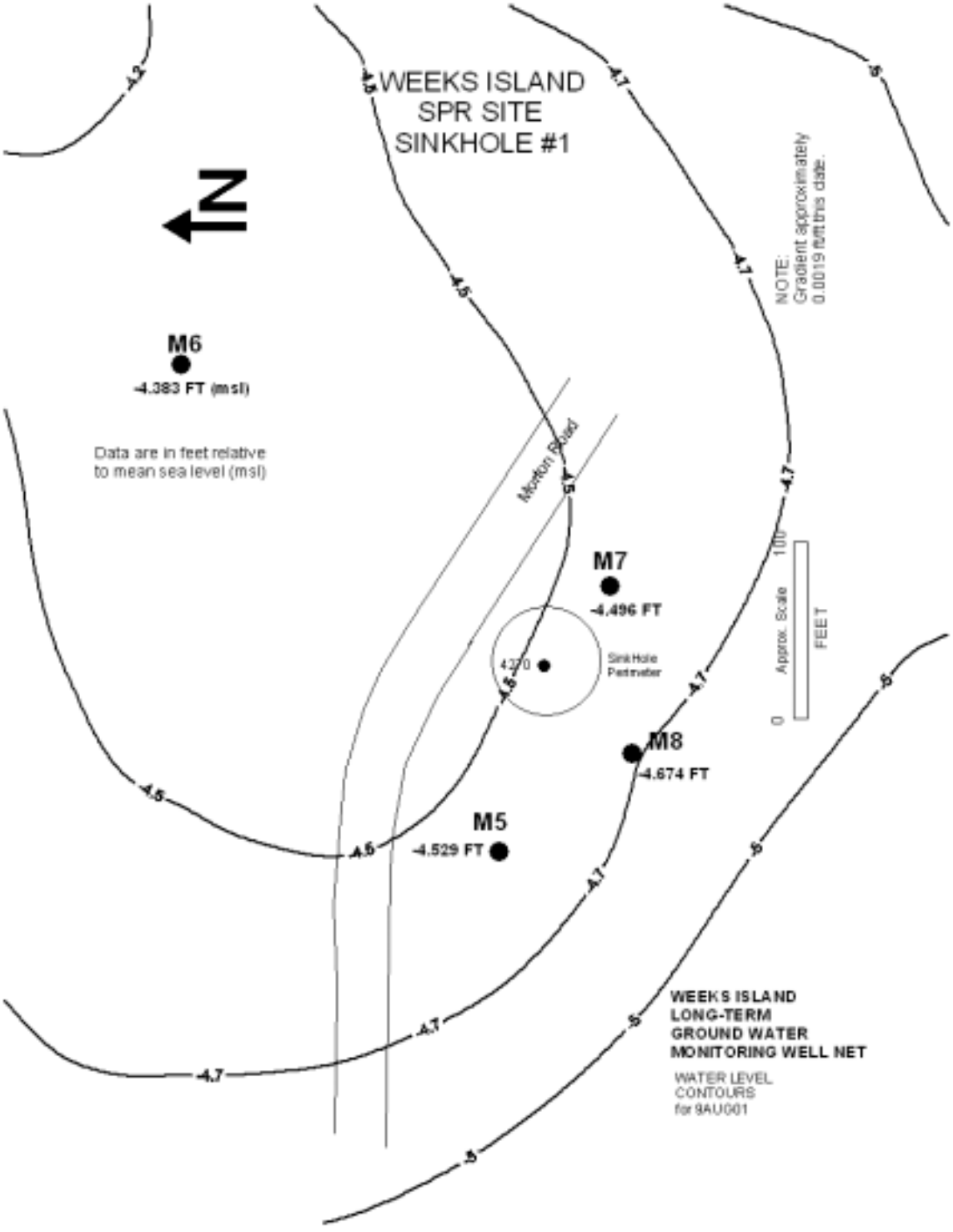


Figure 6-12. WILT 18 Flow Direction and Gradient Summer 2001

In addition to the ground water monitoring performed in the sinkhole area, fluid levels, flow data, and TPH tests are taken at the East Fill Hole (EFH) position. This structure was modified to accommodate pressure relief for the mine in the form of brine-bleed to the outside briney portion of the aquifer at the top of the salt dome. This mechanism was needed to adequately address the anticipate “mine-creep” from the decommissioned and brine backfilled storage chambers.

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 depth and 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. Areal limited zones found affected and monitored at West Hackberry are much nearer the ground surface, with a shallow zone at roughly 6 m (20 ft) bls and a 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 site’s 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 historical ambient conditions have been found highly variable across the site.

The 1991 Contamination Assessment Report and Remedial Alternatives Analysis identified the former brine pond as a source of ground water contamination. The decommissioned brine pond is one of five adjoining ponds comprising a pond system and solids management system that handled brine and anhydrite solids pumped from the storage caverns. As an abatement measure early in its history, the brine pond was cleaned, and obvious cracks in the liner's concrete weight-coat walls and floor were grouted to stop leakage. Ground water recovery around the pond was also increased at this time, which was to be maintained until a brine tank system could be constructed as a replacement. 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 were 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 bringing the site total up to thirty. Salinity data, as available, are depicted in the five-year graphs.

West Hackberry personnel began using the low flow technique for sampling all non-pumping wells in December 1995. Water level

measurements from both zones for the summer quarter timeframe of 2001 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 were still evident in both zones at the time the measurements were made in May 2001, even though the recovery pumping had ceased under state authority commencing April 1. With the shut-in of the recovery system a Year Long Evaluation Period began. In the shallow zone map from May (Figure 6-15) only one well-defined cone of depression remains and appears to be shrinking as this water-bearing zone begins to recharge. The contour map of the water levels in the underlying deep zone reveals a rather flat but pervasive cone of depression remaining under well WH P4D. The low permeability of the deeper zone routinely produces very deep draw down levels at the pumping wells, which in turn, produces unusually deep and pronounced cones of depression as an artifact of the contouring. The slow recharge to this lower permeability zone was monitored closely throughout the calendar year.

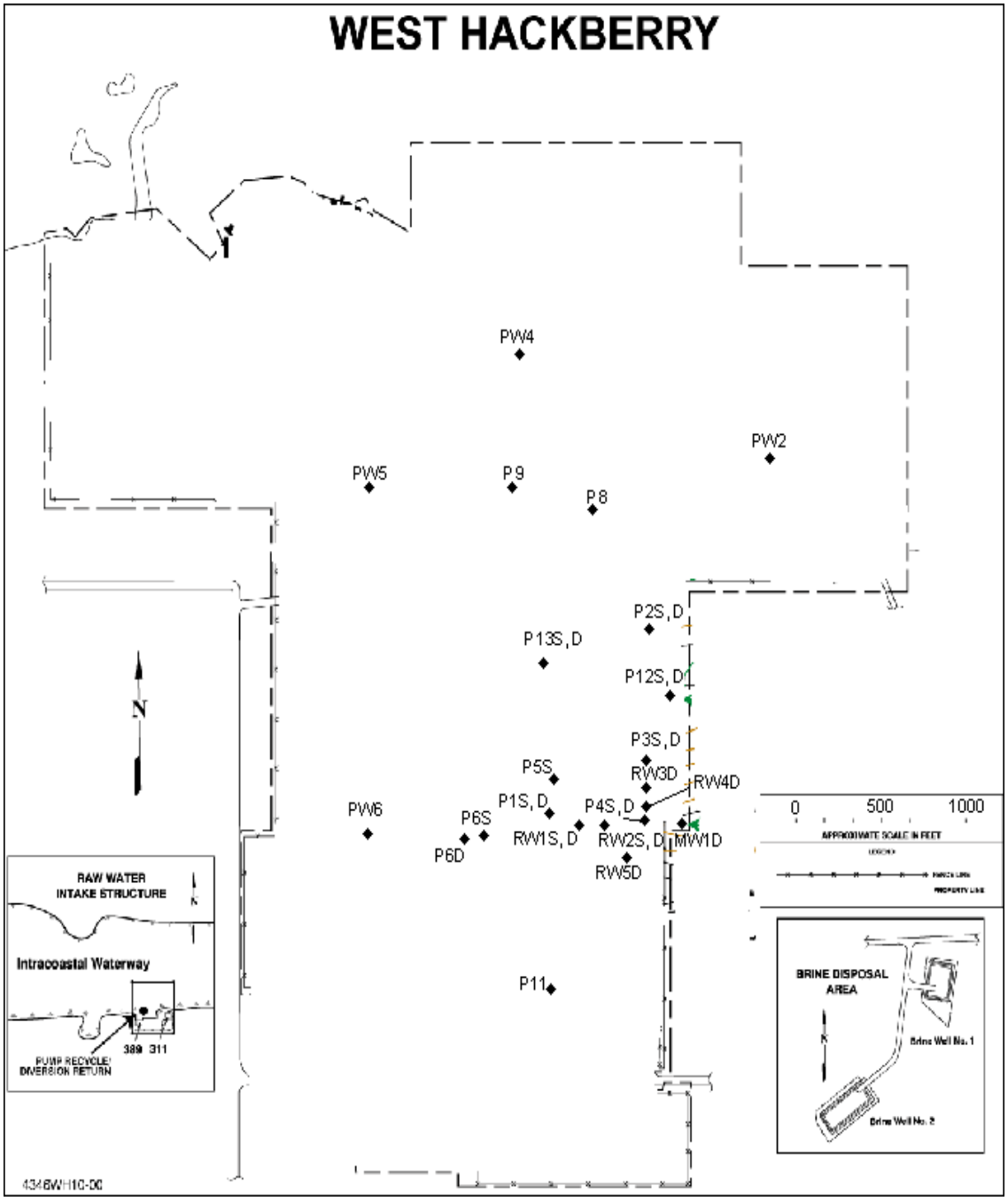


Figure 6-13. West Hackberry Ground Water Monitoring Wells
(Deep and Shallow Shown)

