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

Site Environmental Report
For
Calendar Year 2002

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

October 6, 2003

Distribution:

SITE ENVIRONMENTAL REPORT FOR CALENDAR YEAR 2002 - STRATEGIC PETROLEUM RESERVE

Enclosed for your information is a copy of the Site Environmental Report for Calendar Year (CY) 2002 for the U.S. Department of Energy's (DOE'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 DOE by DynMcDermott Petroleum Operations Company.

To the best of my knowledge, this report accurately summarizes and discusses the results of the 2002 Environmental Monitoring Program.

If you have any questions or desire additional information, please contact William L. Vierling of the Project Management Office, Environmental, Safety and Health Division at (504) 734-4985.

Sincerely,

William C. Gibson, Jr.
Project Manager

FE-4441:(NEllis)

Enclosure
As Stated

STRATEGIC PETROLEUM RESERVE

SITE ENVIRONMENTAL REPORT

FOR

CALENDAR YEAR 2002

Document No. ASE5400.64A0

Prepared for the U. S. Department of Energy
Strategic Petroleum Reserve Project Management Office
under Contract No. DE-AC96-93PO92207

DynMcDermott Petroleum Operations Company
850 South Clearview Parkway
New Orleans, Louisiana 70123

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QUESTIONNAIRE/READER COMMENT FORM

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: _____

City/State/Zip code: _____

Organization (if applicable): _____

Comments:

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

Subject Matter Expert (SME): _____ Date: _____

SME's Response:_____

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ABBREVIATIONS AND ACRONYMS

ac	acre
A&E	Architect and Engineer
AFFF	aqueous film forming foam
AFV	Alternate Fuel Vehicle
AP	Affirmative Procurement
APHA	American Public Health Association
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 ACRONYMS

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 Improvement
CV	coefficient of variation
CWA	Clean Water Act
CY	calendar year
DCS	Distributed Control System
DM	DynMcDermott Petroleum Operations Company
DMR	discharge monitoring report
DO	dissolved oxygen
DOE	United States Department of Energy
DOT	United States Department of Transportation
E2	Energy Efficiency
EA	environmental assessment
EFH	East Fillhole
EIQ	emissions inventory questionnaire
EIS	emissions inventory summary
EIS	environmental impact statement
EMP	Environmental Monitoring Plan

ABBREVIATIONS AND ACRONYMS

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
FFCA	Federal Facilities Compliance Act
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FRP	Facility Response Plan
ft	feet
ft/yr	feet per year
FTX	Field training exercise
F&WS	United States Fish and Wildlife Service
FY	Fiscal Year
GALCOE	U.S. Army Corps of Engineers, Galveston District
GC	gas chromatographic
GLO	General Land Office
gpd	gallons per day

ABBREVIATIONS AND ACRONYMS

GSA	General Services Administration
GWPMP	Ground Water Protection and Management Plan
HAP	hazardous air pollutant
HVAC	High Ventilation Air Conditioning
HW	hazardous waste
ICW	Intracoastal Waterway
ISM	Integrated Safety Management
ISO	International Organization of Standardization
IR	Infrared
km	kilometers
LA	Louisiana
lab	laboratory
LAC	Louisiana Administrative Code
lbs	pounds
LCMS	Lake Charles Meter Station
LDEQ	Louisiana Department of Environmental Quality
LDHH	Louisiana Department of Health and Hospitals
LELAP	Louisiana Environmental Laboratory Accreditation Program
LLEA	local law enforcement agency
LPG	Liquefied Petroleum Gas
LPG2	Liquefied Petroleum Gas
LDNR	Louisiana Department of Natural Resources

ABBREVIATIONS AND ACRONYMS

LPDES	Louisiana Pollutant Discharge Elimination System
LPDES	Louisiana Pollutant Discharge Elimination System
LWDPS	Louisiana Water Discharge Permit System
m	meters
m^3	cubic meters
ml	milliters
m/yr	meters per year
max	maximum
mgd	million gallons per day
mg/l	milligrams per liter
mmb	million barrels
MPAR	Achieve weighted average
m/sec	meters per second
M&O	management & operating
MSDS	Material Safety Data Sheets
MSGP	multi-sector general permit
mt	metric tons
NAAQS	National Ambient Air Quality Standards
N	north
NEPA	National Environmental Policy Act
NEPT	National Environmental Performance Track
NFRAP	No Further Remedial Action Planned
NHPA	National Historic Preservation Act

ABBREVIATIONS AND ACRONYMS

NIIMS	National Interagency Incident Management System
NO	New Orleans
NOCOE	U.S. Army Corps of Engineers, New Orleans District
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
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
PCB	polychlorinated biphenyl
PE	performance evaluation
pH	negative logarithm of the hydrogen ion concentration

ABBREVIATIONS AND ACRONYMS

PM_{10}	particulate matter (larger than 10 microns)
PMO	Project Management Office
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
ROD	Record of Determination
RWIS	raw water intake structure
S	South
SAL	salinity
SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act
SER	Site Environmental Report
SIC	Standard Industrial Classification
SIP	state implementation plan
SO_2	sulfur dioxide
SOC	security operations center

ABBREVIATIONS AND ACRONYMS

SO_X	Sulfur oxides
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&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
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

ABBREVIATIONS AND ACRONYMS

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
W	west
WH	West Hackberry
WILT	Weeks Island Long Term

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 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, affirms that the SPR has been operating within acceptable regulatory limits and promotes pollution prevention, and illustrates the success of SPR efforts toward continual improvement.

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 2002.

There were two reportable brine spills and no reportable oil spills during CY 2002. The fact that there were no reportable oil spills while a total volume of 23 million m^3 (144.6 million barrels) of oil moved (received and transferred internally) was a significant accomplishment. The longer-term trend for oil and brine spills has declined substantially from 27 in 1990 down to two in CY 2002. The brine and oil spills were reported to the appropriate agencies where applicable 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 seamless integration of environmental awareness and control into all operations are consistent with the Code of Environmental Management Principles (CEMP) and the ISO 14001 standard. Environmental management is a part of a greater Integrated Safety Management System.

The SPR management and operating contractor environmental management system (EMS) has been certified by a third party registrar against the international ISO 14001 standard since May 2000. The SPR is also 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 sixteen occasions by outside regulatory agencies or third party auditors during CY 2002. There were 15 minor findings associated with these inspections. Five minor noncompliances were self-reported under state and federal discharge permits for all SPR sites during CY 2002, and no Clean Air Act or Clean Water Act Notice of Violations (NOV) were received.

During CY 2002 the SPR facilities in Louisiana and Texas continued to operate as Conditionally Exempt Small Quantity Generators (CESQG) and take advantage of relaxed regulatory requirements. 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 2002 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 Conservation on Environmental Quality (TCEQ) for the 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 2002.

The SPR met its drill and exercise requirements for CY 2002 under the Oil Pollution Act of 1990 (OPA) through the National Preparedness for Response Exercise Program (PREP).

Environmental compliance and management audits were conducted in-house and by outside entities. DOE Strategic Petroleum Reserve Project Management Office 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. Three low risk findings were identified. Internal M&O contractor environmental assessments at the five SPR sites during 2002 identified no Environmental Category type I or II (Administrative) findings and nine 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 Systems, Inc., who verifies certification against the ISO 14001 standard, audited the DynMcDermott Petroleum Operations Company (DM) EMS with only two 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 and includes results from laboratory and field audits and studies performed internally and by regulatory

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

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

1. INTRODUCTION

The purpose of this Site Environmental Report (SER) is to present a summary of environmental data gathered at or near SPR sites to characterize site environmental management performance, confirm compliance with environmental standards and requirements, and highlight significant programs and efforts.

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

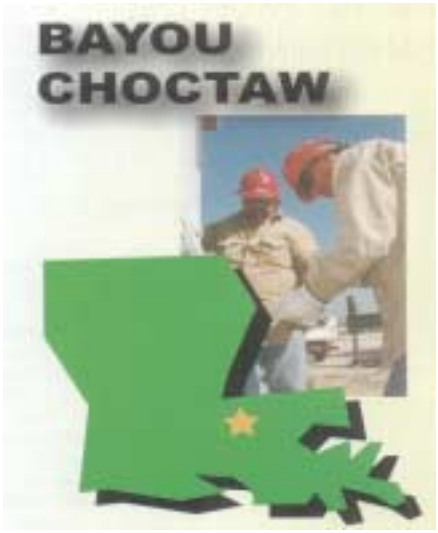
Emergency crude oil is stored in the Strategic Petroleum Reserve in salt caverns. Created deep within the massive salt deposits that underlie most of the Texas and Louisiana coastline, the caverns offer the best security and are the most affordable means of storage, costing up to 10 times less than aboveground 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 2002, 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 continue; 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 749 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 recently constructed 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 groundwater 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.

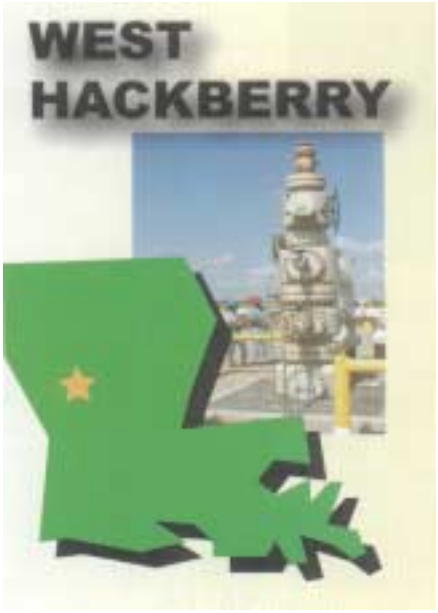
The vegetation communities on Weeks Island are diverse. Lowland hardwood species proliferate in the very fertile loam soil common at the higher elevations. The predominant tree species are oak, magnolia, and hickory, and extend down to the surrounding marsh. Pecan trees are also present. Gulls, terns,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

The DOE Office of Deputy Assistant Secretary for the Petroleum Reserves has overall programmatic responsibility for establishing the objectives of the SPR. The SPRPMO Project Manager is responsible for implementing these goals and objectives including articulating an Environmental Policy statement 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, DM operates with an EMS that is 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, reuse, 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;

j. regulatory review program for new environmental requirements;

k. an employee environmental awards program to recognize activities and innovative approaches for improved environmental management and pollution prevention;

l. A NEPA program that provides a comprehensive environmental review of all projects to include Purchase Requisitions, Engineering Scopes of Work, Engineering Change Proposals, Design Reviews, and Design Changes for all the SPR environmental program; and

m. A Corps of Engineers Permitting program utilized in permit acquisition for projects that have an impact on Section 404 of the Clean Water Act, and Section 10 of the Rivers and Harbors Act.

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 Commission on Environmental Quality (TCEQ), 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. Five of the previously existing major orders are 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. 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 (450.1) 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, 2002 THROUGH DEC. 31, 2002)

The majority of the SPR's compliance program is associated 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 control and countermeaures (SPCC) regulations, complying with the

requirements of the Oil Pollution Act of 1990 (OPA), and complying with the wetlands usage program.

During 2002 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.

The administratively complete renewal applications from 1993 for the Big Hill site and from 2000 for the Bryan Mound site, remained the authority for water discharges limited through the NPDES program throughout 2002 for the two Texas sites. Contact with the Regional Performance Track coordinator, made early in the year, lead to an intermittent effort by EPA Region VI permit writers to commence the arduous task of rewriting both of those expired but administratively extended permits. In Louisiana, NPDES water discharge permits have been replaced with equivalent state permits (LPDES) under LDEQ's primacy granted in late 1999.

The SPR maintains a Louisiana statewide permit from LDEQ for discharge of hydrostatic test water that minimizes 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 2002, seven 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). Projects resulted from work involving maintenance dredging and spoil placement at the raw water intake structures (RWIS), bridge replacements, 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 2002 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 required ground water recovery pumping, ground water monitoring, and submission of quarterly recovery 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 2002. 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 2001 while routine monitoring at all other locations

continued. Late in the CY 2002, routine sampling indicated the sporadic presence of total petroleum hydrocarbons (TPH) in several well locations above the historic method detection limits. Additional detailed investigations carrying over into CY 2003 utilizing a more specific gas chromatographic (GC) method document no impacts at the 1 mg/l level. The EPA method 8015 is now being transitioned to avoid the false positives suspected with interferences associated with the former wide-spectrum IR testing.

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 TCEQ) 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.

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 450.1. and E.O. 13148, which require a Pollution Prevention Program, 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 as a result 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. Tables 2-2 through 2-7 contain a summary of the inventory information that was submitted for CY 2002. In an effort to comply with the Louisiana mandatory requirements and Texas preferred submittal methods, the CY 2002 SARA Tier Two reports were prepared and submitted via electronic format. In Louisiana, the reports were prepared and submitted at the Louisiana State Police, Right to Know website. In Texas, the reports were prepared by using a software program developed by the EPA (Tier 2 Submit)

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 2002 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 2002, the SPR manifested hazardous waste from the 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). In 2002, all SPR sites averaged hazardous waste generation rates well within the CESQG limits. Based on this CESQG status, the two Texas sites submitted Voluntary Notifications of Exemption From 2002 Hazardous Oil and Gas Waste Reporting. Although the three Louisiana sites were also exempt from filing annual hazardous waste reports, there is no corresponding exemption report required for LDEQ.

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)

A total of 1756 design reviews, scopes of work, and purchase requests were evaluated for NEPA review in 2002. Out of these documents, only 55 required NEPA documentation. 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 2002.

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

Much of the SPR property is developed with buildings, piping, cable trays, and other structures requiring the use of herbicide and pesticide products. Calendar year 2002 presented the SPR with special issues regarding the use of pesticides and herbicides. Due to West Nile Virus concerns and increased security initiatives to establish clear zones around the perimeter of the SPR sites, several other types of herbicides or pesticides were evaluated. Each pesticide product was thoroughly researched and evaluated for toxicity, persistence in the environment, and harm to non-target wildlife. All pesticide products were used in accordance with manufacturers' labels.

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 is consulted in regard to appropriate actions taken that may affect migratory birds or threatened and endangered species. For example, the F&WS is consulted prior to the removal and relocation of nuisance wildlife.

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 2002 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 previous ESA section. 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 2002 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

X-ray and other sealed radioactive sources are used at the SPR to perform analytical, monitoring and scanning activities. Conformance with this act is demonstrated by following state implementing agency radiation control regulations.

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 year. Environmental awareness of the migratory bird issues commences at the site level. Each ES&H Site Manager implements site wide surveillance, through others as appropriate, 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 listed 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, restricting its procurement and tracking processes for purchase of affirmative procurement materials. In 2002, the SPR incorporated AP specifications into contracts involving constructions projects. Affirmative Procurement success was 100 percent for CY 2002.

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

On April 21, 2000, E.O. 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 2002 the SPR reduced hazardous waste generation by 96 percent, down to 0.32 mt (0.35 tons). This reduction is continuing into 2003. 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 well below the fiscal year's target of 3140 lbs by the end of FY 2002.