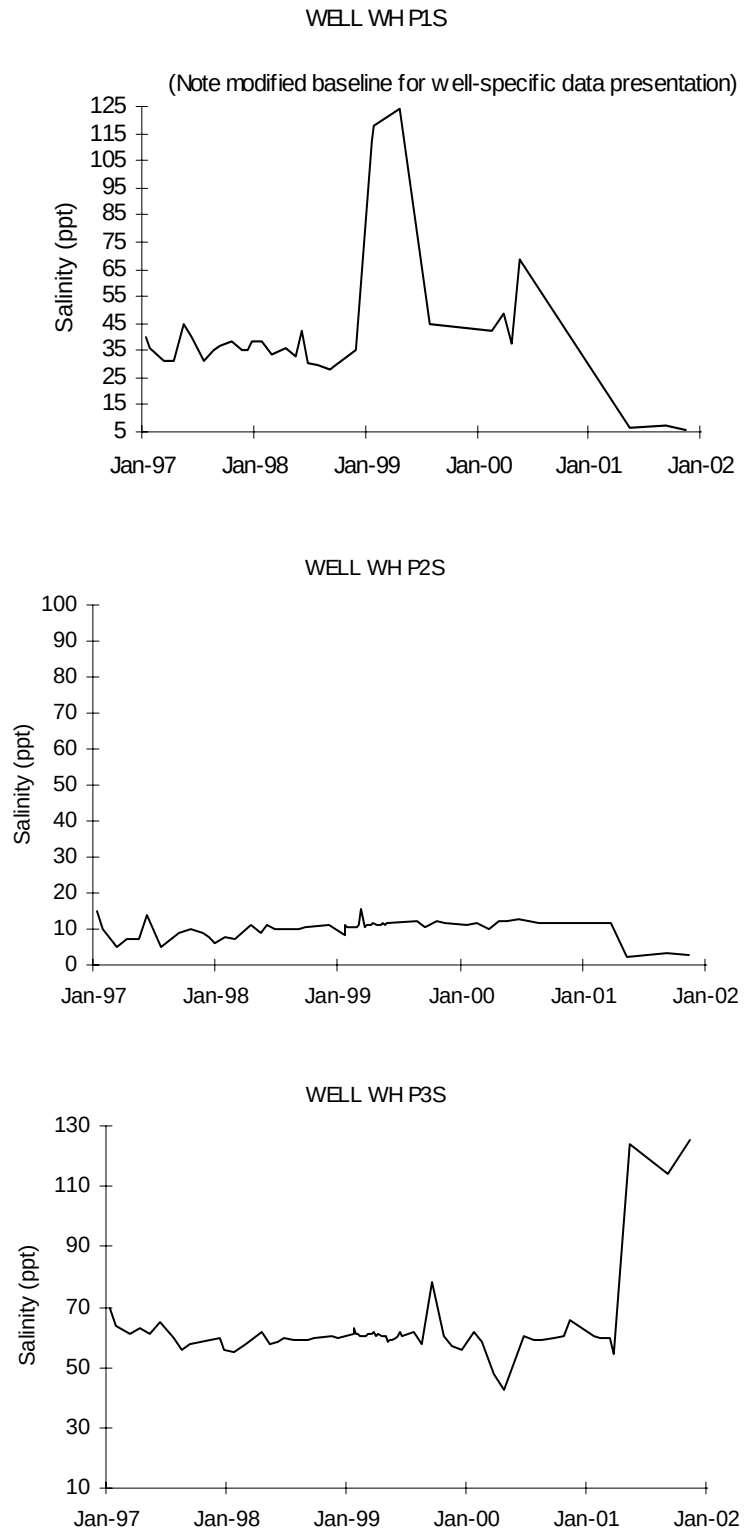


Figure 6-14. West Hackberry Ground Water Monitoring Well Salinities

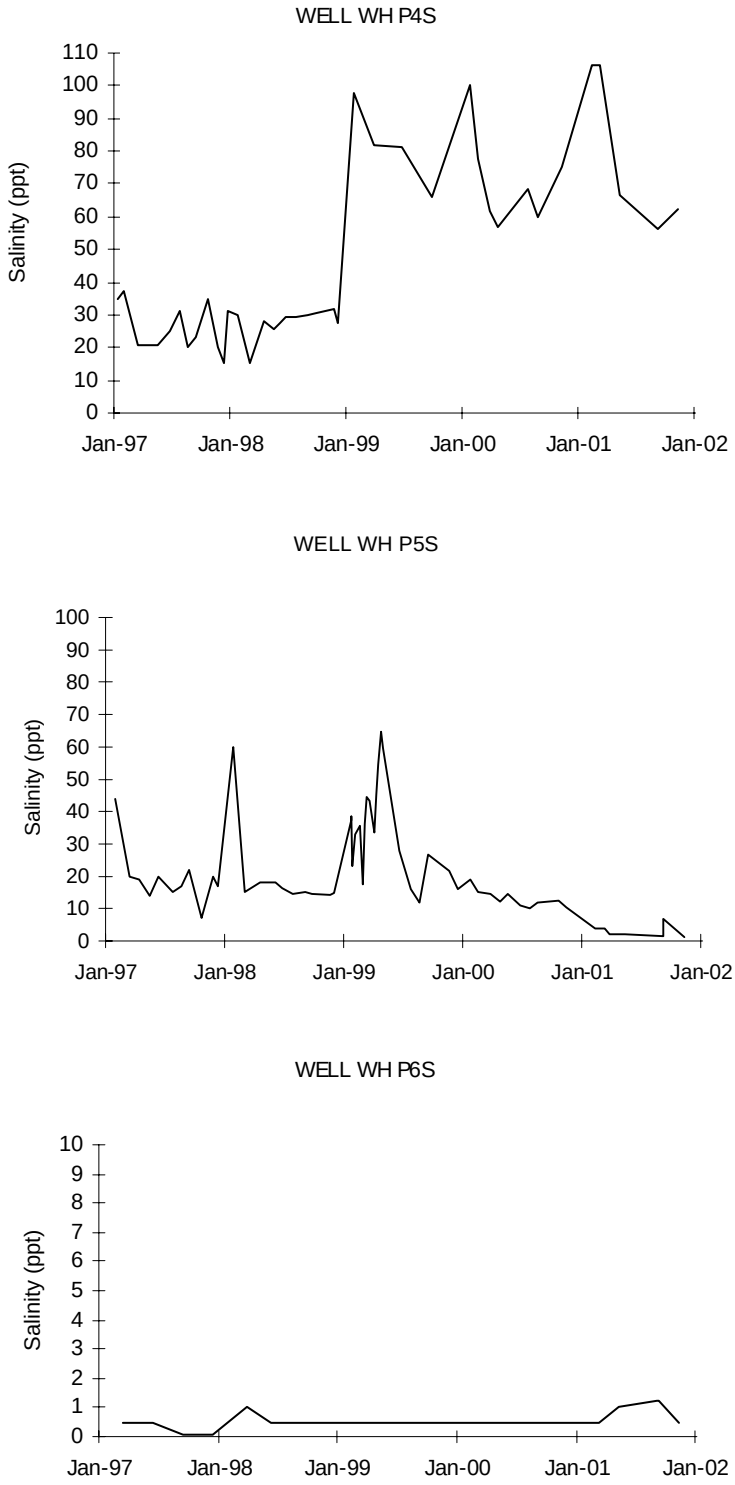


Figure 6-14. West Hackberry Ground Water Well Salinities (continued)

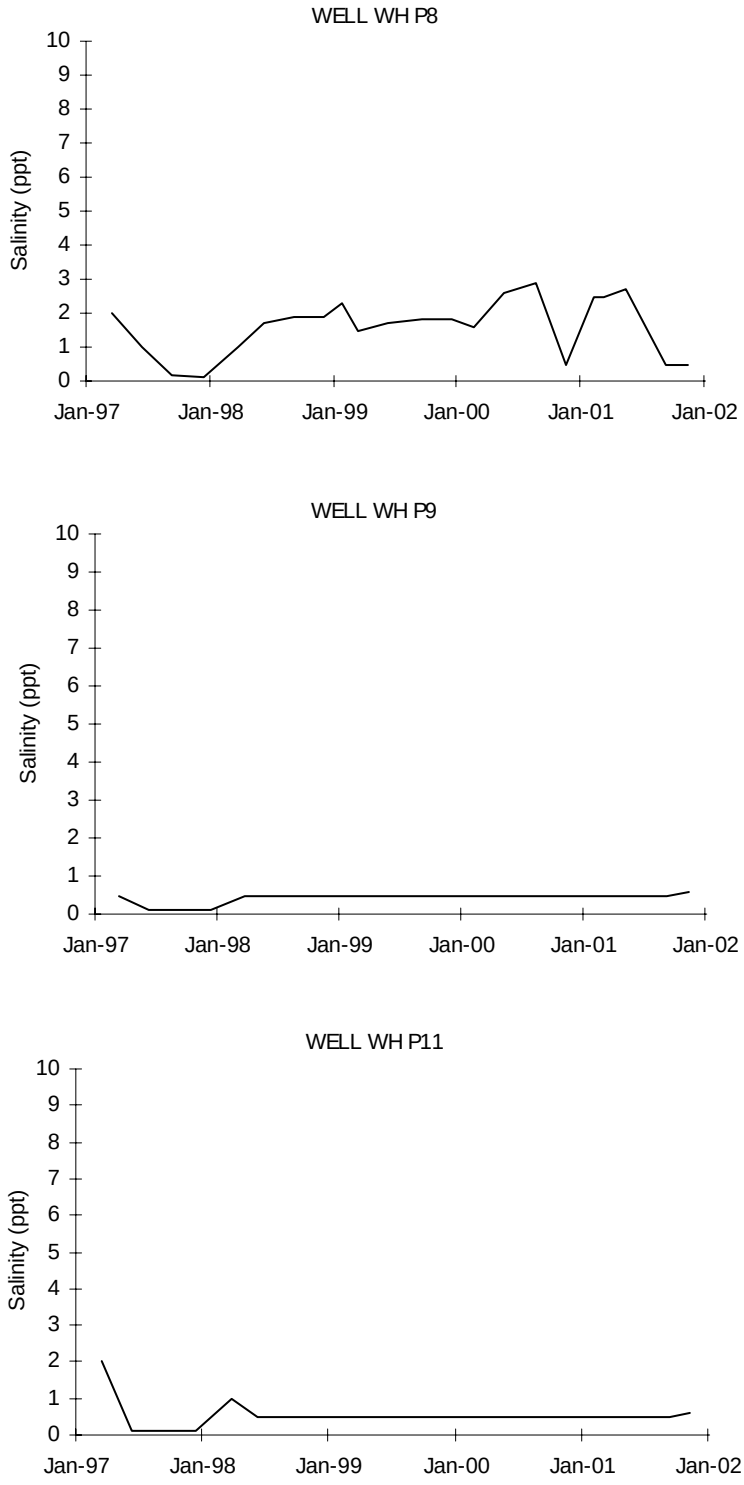


Figure 6-14. West Hackberry Ground Water Well Salinities (continued)

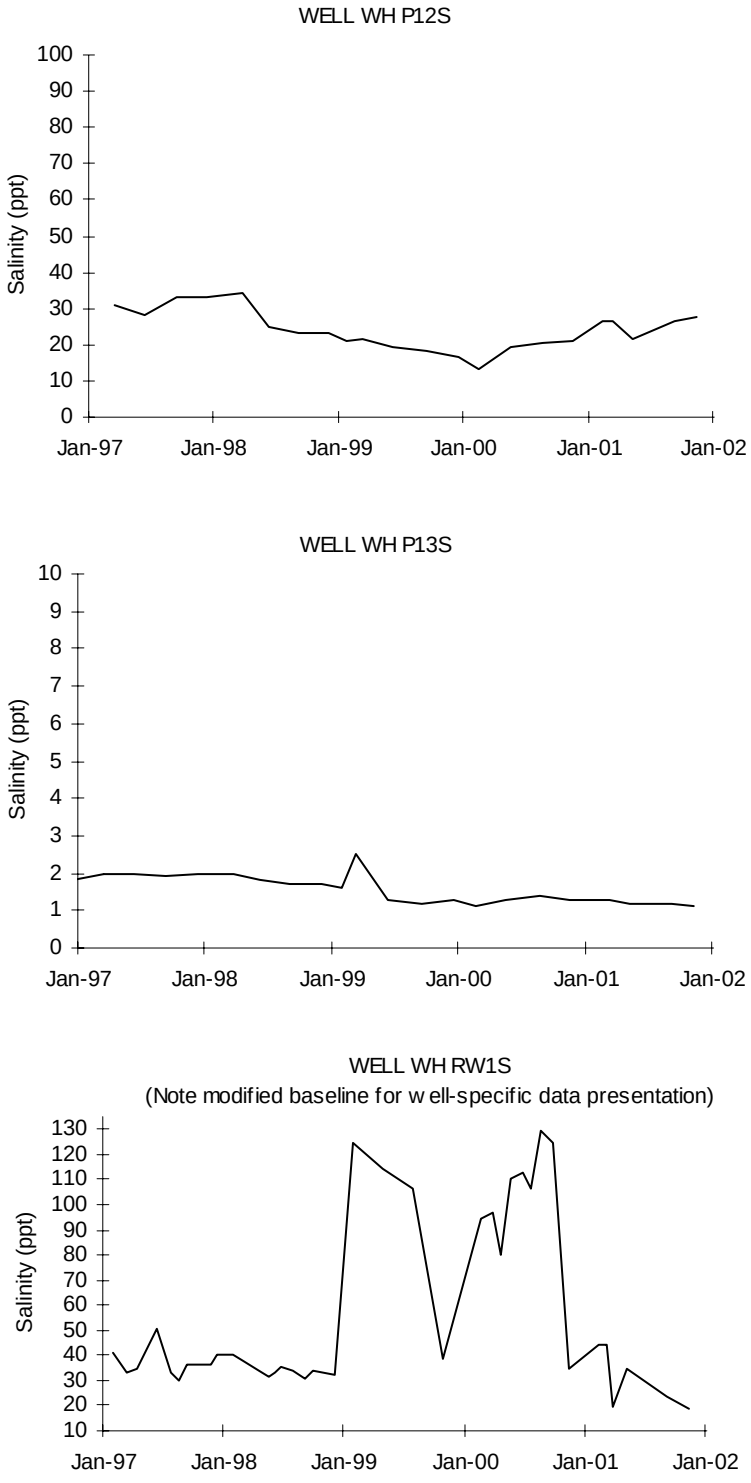
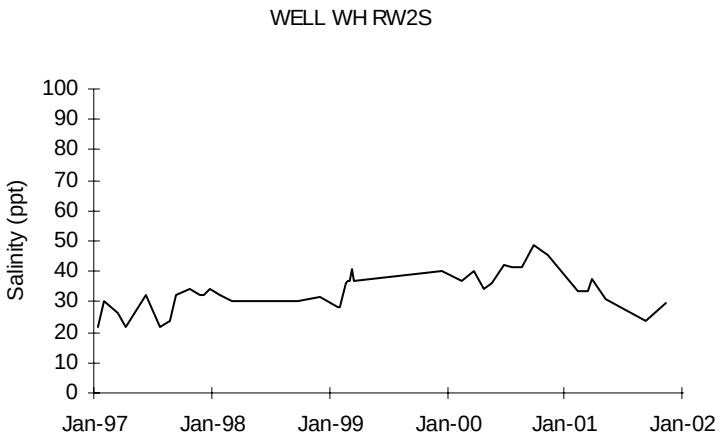
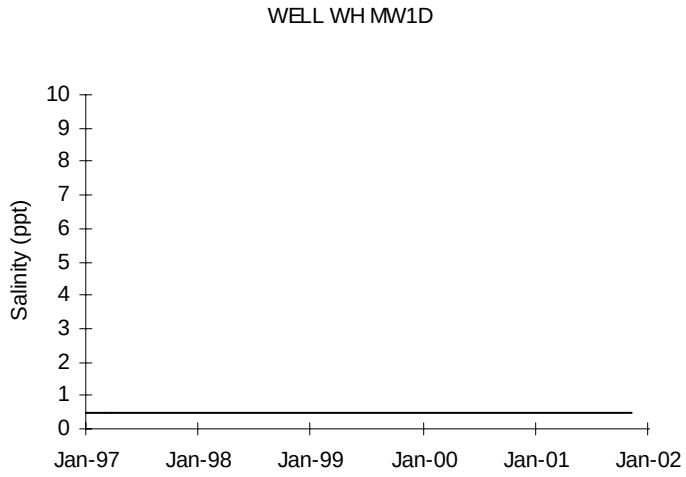