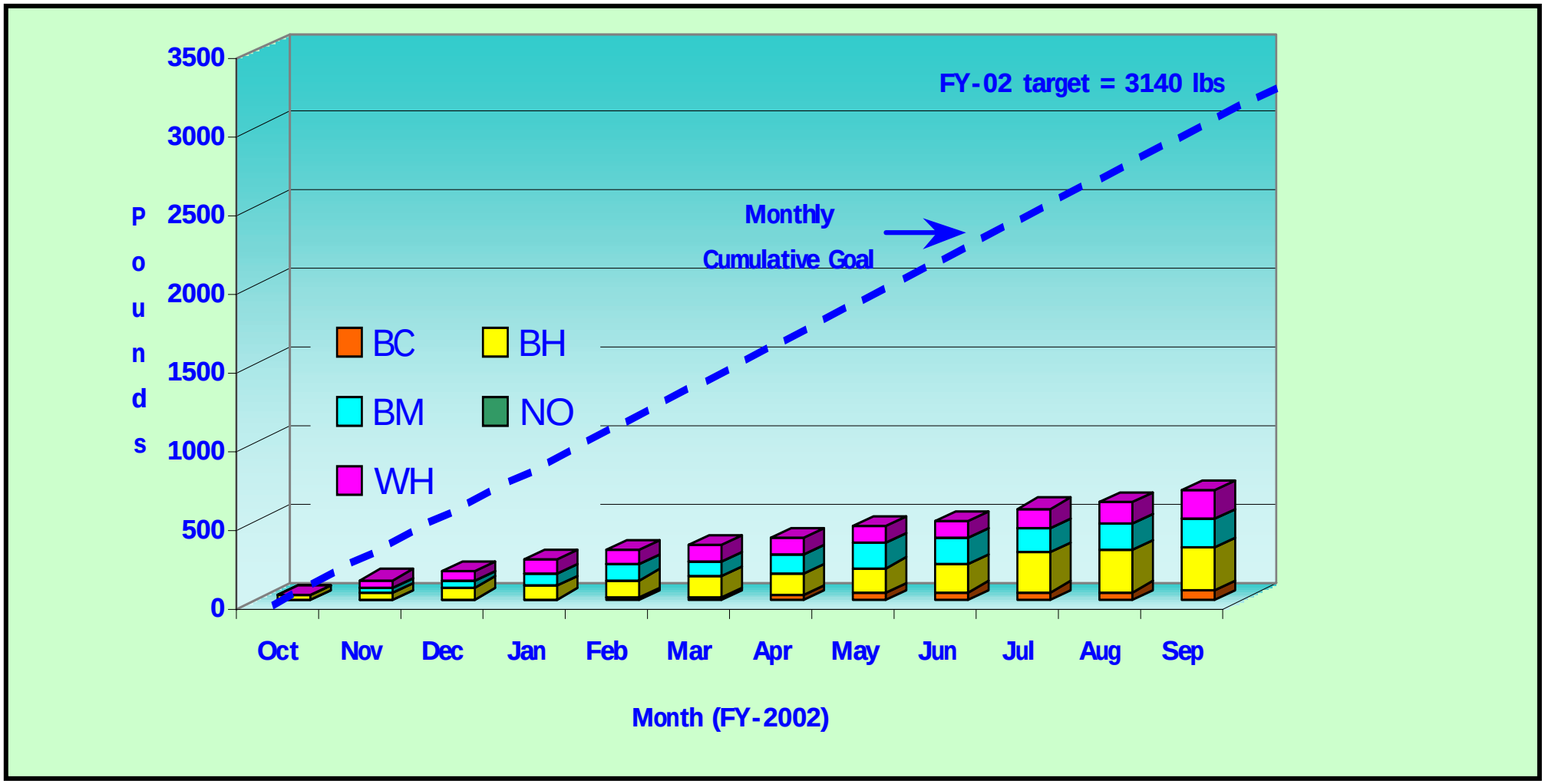

Figure 2-1. FY 2002 Monthly Hazardous Waste Generation

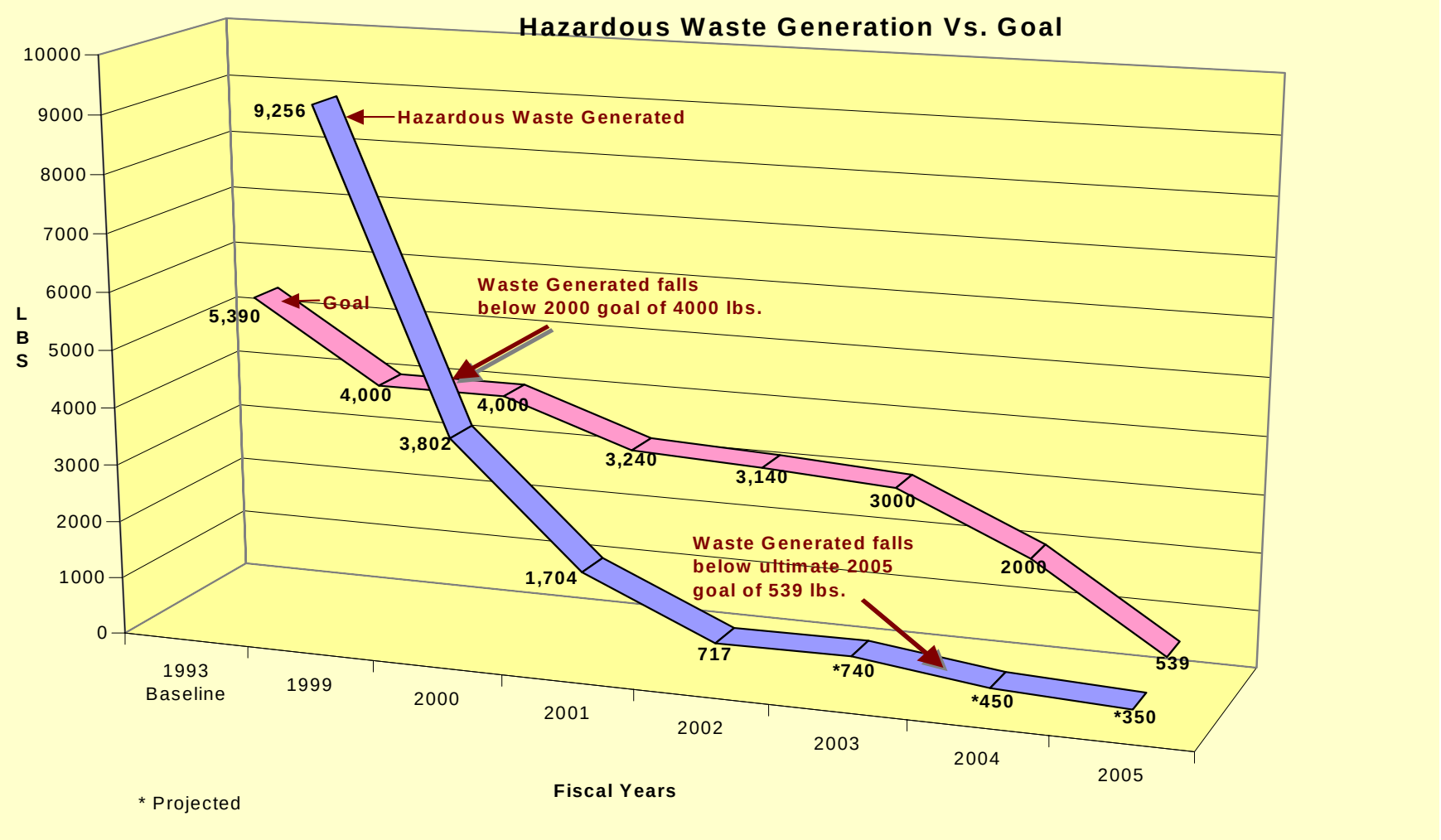

Figure 2-2. 2005 Hazardous Waste Generation Goal

The SPR takes an environmental leadership role by striving to eliminate or reduce all SPR waste streams at the source whenever possible. The initiatives implemented as a result of the Paint Waste Minimization Team resulted in a significant reduction in hazardous paint waste generation at the SPR. as illustrated in Figure 2-3.

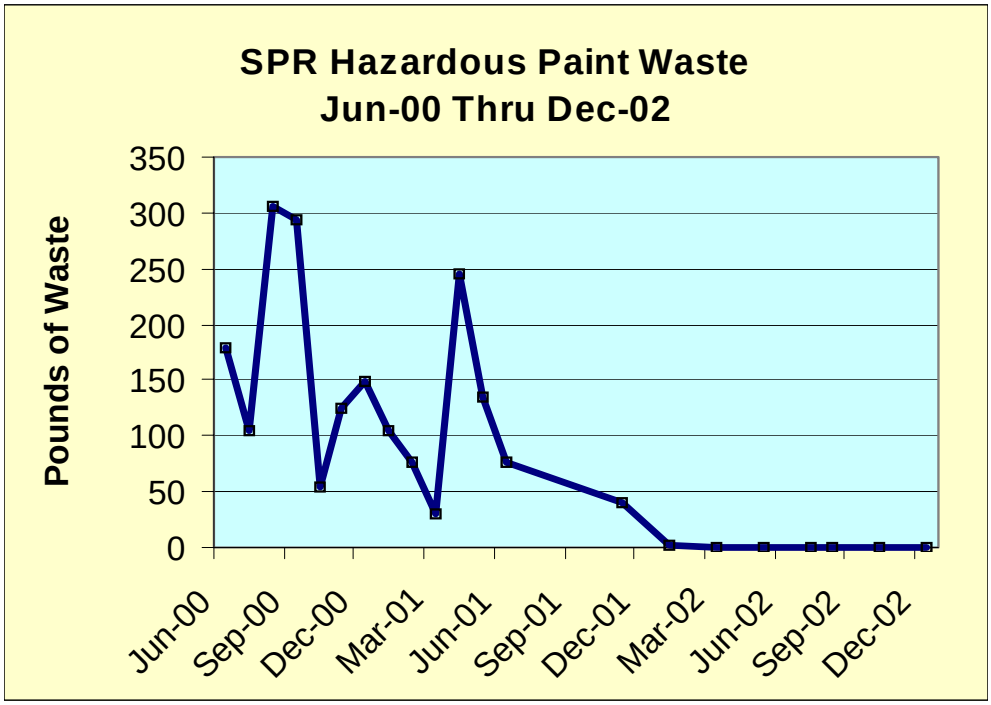

Figure 2-3. SPR Hazardous Paint Waste Generation

In 2002, the SPR painters at the Bryan Mound site were provided Pollution Prevention Awards for their significant contribution in eliminating waste from a paint maintenance project. The SPR Bryan Mound Tank-1 was cleaned and painted. A total of 41,000 sq. ft. surface was coated using 250 gallons of paint with zero hazardous waste generation. In addition the SPR received two national awards during CY 2002 as a result of the success of the Paint Waste Minimization team.

In an effort for continual improvement, in CY 2002 the SPR

identified laboratory waste (crude oil/toluene) as the primary contributor to the hazardous waste generation numbers. A laboratory waste minimization team was chartered on March 14, 2002 and concluded in July 2002 with four recommendations to reduce the waste generation rate by 55%. This team is currently implementing the improvements.

The SPR expanded the recycling program to include more cardboard, file stock and newspaper. The SPR recycled a total of 133,255 lbs of paper waste including cardboard during 2002. A decrease in paper purchased combined with an increase of all paper recycled indicates progress in increasing source reduction and recycling efforts.

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 process at all sites 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 those beneficial behaviors.

In CY 2002 DynMcDermott received three Environmental Management Awards at the highest Excellence Level, from the Louisiana Quality Foundation for the Bayou Choctaw, New Orleans, and West Hackberry sites. Only four such awards were presented to facilities throughout Louisiana with the SPR winning three of those awards. The award recognizes leadership in environmental management.

During CY 2002, the process of screening purchase requests against the SPR Qualified Products List and the Affirmative Procurement guidelines continued 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" are 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.	• Initiated lab waste team to address recommendations of PPOA findings with four recommendations to reduce waste. Currently beginning implementation. • Continued to implement new painting procedures and the Ameron painting process resulting from Paint CQI team. Team won the DOE National Pollution Prevention Award • Track wastes generated each month by site • Prepared Annual Waste Min and P2 Progress Report to DOE in Nov 2002 • Tracked P2 accomplishments through year that have achieved HW reduction • Awareness of Pollution Prevention was increased and integrated with Energy Efficiency through the E2P2 committee. • FY 02 Goal: 3,140 lbs • 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.	• Continued to reduce sanitary waste through implementation of Goal 4: improved recycling. • Expanded recycling program at all sites where feasible. • Implemented administrative controls to more accurately calculate the generation of sanitary waste for each SPR site. • Continued to track sanitary waste generated and provide reporting to DOE as required • FY 02 Goal: 2,872, 351 lbs. • 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. • Participated in at least one recycling promotional (Mardi Gras Bead Recycling) the study. • Integrated P2 Activities into Behavioral Safety Program • Utilized various media to promote recycling and reuse. • Expanded the New Orleans and Bryan Mound paper recycling program by implementing cardboard balers • Sanitary waste generated and recycled waste is reported monthly. The SPR anticipates expanding recycling programs where the market permits. • FY 02 Goal: Recycle 12 % of Sanitary Waste
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.
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. • Updated the Guidance and vendor list to assists the buyer in achieving AP purchases. An AP library was expanded in public folders. • A success rate of 100% was achieved in 2002. 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.

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

	SPR POLLUTION PREVENTION AND ENERGY EFFICIENCY LEADERSHIP GOALS	ACTION TO REACH TARGETED GOALS
7	Reduce energy consumption through life-cycle cost effective measures by: • 40% by 2005 and 45% by 2010 per gross square foot for buildings, using a 1985 baseline. • • • 20% by 2005 and 30% by 2010 per gross square foot, or per other unit as applicable, for laboratory and industrial facilities, using a 1990 baseline.	Audits performed on New Orleans buildings during FY 2000 resulted in projects to conserve energy. • Installed light sensors for offices, hallways, and restrooms for buildings 850 and 900 in FY2002. • Installed fluorescent lighting reflectors in NOLA • Completed installation of protective mylar window film - a security enhancement with some energy savings in FY2002. • Conducted annual balancing of the air conditioning and heating systems in the New Orleans buildings to conserve energy FY 02 Goal: 10% reduction in energy consumption 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, 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.) Metered Process (SPR storage sites: BC, WH, BH and BM) • Installed site security outdoor controls at BM, BH, WH, and BC in FY2002. • WH HVAC temperature control upgrade was completed in FY2002 Due to the FY2002 security enhancement of installing peripheral lighting at the SPR storage sites, it is doubtful that the goals will be met in the immediate year or following years. The added lighting requirements at all SPR sites will increase the energy consumption.

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

	SPR POLLUTION PREVENTION AND ENERGY EFFICIENCY LEADERSHIP GOALS	ACTION TO REACH TARGETED GOALS
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 at BM was initiated in 2002.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. • There was a 16% reduction in GSA gasoline vehicles by the end of 2002. There were also 23 GEM electric vehicles on the SPR in 2002.
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 would 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. Consumption of propane by the 8 vehicles over 9 months at BH was tracked. Fuel consumption of propane ran 6463 gallons vs. 9285 gallons for gasoline. With the increases in gasoline prices, the propane is more cost effective. The installation of fueling stations was proposed in the 2002 budget. Buying propane in bulk and storing it in on-site fueling stations will assist the SPR in achieving the goal and provide a cost savings over home delivery of propane. 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 all 5 SPR facilities were accepted as part of 228 charter members named nationwide. 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 reports for CY 2001 and 2002 are available to the public at the EPA website www.epa.gov/performancetrack. They include 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. Success in meeting the commitments in CY 2002 is discussed as follows.