Figure 6-14. West Hackberry Ground Water Well Salinities (continued)





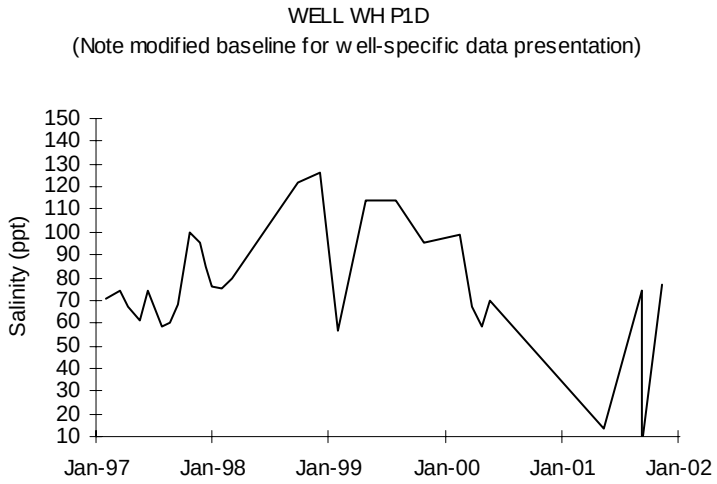


Figure 6-14. West Hackberry Ground Water Well Salinities (continued)

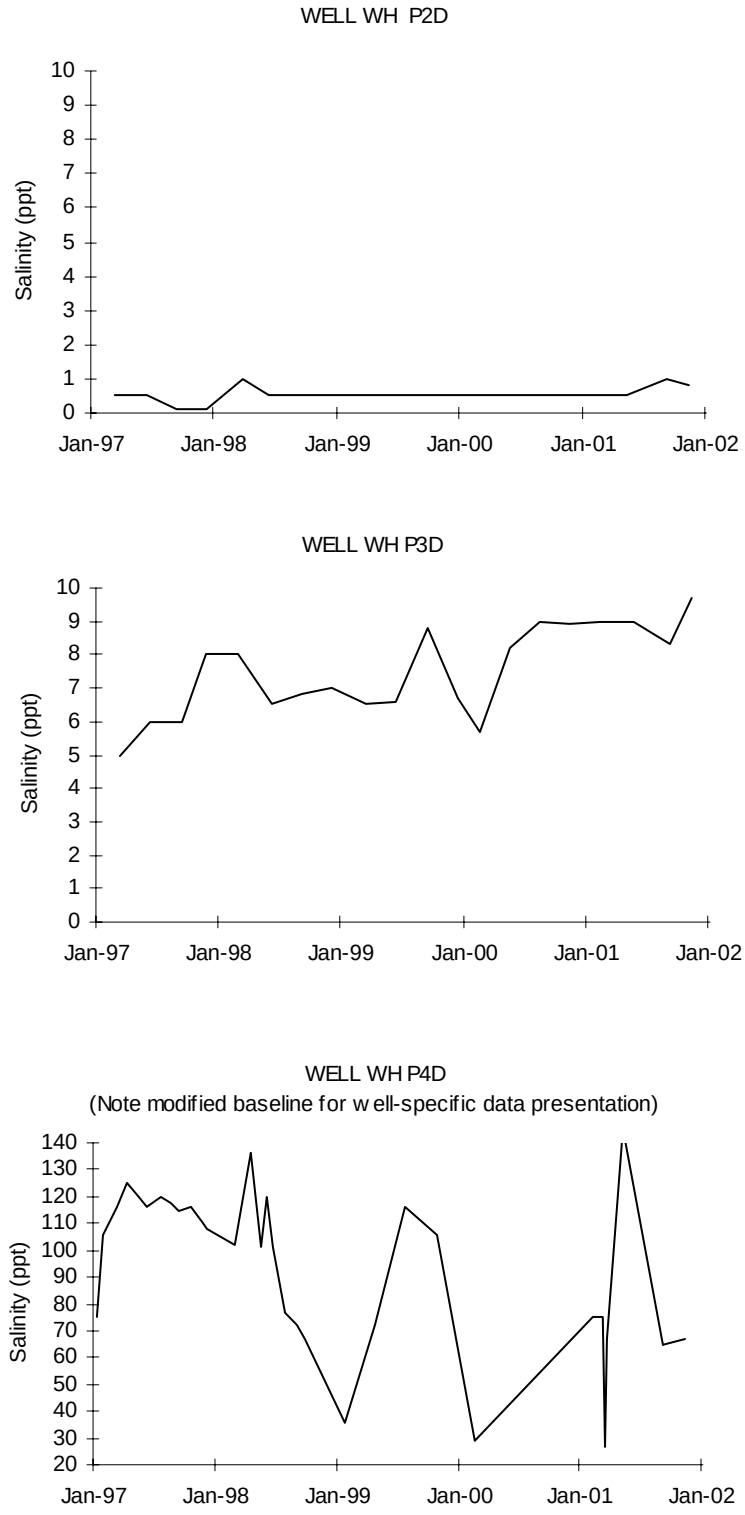
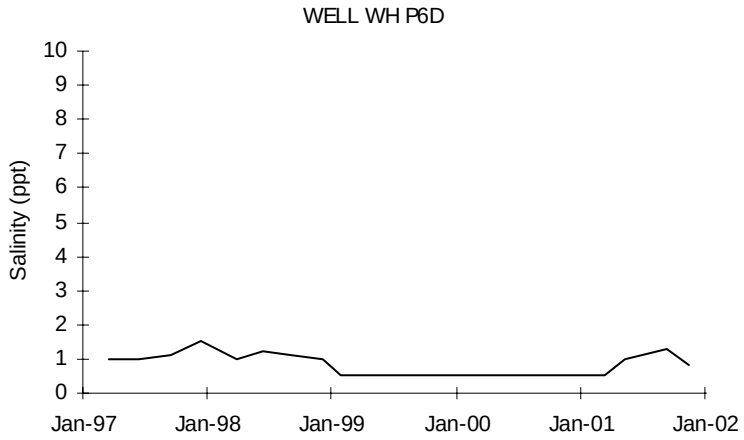
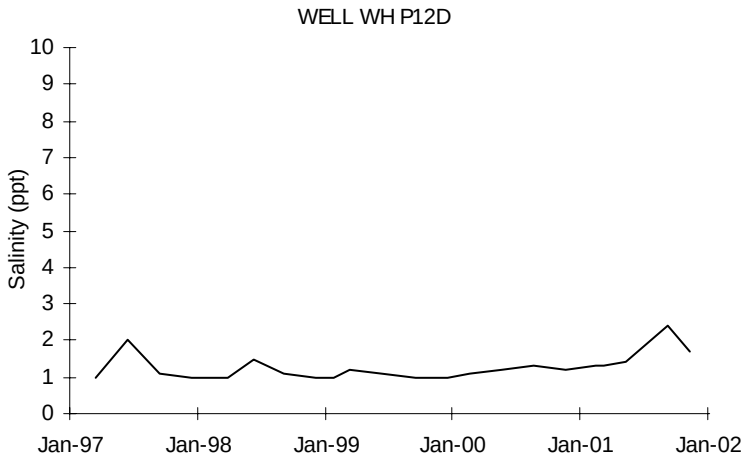


Figure 6-14. West Hackberry Ground Water Well Salinities (continued)





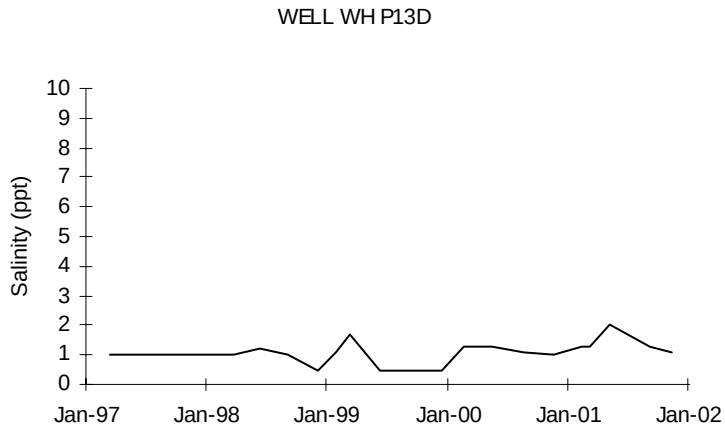


Figure 6-14. West Hackberry Ground Water Well Salinities (continued)

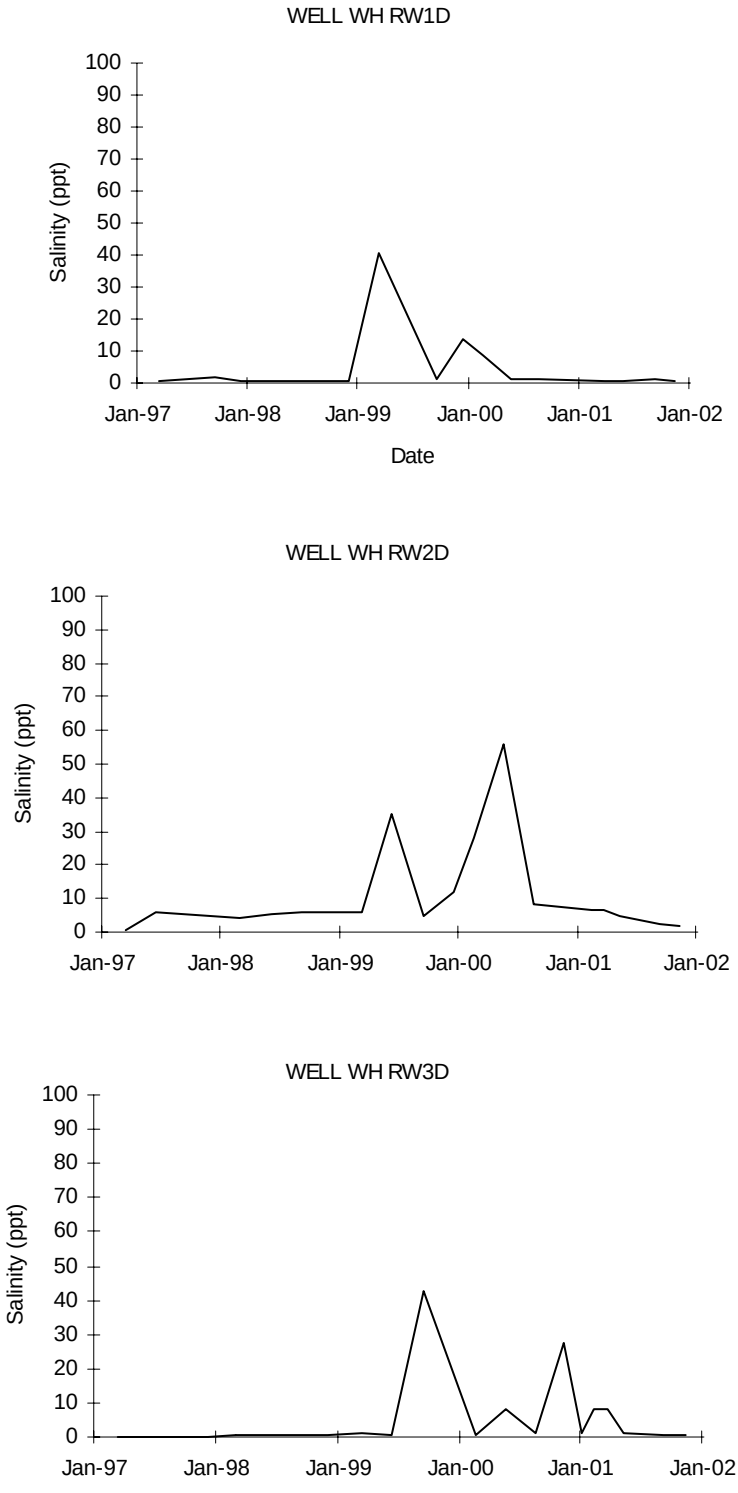


Figure 6-14. West Hackberry Ground Water Well Salinities (continued)

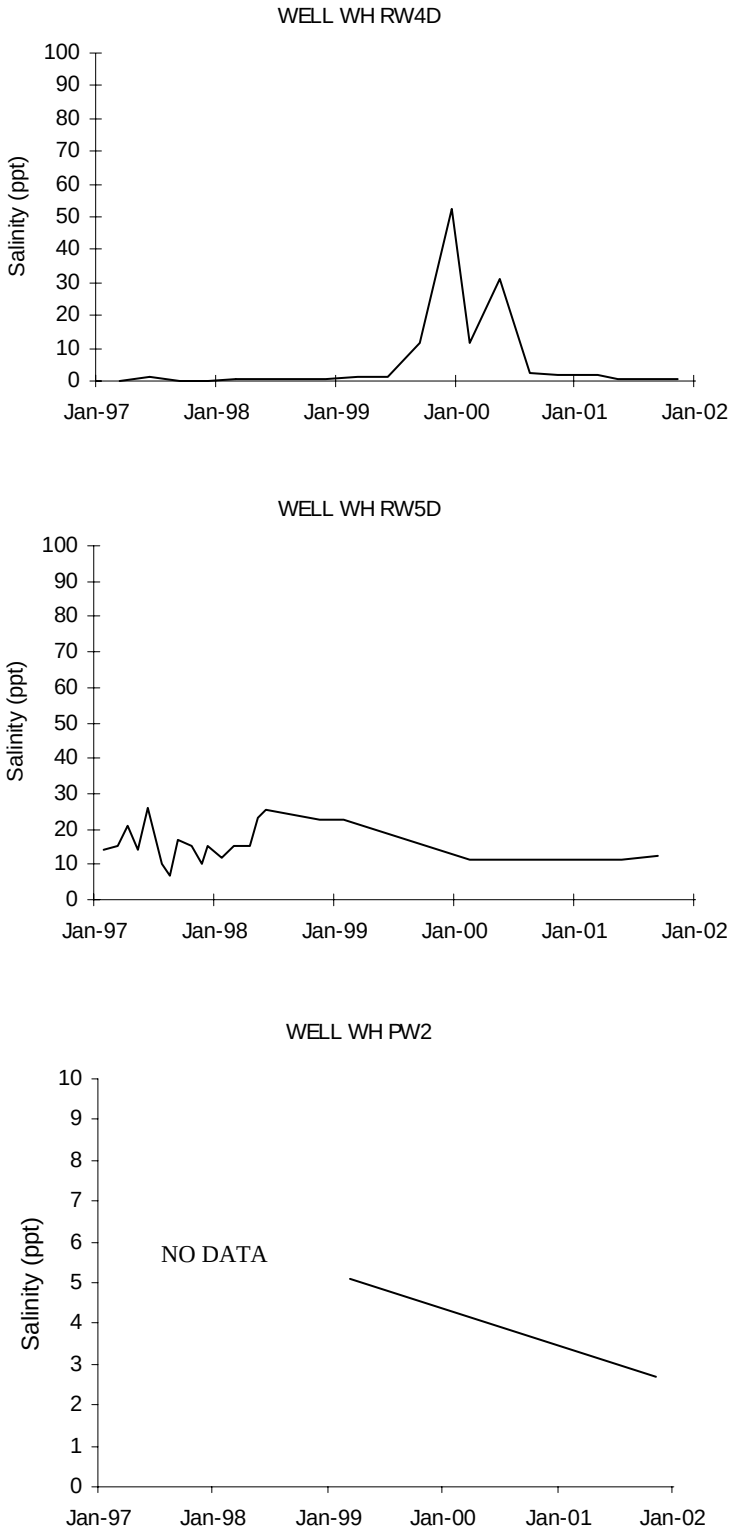


Figure 6-14. West Hackberry Ground Water Well Salinities (continued)