The commitment for reducing hazardous waste was surpassed during the first year (CY 2001) of this three-year program, and continued to be met in CY 2002. Hazardous waste generation was reduced to 1364 pounds in CY 2001 and decreased further to 706 pounds in CY 2002 that was well below the 3,000-pound performance commitment. Over the past two years great effort has been made in reducing paint waste. As a result, in CY 2002 paint waste was reduced to below laboratory waste which became the primary contribution to hazardous waste generation. Efforts are underway to reduce lab waste through source reduction – reduction in sampling frequency and required tests – with no loss in program quality or integrity.

No Halon 1301 was removed in CY 2002. Plans for its removal have been broadened from the 1356 pounds committed for the Performance Track program to over 8600 pounds and will be initiated in CY 2003.

Solid waste (excluding exploration and production wastes) reduction through recycling, waste minimization, and reuse continues to escalate. The not-to-exceed goal of 350.9 tons generated per year was handily surpassed in CY 2002 (231.05 tons generated). The increase is attributed to identifying and segregating significant waste streams that can be recycled, such as cardboard, concrete, scrap metal, and wood pallets.

The reduction of fleet vehicle emissions (NO_X, CO, SO_2, PM_{10}, and VOCs) began in CY 2001 through the replacement of

gasoline-powered scooters and light duty trucks with electric scooters and dual fuel (gasoline/propane) trucks. Emissions decreased further in CY 2002 when 19 additional scooters were replaced with electric equivalents (28 total) and 11 additional trucks (19 total) were replaced with dual fuel equivalents. Effort is made to burn propane in the dual fuel trucks before switching to gasoline. Propane is delivered to the Big Hill site for refueling, and trucks at West Hackberry are refueled when they are driven to town. A local off-site source of propane was not readily available for trucks used at Bayou Choctaw and Bryan Mound. About 10.2 tons of emissions were eliminated in CY 2002 through the use of these vehicles, and the reduction is primarily attributed to 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 2002 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 2002, 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 2002 the SPR did not conduct any activities that would require submission of the TRI form R and forwarded appropriate notification correspondence to the EPA, TCEQ, and LDEQ 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 has continued through 2002 and was verified during two semi-annual surveillance audits conducted by the registrar. Two minor non-conformances were found during the audits, and one was closed within the calendar year.

DOE ORDER 435.1, "Radioactive Waste Management"

There are no radioactive processes that generate radioactive wastes 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"

In addition to the X-ray sources used in equipment the SPR does subcontract work where sealed radioactive sources are used in monitoring activities. This topic is addressed in Section 4 of this report.

Table 2-2. 2002 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
FC-203CE Lightwater Brand AFFF	10,000 - 99,999	Foam storage building
FC-203CF Lightwater Brand AFFF	1,000 – 9,999	Foam deluge building
Flogard POT805	100 – 999	Potable Water Building
Gasoline	10,000 - 99,999	Property tank # 1, Flammable storage cabinet, High pressure pump pad
Monsanto Rodeo Herbicide	1,000 – 9,999	Property Warehouse, Flammable Storage Building
Motor Oil	1,000 - 9,999	Bench stock, Flammable storage building, Flammable storage cabinet, High pressure pump pad, Maintenance bay, Property flammable cabinet
Paints, flammable or combustible	1,000 – 9,999	Flammable storage building, Property Flammable Cabinet
Red River 90 Spray Adjuvant Herbicide	100 – 999	Flammable storage building, Property warehouse
Sodium Chloride	1,000 - 9,999	Potable water building
Sodium Hypochlorite Solution	100 - 999	Potable water building
Windex Glass Cleaner	999	Benchstock

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

Table 2-3. 2002 Texas SARA Title III Tier Two Summary at Big Hill

Chemical Name (Category)	* Max Daily Amt (lbs.)	Location
Ammonium Bisulfite, solution	10,000 - 99,999	Brine pad, Raw water injection pad
Crude oil, petroleum	> 1 billion	Site tanks, piping, and underground caverns. BHT-7, BHT-10
Diesel fuel	10,000 - 99,999	BHT-11, BHT-51, Rental Tank, BHT-50, BHT-4, BHSE-46-1
FC-203CF Light Water Brand AFFF	10,000 – 99,999	Foam Bldg.-BHT-16, Boat Shed, ERT Pad, Fire Truck
FC-600 Lightwater Brand ATC/AFFF	10,000 - 99,999	Boat Shed, ERT Pad, Foam Building (BHT-16), Fire Truck, Fire Bay Flammable Cabinet
Gasoline	10,000 - 99,999	BHT-52 (Fuel Station)

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

Table 2-4. 2002 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
Diesel fuel	10,000 - 99,999	Fuel Tank Area
FC-203CF Light Water Brand AFFF	100,000 - 999,000	AFFF Fixed systems, Storage and Mobil units
Gasoline	10,000 - 99,999	Fuel Tank Area

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

Table 2-5. 2002 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	10,000 – 99,999	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. 2002 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
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, Maintenance Lay down Yard
FC-203CF Light Water Brand AFFF	10,000 – 99,999	Foam Storage Bldg.
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, Armory MCC, Environmental Lab, LSW Laydown Yard, Main Gate
Paints, flammable or combustible	1,000 – 9,999	Flammable Storage Building, Laydown Yard, LSW Laydown Yard, Workover Rig Part House, Workover Rig Yard
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. 2002 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 receiving commercial 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 in during 1995 and completed in 1997. Due to the amount of gas regained, DOE and DM began readdressing the gassy oil phenomenon in 1999, planning for a second degas cycle of the next several years. A conceptual design and a performance specification to solicit a contractor for the final design, construction, and installation of the new degas units were developed in 2000. The contractor was selected in 2001. Degas air permits for Big Hill and Bryan Mound were obtained from TCEQ in 2002. Design of the new degas unit was completed in 2002, and construction of the degas mobile skid units began at the contractor's facility 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. The oil product recovery process has continued and 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 gals 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. The analytical data provided evidence that the Risk Evaluation Corrective Action Program (RECAP) parameters were reduced, however they 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. Section 6 of this document contains more detailed information regarding this topic.

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 2001 were closed in CY 2002. Three low risk findings were identified in CY 2002, and all were closed by the end of the year.

M&O Contractor Organizational Assessment

The New Orleans environmental group conducted annual EMS and compliance assessments of all five sites in 2002. Assessors were independent of the sites or, in New Orleans, were not accountable to those directly responsible for the issues audited.

Top management chose topics for review based on departmental performance evaluations, current management concerns, and the results of previous audits. Environmental concerns of top management for 2002 continued to be the performance of the EMS, but the use of the Qualified Products List was also of special interest and was examined at all sites. Environmental compliance was determined through evaluating EMS performance which included compliance with

regulations, DOE contract requirements, and other internal requirements. Findings are tracked to completion in the DOE Consolidated Corrective Action Plan and in the DM Assessment Tracking System (ATS).

DM identified seven compliance findings and two EMS non-conformances during 2002. All were classified as low risk hazards, minor deviations from internal requirements and regulations. Corrective action plans for all of the findings and non-conformances were provided, and three findings were closed in CY 2002. Table 2-8 is a tabulation of 2002 findings by site.

Third Party EMS Audits

Two EMS surveillance audits were conducted in CY 2002 by the DM ISO 14001 registrar, Advanced Waste Management Systems, Inc. All five sites were audited once, the New Orleans site (headquarters) twice. The success of DM in meeting the requirements of eleven of the 17 elements of the ISO 14001 standard was evaluated during 2002. Two minor non-conformances were found which did not jeopardize certification.