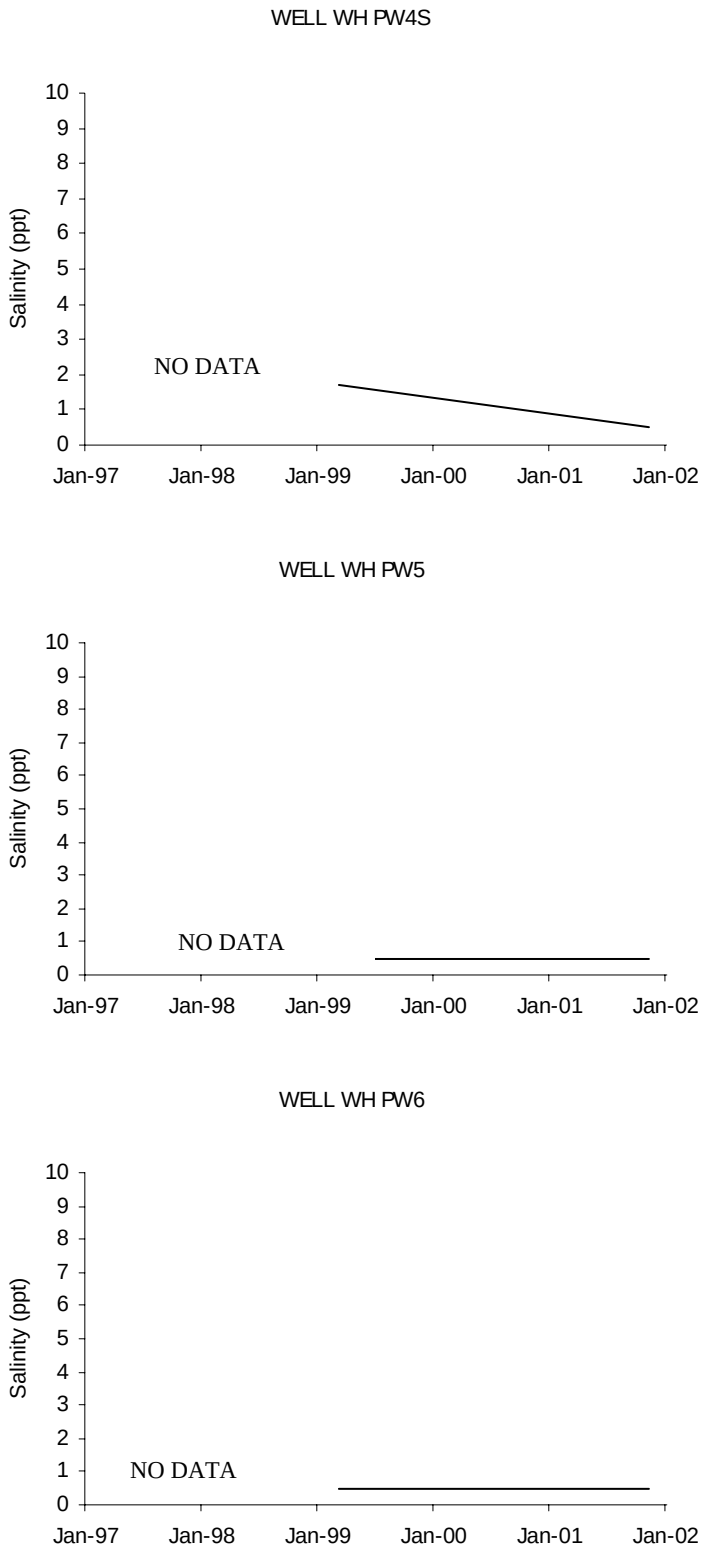


Figure 6-14. West Hackberry Ground Water Well Salinities (continued)

Ground water recovery from both affected zones beneath the brine pond system has remained a maintenance intensive project during the nearly nine years of Phase III continuous pumping. 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 hindered overall recovery operations in the latter two years of pumping due to the new form manifold discharge piping system to our aboveground tanks. Manifolding also necessitates backflow prevention devices at each well location connection requiring high maintenance due to the mineralization and salts crystallization.

Once the pumping wells were shut-in commencing with the end of the first quarter of 2001, all of the wells began fluctuating in both water level and salinity.

Observed former 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.

An essentially stably positioned 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 formerly tugging on the plume from the west side of the pond show notable freshening once their pumping ceased. Wells WH RW1S and WH RW2S on the south side, and WH P3S and WH P4S on the east side all reveal increasing salinity trends with the pumping stopped presumably because fresher waters are no longer mixed in these wells centered in the historic core of the plume. Wide salinity fluctuations seen on the data graphs are attributed to salinity/density stratification occurring in the wells and to the oscillating cones of depression affecting both zones. Two submersible pumps were re-introduced to wells WH P2S and WH P3S in 1999 primarily for their flow volumes and the two wells were pumped heavily in the 2000 to 2001 period until the end of March 2001.

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 that eventually began to subside sometime in 2000. This time-series signature is especially noticeable in well WH P5S and is reflected in the post-closure data of the other two.

Many shallow wells reveal an obvious salinity drop upon cessation of active recovery, this would be indicative of fresher recharge and to wells no longer pulling salty water through the formation to their screens. A relatively few (most notably hard pumped well WH P3S) responded with an abrupt salinity spike at shut-in. These wells undoubtedly were formerly pulling a fresher water mix across their screened length when actively pumping. With the pre-recovery

ground water movement to the east now returning, it is expected that wells on the west side of the pond will eventually capture fresher, uncontaminated ground water from the western recharge area as the source of brine contamination was removed with to pond closure in late 1999. The two shallow pumping wells WH P1S and WH P5S have already responded this way. This improving or decreasing salinity response will undoubtedly be delayed to the wells on the east and situated directly in the core of the plume as the overlying salt impregnated soils slowly respond to the now diminished available percolation and to the slow post-closure recharge.

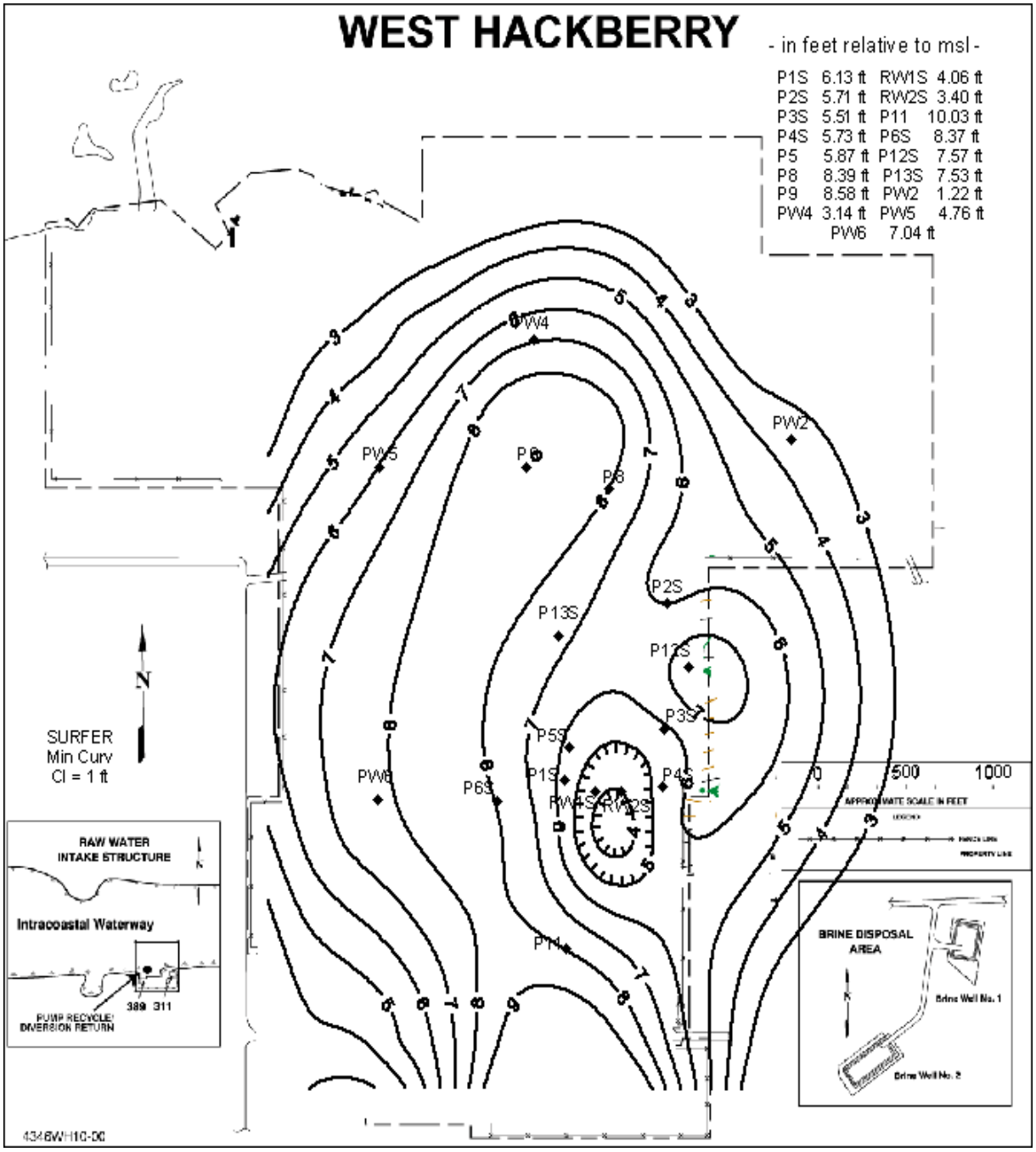


Figure 6-15. West Hackberry Shallow Ground Water Zone Contoured Elevations
Summer 2001

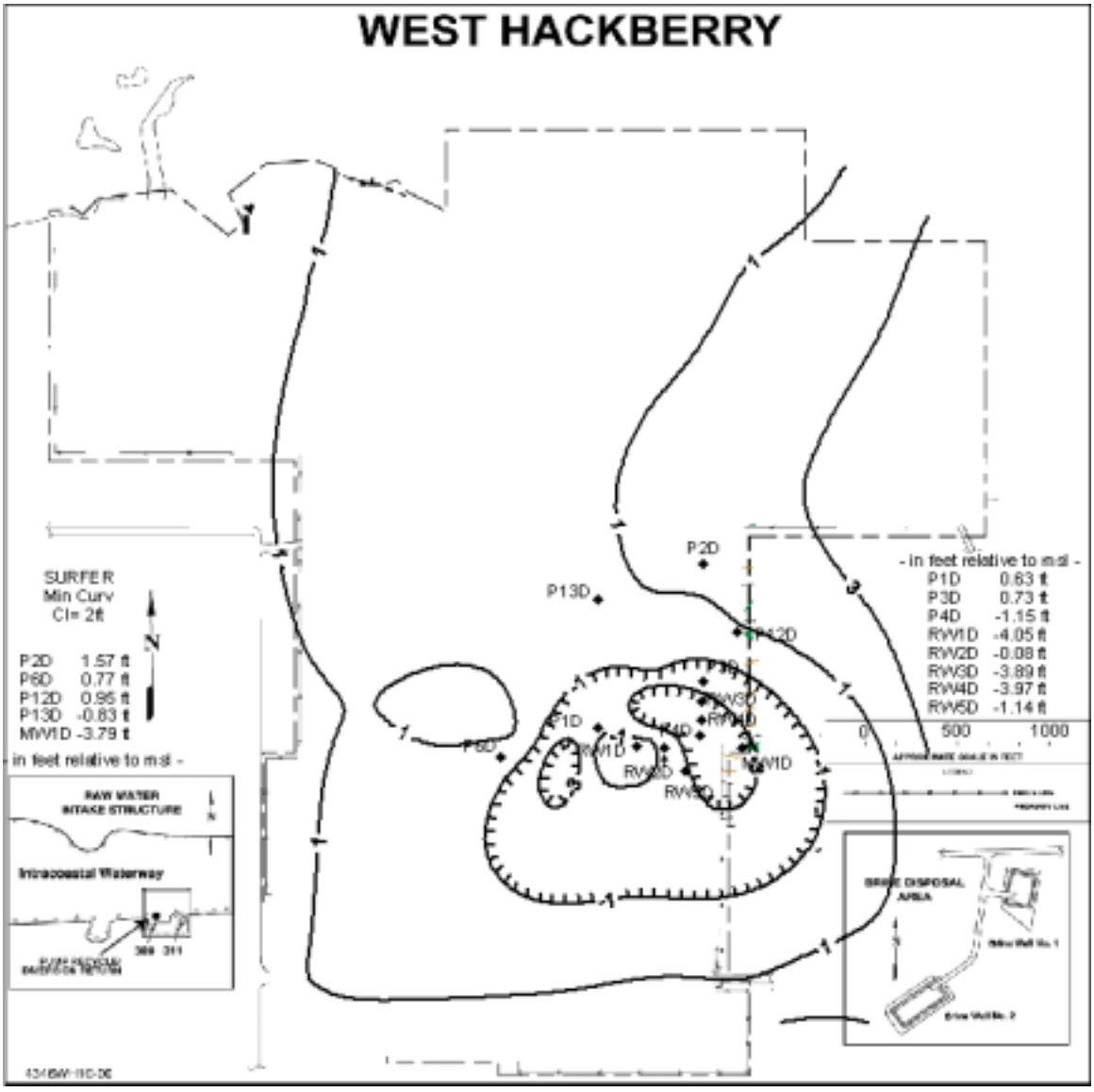


Figure 6-16. West Hackberry Deep Ground Water Zone Contoured Elevations
Summer 2001

It appears that elevated deep zone salinity effects remain 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 (12.3 ppt measured September 2001) 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 from the long-term slow pumping efforts that it was considered essentially incapable of producing a regular flow. A special manual sampling effort was made in early 2000 and again late in 2001.

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 along the site's perimeter 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 (25.5 ppt annual average in 2001) which has been generally consistent since sampling began in 1992 (range 13.1 to 39 ppt, Std. D = 6.4 ppt, avg. = 27.93 ppt, n = 39); however, the well has shown a reversal of the freshening trend that commenced the last half of 1998. The gradual rise in salinity noted for 2000 and continuing into 2001 may be a delayed (travel time) response to the closure construction spikes seen nearer the pond early in 1999 and perhaps the gradual down gradient plume movement towards this well.

Cones of depression have been sustained in both zones as a result of successful ground water recovery through all of 2000 and to the first quarter of 2001. The head differences in shallow and deep zone potentiometric surfaces indicate that the two zones are hydraulically separate; however, the overall potential remains downward and when combined with the increased density of saline water, contamination will always tend to seek lower elevations at this site. The two zones behave as leaky, poorly confined water-bearing 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 off take 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 sub paralleling 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.

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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 organizational Assessments and Management Assessments, and program inspections at selected sites by state and federal environmental agencies. Results from the environmental program assessments are addressed in Section 2 of this report.

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 are recorded and maintained in bound, numbered, and signed laboratory notebooks. Contractor laboratory data and accompanying QC data are received by the site laboratory or environmental department and retained on site as part of the original data file.

Water quality data are added to the SPR ES&H Management Information System (SEMIS) for retention, manipulation, and interpretation. The data are compiled and appear 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 generations 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. The Texas sites are accredited through this program because they may serve as a backup to the Louisiana site laboratories. In addition, the Texas SPR laboratories are exempt from the Louisiana accreditation fees. These laboratories have successfully completed the first and third quarter 2001 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 2001 to verify the continuing high quality of SPR laboratory data.

The EPA quality control document advocates use of quality control charts to maintain and evaluate accuracy and precision data. The SPR uses a computer program to allow

rapid and exact determinations of accuracy and precision without the necessity of manual quality control chart preparation.

7.5 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, the respective laboratory staff and M&O Contractor Quality Assurance, Operations and Maintenance, and Environmental staff review procurement documents.

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.

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.

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Appendix A
SPR - DM ES&H STANDARDS

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STRATEGIC PETROLEUM RESERVE – DM ENVIRONMENTAL STANDARDS

STANDARD	AREA	DESCRIPTION
10 CFR 1021	MR	Compliance with the National Environmental Policy Act
10 CFR 1022	MR	Compliance with Flood Plain/Wetlands Environmental Review
29 CFR 1910 SUBPART H	CS	Hazardous Materials (101 through 126)
29 CFR 1910 SUBPART Z	IH	Toxic and Hazardous Substances Workers Right-to-Know (1200)
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
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

STRATEGIC PETROLEUM RESERVE – DM ENVIRONMENTAL STANDARDS

STANDARD	AREA	DESCRIPTION
40 CFR 80	CA	Regulations of Fuels and Fuel Additives
40 CFR 81	CA	Designation of Areas for Air Quality Planning Purposes
40 CFR 82	CA	Protection of Stratospheric Ozone
40 CFR 109	CW	Criteria for State, Local, and Regional Oil Removal Contingency Plans
40 CFR 110	CW	Discharge of Oil
40 CFR 112	CW	Oil Pollution Prevention
40 CFR 116	CW	Designation of Hazardous Substances
40 CFR 117	CW	Determination of Reportable Quantities for Hazardous Substances
40 CFR 121	CW	State Certification of Activities Requiring a Federal License or Permit
40 CFR 122	CW	EPA Administrated Permit Programs: NPDES
40 CFR 124	CW	Procedures for Decision Making
40 CFR 125	CW	Criteria and Standards for NPDES
40 CFR 129	CW	Toxic Pollutant Effluent Standards
40 CFR 131	CW	Water Quality Planning and Management, Water Quality Standards
40 CFR 133	CW	Secondary Treatment Regulation
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

STRATEGIC PETROLEUM RESERVE – DM ENVIRONMENTAL STANDARDS

STANDARD	AREA	DESCRIPTION
40 CFR 247	HW	Comprehensive Procurement Guideline for Products Containing Recovered Materials
40 CFR 260	HW	Hazardous Waste Management System: General
40 CFR 261	HW	Identification and Listing of Hazardous Waste
40 CFR 262	HW	Standards Applicable to Generators of Hazardous Wastes
40 CFR 263	HW	Standards applicable to transporters of hazardous wastes
40 CFR 264	HW	Standards for Owners and Operators of Hazardous Waste, Treatment, Storage, and Disposal Facilities
40 CFR 266	HW	Standards for Management of Specific Hazardous Wastes
40 CFR 268	HW	Land Disposal Restrictions
40 CFR 272	HW	Approved State Hazardous Waste Management Programs
40 CFR 273	HW	Standard for Universal Waste Management
40 CFR 279	HW	Standards for Management of Used Oil
40 CFR 280	HW	Technical Standards and Corrective Action Requirements for Owners and Operators of UST
40 CFR 282	HW	Approved Underground Storage Tank Programs
40 CFR 300	CS	National Oil and Hazardous Substances Pollution Contingency Plans
40 CFR 302	CS	Designation of Reportable Quantities and Notification
40 CFR 355	CS	Emergency Planning and Notification
40 CFR 370	CS	Hazardous Chemical Reporting: Community Right-to-Know
40 CFR 372	CS	Toxic Chemical Release Reporting: Community Right-to-Know
40 CFR 373	CS	Reporting Hazardous Substance Activity When Selling or Transferring Federal Real Property
40 CFR 401	CW	General Provisions
40 CFR 403	CW	General Pretreatment Regulations for Existing and New Sources of Pollution
40 CFR 700	CS	General
40 CFR 761	CS	PCB Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions
40 CFR 763	CS	Asbestos
40 CFR 1500	MR	NEPA Purpose, 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 Pre-decision Referrals to the Council of Proposed Federal Actions Determined to be Environmentally Unsatisfactory