Regulatory Inspections/Visits

There were sixteen inspections or visits by regulatory agencies to SPR facilities in 2002. There were fifteen minor findings associated with these inspections. Table 2-9 is a summary of the inspections/visits

Table 2-8. 2002 M&O Contractor Organizational Assessment Environmental Findings

Site	High Risk Hazard (compliance)	Medium Risk Hazard (compliance)	Low Risk Hazard (compliance)	Low Risk Hazard EMS
Bayou Choctaw	0	0	1	0
Big Hill	0	0	2	0
Bryan Mound	0	0	2	0
New Orleans	0	0	0	0
West Hackberry	0	0	2	2

Table 2-9. Summary of Regulatory and Third-Party Inspections/Visits During 2002

Site	Organization	Remarks
BC	LDEQ	Two procedural findings for NO. One operator error finding for the Lab. (Lab Audit)
	LDEQ	No findings. Unannounced inspection of all cavern wellpads, brine disposal wellpads, Sewage Treatment Plants, Discharge Monitoring Reports, and the Spill Prevention Control and Countermeasure Plan. There were no discrepancies identified.
	ISO 14001 Registrar	No findings. ISO 14001 Surveillance Audit at BC
BH	ISO 14001 Registrar	One Minor Non-conformance ISO 14001 Surveillance Audit - Hardcopy of site welding procedures has no owner and has not been updated or placed in PCENTRA
	TGLO	No findings. Annual inspection of Big Hill under OSPRA.
	TCEQ - Air	No findings. DM provided proof of removal of a second paint still as verbally requested.

Table 2-9. Summary of Regulatory and Third-Party Inspections/Visits During 2002 (continued)

Site	Regulatory Agency	Remarks
BM	ISO 14001 Registrar	No findings. ISO 14001 Surveillance Audit
	LDEQ	Four procedural findings for NO. Four documentation findings for the lab. (Lab Audit)
	TGLO	No findings. Unannounced inspection of the Bryan Mound SPR Site. His inspection revealed no problems with our current adherence to the State's Oil Spill Prevention and Response requirements as they pertain to the BM SPR Site.
	EPA –Houston	No findings. Required by Dallas EPA to inspect TX and LA DOE sites.
	TCEQ - Air	No findings. TCEQ Office Houston - Air permit renewal application verification of distances to offsite receptors - Recommend approval
NO	ISO 14001 Registrar	No findings. ISO 14001 Surveillance Audit at NO
	ISO 14001 Registrar	One Minor Non-conformance ISO 14001 Surveillance Audit – There is no clear procedure or policy for receiving, documenting, and responding to communications from the public (not the media or regulators) maintained at the sites.
WH	LDEQ	Two procedural findings for NO. (Lab Audit).
	LDEQ – Air	No findings. Observed emission points, reviewed records and obtained oil throughput - No findings documented on field interview form.
	ISO 14001 Registrar	No findings. ISO 14001 Surveillance Audit at WH

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 2002, the SPR sites reported zero crude oil spills and two brine spills in quantities of one barrel (42 gallons) or greater or as otherwise required by regulation.

State and federal agencies require notification if an oil spill meets or exceeds the reportable criteria. This reportable criteria is

established by each agency and may vary greatly in the amount to be considered a reportable spill. This is illustrated by the following examples: one barrel for the LDNR, five barrels for the RCT, or a sheen on a navigable waterway for the NRC. One of the reportable brine spills occurred at Bayou Choctaw with a volume totaling 10 barrels. The other brine spill occurred at West Hackberry releasing a volume of three barrels due to a pinhole leak. Details of these two spills are shown in Table 2-11. Corrosion/erosion has been the leading cause of brine spills over the past few years.

During CY 2002, the SPR moved (received and transferred internally) 23.0 million m^3 (144.6 mmb) of oil and disposed of 8.41 million m^3 (53.3 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 two in 2002 as depicted in Figure 2-4.

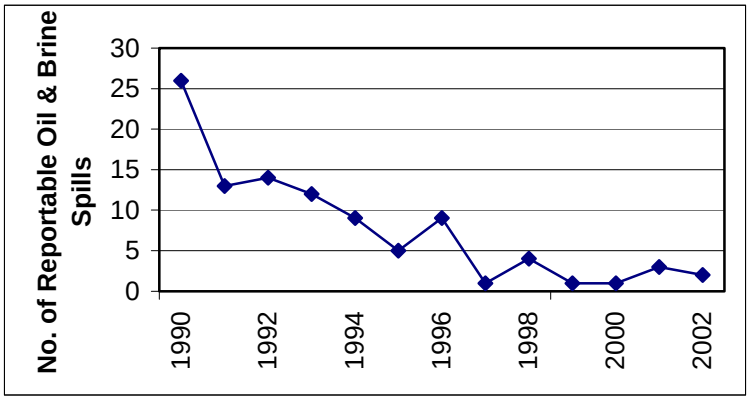

Figure 2-4. Number of Reportable Spills 1990-2002

Table 2-10. 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
2002	0	0	0

Table 2-11. 2002 Reportable Brine Spills

Date	Location	Amount	Cause/Corrective Action
01/25/02	WH	3 Bbls	Operations personnel detected a pinhole leak in the brine disposal line at a point where the line enters the ground east of the brine disposal injection pumps. The brine system was immediately shut down. Excavation was completed, leak repaired, and line placed back in service. In situ bioremediation is ongoing to restore the affected area.
11/10/02	BC	10 Bbls	While pumping brine from the brine pond to the High Pressure Pump for injection into site disposal wells, a leak was detected on the brine line. Pumping operations were immediately shutdown. The leak flowed into an onsite ditch that contained rainwater. Fresh water applied several times to the spill site and vacuumed to ensure no environmental damage. The corroded section of the line was replaced with new piping.

Table 2-12. 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}
2002	2	2.1 (13)	3.9×10^{-6}

2.3 SUMMARY OF PERMITS (JAN. 1, 2002 THROUGH DEC. 31, 2002)

General

Permits in effect during 2002 include 11 state and federal NPDES permits, six CAA permits, 42 COE wetlands permits and associated modifications and amendments (Section 404 of CWA), and over 100 oil field pit, underground injection well, and mining permits. In addition, a number of other minor permits were in effect during the year. Many of these major permits are presented in tabular form in Section 3, Tables 3-2 through 3-7.

Permit Compliance

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

Air quality operating permits require that piping components such as valves, flanges, pressure relief valves, and pump seals be inspected for leaks of VOC on a regular basis (quarterly in Texas and annually in Louisiana) using organic vapor analyzers (OVA). In addition, the Texas permits require that the flanges be inspected visually, audibly, and or by olfactory methods to identify any possible leaks on a weekly basis. All SPR air permits contain permit limitations based on pollutant emission 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 5,788 permit-related analyses performed in 2002. Three of the five were the result of a sample being outside of the permit parameter limits with the remaining two 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 2002. Summary information of NPDES exceedances and noncompliances is contained in Section 5.4, Tables 5.8 and 5.10.

Notice of Violation (NOV)

During 2002, 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 2-5.