STRATEGIC PETROLEUM RESERVE – DM ENVIRONMENTAL STANDARDS

STANDARD	AREA	DESCRIPTION
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 171	TS	General Information, Regulations, and Definitions
49 CFR 172	TS	Hazardous Materials Tables and Hazardous Materials Communications Regulations
49 CFR 173	TS	Shippers - General Requirements for Shipments and Packaging
49 CFR 177	TS	Carriage by Public Highway
49 CFR 194	TS	DOT Response Plans for Onshore Pipelines
49 CFR 195	TS	Transportation of Hazardous Liquids by Pipeline
49 CFR 199	TS	Drug Testing
49 CFR 130	CS	Oil Spill Prevention and Response Plans
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

STRATEGIC PETROLEUM RESERVE – DM ENVIRONMENTAL STANDARDS

STANDARD	AREA	DESCRIPTION
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
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

STRATEGIC PETROLEUM RESERVE – DM ENVIRONMENTAL STANDARDS

STANDARD	AREA	DESCRIPTION
33:LAC V.13	HW	Transporters
33:LAC V.15	HW	Treatment, Storage and Disposal Facilities
33:LAC V.18	HW	Containment Buildings
33:LAC V.19	HW	Tanks
33:LAC V.21	HW	Containers
33:LAC V.22	HW	Prohibitions on Land Disposal
33:LAC V.26	HW	Corrective Action Management Units and Temporary Units
33:LAC V.37	HW	Financial Requirements
33:LAC V.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,

STRATEGIC PETROLEUM RESERVE – DM ENVIRONMENTAL STANDARDS

STANDARD	AREA	DESCRIPTION
		Production of, or Transportation of Oil, Gas or Sulphur (as amended January 27, 1953)
33:LAC IX.19	CW	State of Louisiana Control Commission
33:LAC IX.23	CW	The LPDES Program Definitions and General Program Requirements
33:LAC XI.1	HW	Program Applicability and Definitions
33:LAC XI.3	HW	Registration Requirements, Standards and Fee Schedule
33:LAC XI.5	HW	Spill and Overfill Control
33:LAC XI.7	HW	Methods Release Detection and Release Reporting, Investigation, Confirmation and Response
33:LAC XI.9	HW	Out of Service UST Systems and Closure
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 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
R.S. 30:2361-2379 SARA Title III	CS	Hazardous Materials Information Development, Preparedness and Response Act
ANSI/ISO 14001-1996	MR	Environmental Management Systems Specification With Guidance For Use

STRATEGIC PETROLEUM RESERVE – DM ENVIRONMENTAL STANDARDS

KEY TO ACRONYMS:

CA	Protection of Air Quality
CFR	Code of Federal Regulations
CS	Control of Toxic Substances
CW	Protection of Water Quality
EO	Executive Order
HW	Solid and Hazardous Waste Generation and Control
LAC	Louisiana Administrative Code
MR	Management, Oversight, and Reporting
PP	Pollution Prevention and Waste Minimization
RCRA	Resource Conservation and Recovery Act

Appendix A-1
SPRPMO ES&H Standards

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SPRPMO ES&H Directives

Directive	Description
DOE O 151.1A	Comprehensive Emergency Management System
DOE O 225.1A	Accident Investigations
DOE O 231.1 Change 2	Environment, Safety and Health Reporting
DOE O 232.1A	Occurrence Reporting and Processing of Operations Information
DOE O 420.1 Change 1-3	Facility Safety
DOE O 430.1A	Life-Cycle Asset Management
DOE O 430.2A	Departmental Energy and Utilities Management
DOE O 440.1A	Worker Protection Management for DOE Federal and Contractor Employees
DOE O 440.2A	Aviation Management Safety
DOE O 451.1B Change 1	National Environmental Policy Act Compliance Program
DOE O 460.1A	Packaging and Transportation Safety
DOE O 460.2 Change 1	Departmental Materials Transportation and Packaging Management
DOE 1300.3	Policy on the Protection of Human Subjects
DOE 5400.1 Change 1	General Environmental Program
DOE 5400.5 Change 1&2	Radiation Protection of the Public and the Environment
DOE 5480.4 Change 1-4	Environmental Protection, Safety, and Health Protection Standards
DOE 5480.19 Change 1	Conduct of Operations Requirements for DOE Facilities
DOE 5480.22 Change 1&2	Technical Safety Requirements
DOE 5530.1A	Accident Response Group
DOE 6430.1A	General Design Criteria
DOE M 232.1-1A	Occurrence Reporting and Processing of Operations Information
DOE M 440.1-1	DOE Explosives Manual

SPRPMO ES&H Directives

Directive	Description
DOE P 411.1	Safety Management Functions, Responsibilities, and Authorities Policy
DOE P 441.1	DOE Radiological Health and Safety Policy
DOE P 450.1	Environment, Safety and Health Policy for the DOE Complex
DOE P 450.2 A	Identifying, Implementing, and Complying with ES&H Requirements
DOE P 450.3	Authorizing Use of the Necessary and Sufficient Process For Standards based ES&H
DOE P 450.4	Safety Management System Policy
DOE P 450.5	Line Environment, Safety, and Health Oversight
DOE P 450.6	Secretarial, Policy Statement Environmental, Safety, and Health

Appendix B
SPR Environmental Policy Statements

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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

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

POLICY

DynMcDermott Petroleum Operations Company

RESPONSIBLE ORGANIZATION: ENVIRONMENTAL SAFETY AND HEALTH SUBJECT CLASSIFICATION: ENVIRONMENTAL OWNER: ENVIRONMENTAL MANAGER	SUPERSEDES: ASP5400.2, VERSION F0, "ENVIRONMENTAL POLICY" APPROVED BY: R MCGOUGH, PROJECT MANAGER	POLICY NO: ASP5400.2 VERSION: G0 PAGE 1

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

Title: Environmental Policy

Effective Date: 11/29/01

Applicability: All DynMcDermott Petroleum Operations Company (DM) Organizations

Significant Changes Since the Last Revision. Deleted specific responsibilities from this document and revised to contain only policy information. The deleted information is covered in other documents.

1. PURPOSE AND SCOPE

DynMcDermott Petroleum Operations Company (DM) is committed to continued excellence, leadership, and stewardship in protecting the environment through its environmental management system (EMS). DM will manage, operate, and maintain the SPR sites with the highest regard for the protection of human health and the environment within the confines of the SPR sites and the community. Top management considers this commitment essential to the operation of DM.

2. POLICY

Policy Statement: DynMcDermott operates only in an environmentally responsible manner.

A. **Line Responsibility.** Environmental protection is a line responsibility and the responsibility of every employee. All DM employees are aware of their responsibilities for conformance with this policy and DM procedures that support the environmental management system. Environmental protection is an important measure of employee performance.

B. **Policy Commitments.** In keeping with this policy and the nature and scale of SPR activities and their impact on the environment, DM pledges to:

- comply with relevant legislation and other requirements to which we subscribe
- prevent pollution
- continually improve

through excellence in environmental management.

DM incorporates these commitments in all phases of its activities, including concept, design, development, construction, operations, and decommissioning. DM fully

TITLE: Environmental Policy	POLICY NO: ASP5400.2 VERSION: G0 PAGE 2

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. Preventing pollution – with emphasis on source reduction - has been and continues to be a prime consideration in process design and operations and is viewed by management as a fundamental activity, as is safety and loss prevention. DM strives to continually improve processes and systems through decision-making and implementation.

C. **Impacts, Objectives, and Targets.** Significant environmental impacts are controlled through recognizing the environmental aspects of our activities and establishing and meeting environmental objectives and targets to protect the environment. Objectives and targets include those described in the Environmental Work Authorization Directive (WAD, a part of the DOE/DM contract), and others that are based on environmental requirements; environmental aspects; appropriate available technology; financial, operational, and business considerations; and the views of interested parties.

D. **Policy and EMS Information Availability.** This policy is available to the public on request and through the annual publication of the SPR Site Environmental Report. Information about DM's environmental performance and the operation of the environmental management system is shared with the community and other external interested parties on request and through the Site Environmental Report, the DM Environmental Advisory Committee, and pollution prevention advocacy groups in Louisiana and Texas.

E. **Review and Approval.** This policy is reviewed and approved annually by the project manager and, if necessary, revised to reflect changing conditions.

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DISTRIBUTION

This report is distributed widely by the Department of Energy's Strategic Petroleum Reserve Project Management Office to local, state, and federal government agencies, the Congress, the public, and the news media.