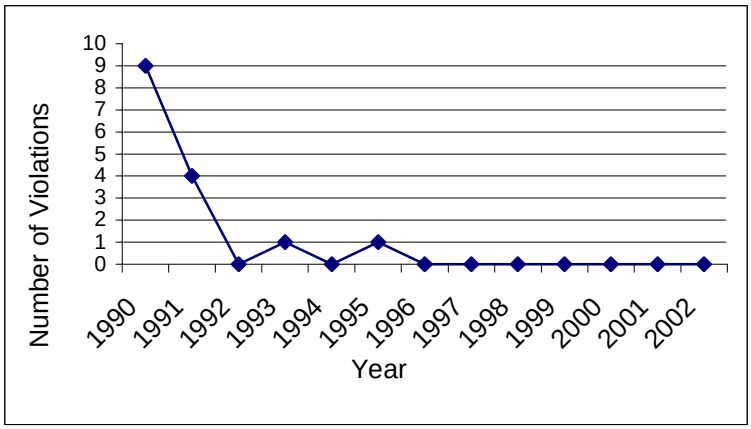

Figure 2-5. Number of Violations 1990-2002

2.4 SUCCESS IN MEETING PERFORMANCE MEASURES

General

Twenty-eight performance measures (objectives) were tracked in FY 2002. Twenty-five 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 2002 eight of the WADs tracked were from the Environmental Department, and seven of these were included in the environmental management system since they are related to significant environmental aspects of SPR activities. Eighteen other WADS originating from other departments were included in the EMS. Three performance measures that are not WADs were also devised and tracked in the EMS.

WADs that are part of the EMS are identified as "objectives." Two "targets" (metrics that can be measured) are established for each WAD and are used to determine success in meeting the WAD at "minimum" level (all DOE contractors should meet as a minimum) and a more challenging "target" level.

Success in Meeting Performance Measures (Objectives)

The performance measures and targets, and success in meeting them during FY 2002 are delineated in Table 2-13.

Of 28 performance measures tracked in FY 2002, 21 met or surpassed the more challenging "target" level and 5 exceeded the minimum target level. One was dropped since it did not support the EMS. Only one performance measure, reduction of Halon 1301 fire suppressant, was not achieved either at the minimum or target level. Halon removal is planned for removal in 2003 and 2004.

Performance trends were analyzed from CY 1999 through CY 2002. CY 1999 serves as a baseline - the year before the EMS was completely implemented. Data are provided in Table 2-14. Performance improved in four objectives, remained steady in eight, and decreased slightly in one.

Table 2-13. Performance Measures and Success FY 2002

Performance Measure Objective	Minimum	Target	Success
*1.J.1.a: Environmental Permit Exceedances – Number of permit exceedances reported on Discharge Monitoring Reports	15/yr	10/yr	Met target (2)
*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	Less than or equal to 10/yr	Less than or equal to 4/yr	Surpassed target (1)
*1.J.2.a: Reduce generation of hazardous waste	N/A	3140 lbs.	Surpassed target (717 lbs.)
*1.J.2.b: Reduce generation of sanitary waste	2.9 million lbs.	1 million lbs.	Surpassed target (0.48 million lbs.)
*1.J.2.c: Increase the recycling of sanitary waste through waste diversion	12%	20%	Surpassed target (49%)
*1.J.2.d: Increase purchase of EPA-designated recycled content products (Affirmative Procurement)	95%	100%	Met target (100%)

Table 2-13. Performance Measures and Success FY 2002 (continued)

Performance Measure Objective	Minimum	Target	Success
1.J.3.a: Maximize the number of environmental assessments and technical reviews performed.	Five Assessments	Eight technical reviews in addition to the minimum assessments	Surpassed target (5 scheduled assessments and 29 site assistance visits)
*1.L.B.2.b: Complete Level 3 milestones associated with performance, accurate, and timely reporting of cavern integrity tests	95%	100%	Met target (100%)
*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.	95% MPAR (all sites) each month	98%+ MPAR (all sites) each month	Surpassed target (98.3%)
*1.M.3: Complete sampling and testing motor oil as scheduled. (Determines when oil needs changing – minimizes waste oil)	95% of quarterly samples	100% of all samples	Surpassed minimum and approached target (99.87%)
*No WAD designation: Review publications for environmental input by due date, tabulated bimonthly	95% by due date	100% by due date	Met target (100%)

Table 2-13. Performance Measures and Success FY 2002 (continued)

Performance Measure Objective	Minimum	Target	Success
*1.T (ATSM-PM) 4.b: Complete community outreach activities, using annual plan as a baseline	90%	100%	Surpassed target (156%) due to completing planned activities and also those not planned in the baseline.
*1.L.4.b(1): Introduce energy efficient projects, either into detailed design or completed	1 project by the end of FY 2002	3 projects by the end of FY 2002	Exceeded minimum (2 projects)
*1.L.4.b(2): Complete review of alternative of in-service alternative fuel vehicle site utilization	By end of third quarter of FY 2002	N/A	Met target
*1.H.4.a: Maintain percent availability of physical protection system	Maintain at 95%	Site meet available target for 90% of reporting periods	Surpassed target (98%)
*1.T.A.2: In managing the Piping and Pipeline Assurance Program, submit semi-annual piping and pipeline assurance reports in accordance with schedule.	Within 30 days of schedule	On schedule	Met target.
*1.T.1.b: Ensure key spill equipment are available.	90%	100%	Met target. All available and operational.

Table 2-13. Performance Measures and Success FY 2002 (continued)

Performance Measure Objective	Minimum	Target	Success
*1.T.1.c(2): Ensure basic order agreements are in place for spill response and clean up at each site.	One	Two or more	Met target (average of 2.56 available)
*1.T.1.a: Ensure emergency preparedness and response capabilities through training Emergency Response Team (ERT) members.	80% ERT trained/site. 20 at BC 25 at BM, BH, & WH	95% ERT trained/site	Surpassed target (100% trained/site)
*1.T.1.c(1): Ensure Incident Commander/Qualified Individual at each site is trained in ICS (initial and refresher).	90%	100%	Met target
*1.T.2: Ensure fire protection capabilities at each site through prompt Priority One and Two fire protection system repairs.	6-month average equal to completion time of Must-Operate equipment repairs	6-month average less than completion time of Must-Operate equipment repairs	Met target for Priority One. All except BM met Priority 2.

Table 2-13. Performance Measures and Success FY 2002 (continued)

Performance Measure Objective	Minimum	Target	Success
*1.L.1.A.4.a(1): Control overall site electric loads to minimize utility costs and/or reduce consumption through efficiency improvements, including Utility Demand Side Management Programs (fill, drawdown, and unplanned activities excluded)	(FY1990 – FY2002) FY90 ≥ 0.175 FY=Power usage during fiscal year	(FY90 – FY02) FY90 ≥ 0.20	Exceeded minimum and almost met target (19.21%)
*No WAD designation: Submit environmental documents on time to DOE and regulators (timeliness and quality).	N/A	100%	Met target
*1.L.B.3: Monitor site subsidence rates as required by SPR Level III Criteria using percentage of required subsidence monuments available and undamaged in order to obtain quality subsidence survey results.	95% of all monuments required at each site	100% of all monuments required at each site	Approached target (97.4%)

Table 2-13. Performance Measures and Success FY 2002 (continued)

Performance Measure Objective	Minimum	Target	Success
*1.H.1.c: Ensure active continuance of Local Law Enforcement Agency (LLEA) program.	Maintain letters of understanding as appropriate	Maintain monthly site contact and primary agency participation during Field training exercise (FTX)	Met target. Site contact made weekly.
*1.H.1.d: Conduct joint tactical operations with Local Law Enforcement Agency (LLEA)	Conduct joint operations at 75% of sites	Conduct joint operations at all sites	Met target
*No WAD designation: Decrease the amount of Halon 1301 (Class 1 ozone depleting substance) on the SPR	N/A	10%	Not met. Action deferred to FY 2003.
*1.L.B.4.d: Decrease storage cavern pressure to lower end of approved operating range.	When cavern pressure reaches top of operating range	When cavern is within 5 psi of the top of the operating range	Not applicable to the EMS

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

Table 2-14. Performance Trends, CY 1999 through CY 2002

Performance Measure Objective (and metric)	CY 1999 (Baseline unless otherwise stated)	CY 2000	CY 2001	CY 2002	Performance Trend
Reduction in hazardous waste (lbs generated)	11,901 lbs	3,802 lbs	1,704 lbs	706.4 lbs	Improved continually
Reduction in sanitary waste (lbs generated)	0.796 million lbs	0.612 million lbs	0.571 million lbs	0.461 million lbs	Improved continually
Increase recycling of sanitary waste through waste diversion (% of waste recycled)	69%	49%	73%	35%	Fluctuating
Meeting environmental actions on/before milestone dates (% of actions)	100%	100%	97%	100%	Improved since 2000
Reviewing publications by due dates (% of publications)	Not measured yet	97.6% (Baseline)	100%	100%	Remained stable
Reducing environmental permit exceedances (number of exceedances)	3	7	5	5	Remained stable
Reducing violations to the Clean Air and Water Acts (number of violations)	0	0	0	0	Remained stable

Table 2-14. Performance Trends, CY 1999 through CY 2002 (continued)

Performance Measure Objective (and metric)	CY 1999 (Baseline unless otherwise stated)	CY 2000	CY 2001	CY 2002	Performance Trend
Reducing the number of reportable occurrences of releases (number of reportable releases)	2	1	3	2	Remained low but fluctuating
Submitting quality documents to DOE and regulators on time (% submitted on time)	97%	100%	100%	100%	Remained consistently prompt
Maintaining certification to ISO 14001 EMS standard (100% = certification maintained)	Pre-dates initial certification	100% (Baseline)	100%	100%	Certification maintained since beginning
Increase purchasing of EPA designated recycled content products (affirmative procurement) (% success in purchasing recycled or documenting reason for virgin purchases)	Not measured yet	82% (Baseline)	99%	100%	Improved greatly
Achieving high MPAR score for maintenance program (% success, highest being 100%)	95.5%	97.3%	97.9%	98.3%	Improved slightly

Table 2-14. Performance Trends, CY 1999 through CY 2002 (continued)

Performance Measure Objective (and metric)	CY 1999 (Baseline unless otherwise stated)	CY 2000	CY 2001	CY 2002	Performance Trend
Sampling and testing equipment motor oil (% of samples scheduled)	93.7%	95.6%	96.5%	99.9%	Improved slightly
Completing planned community outreach projects (% of projects completed)	100%	100%	100%	168%	All or more projects than scheduled were completed
Completing milestones associated with cavern integrity testing (% of milestone scheduled)	100%	100%	95%	100%	Remained stable
Maintain physical protection system (% availability)	93.5%	≥ 95%	≥ 95%	≥ 95%	Remained stable
Submit semi-annual piping and pipeline assurance reports in accordance with schedule (the end point of pipeline surveillance) (promptness of report)	On schedule	On schedule	On schedule	On schedule	Consistently on schedule

Table 2-14. Performance Trends, CY 1999 through CY 2002 (continued)

Performance Measure Objective (and metric)	CY 1999 (Baseline unless otherwise stated)	CY 2000	CY 2001	CY 2002	Performance Trend
Ensure key spill equipment are available (% available)	100%	100%	100%	100%	All equipment consistently available
Ensure basic order agreements are in place for spill response and clean-up at each site (average number of BOA's in place over the FY)	10	> 3.0	> 3.0	2.84	Exceeded target (2) consistently
Ensure emergency preparedness and response capabilities through training emergency response team (ERT) members (% of members trained during year)	98.3%	96.6%	95.5%	98.2%	Improved slightly
Ensure the Incident Commander/Qualified Individual at each site is trained in Incident Command (initial and refresher) (percent of personnel trained)	50.2%	47.8%	100%	100%	Strongly improved since CY 2001

Table 2-14. Performance Trends, CY 1999 through CY 2002 (continued)

Performance Measure Objective (and metric)	CY 1999 (Baseline unless otherwise stated)	CY 2000	CY 2001	CY 2002	Performance Trend
Ensure fire protection capabilities at each site through prompt Priority One and Two fire protection system repairs (average number of days to complete repairs)	Not measured yet	Not measured yet	PRI 1: 31.7 days PRI 2: 66.8 days (Baseline)	PRI 1: 27.2 days PRI 2: 64.6 days	Improved slightly
Decrease the amount of Halon 1301 (Class 1 ozone depleting substance) on the SPR (lbs of Halon removed)	0	0	0	0	No activity yet. Removal slated for FY 2003
Complete review of alternative of in-service alternative fuel vehicle site utilization (review completed by end of 3rd quarter)	Not measured yet	Not measured yet	Review completed on time	Review completed on time	Remained stable
Introduce energy efficient projects either into detailed design or completed (number of projects)	Not measured yet	Not measured yet	3 projects completed and 3 to be completed (Baseline)	4 projects completed	CY 2002 change affected by stage of previous year's projects

Table 2-14. Performance Trends, CY 1999 through CY 2002 (continued)

Performance Measure Objective (and metric)	CY 1999 (Baseline unless otherwise stated)	CY 2000	CY 2001	CY 2002	Performance Trend
Minimize utility costs by controlling overall electric loads and reduce energy consumption through efficiency improvements (power usage factor, the greater the better)	Not measured yet	Not measured yet	19.03 (Baseline)	19.26%	Improved slightly
Monitor subsidence rates using percentage of required subsidence monuments available and undamaged to obtain quality survey results (% of monuments required)	75%	100%	100%	100%	Improved in CY 2000 and remained stable
Ensure active continuance of local law enforcement agency (LLEA) program (through letters or monthly contact)	Met target – monthly contact	Met target – monthly contact	Met target – monthly contact	Met target – monthly contact	Remained stable
Conduct joint tactical operations with local law enforcement agencies (% of site exercises conducted with LLEA)	100%	100%	100%	100%	Remained stable

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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 450.1. 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 2002 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 and the PPP are 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 where needed that implement the environmental program specific to their facility.

The ISO 14001 Environmental Management System Manual was developed to describe and provide direction to DM policies, plans, and procedures that make up the environmental management system and to illustrate how the EMS conforms to the ISO 14001 standard. 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 to 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	TCEQ	Air Emissions Permit	Annual Emissions Inventory Questionnaires
		TCEQ	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, TCEQ, 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 450.1*	Environmental Planning and Monitoring	DOE	Environmental Protection and Implementation Plan	Annual revision
DOE Order 450.1* (continued)			Ground Water Protection Management Program Plan	Annual review (now contained in EMP)
			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	TCEQ	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

***Note: Reporting requirements changed as the result of the replacement of DOE Order 5400.1 with DOE Order 450.1.**

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 Performance Track Program	Environmental Management Systems	U.S. EPA	In 2000 the initial membership application was submitted to EPA and approved for a 3 year commitment to the program	Annual progress report
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, TCEQ	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, TCEQ	Shipping Paper	Complete and submit form with disposal
	Waste Management	LDEQ, TCEQ	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 Residual Concentration	Retain on site
		TCEQ	Weekly disinfectant residual concentration	Monthly
	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

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 TCEQ in Texas. During CY 2002, the TCEQ renewed the Bryan Mound site air permit and issued new standard air permits to the two Texas sites for construction and operation of the new Degas II Plant.

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.

LDNR issued a concurrence in June 2002 for the addition of corrosion inhibiting chemicals in low concentrations to lifted raw water for drawdown per a request made after a bench scale environmental chemical testing had been completed.

The U.S. Army Corps of Engineers, New Orleans District, issued three permits to Bayou Choctaw in 2002 to install and maintain a parking lot, security fence, and minor roadway crossings.

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	LPDES*	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)
WN-20-020-0168	COE	Constr. & Maintain	04/02/02	-	(12)
WT-20-020-2654	COE	Constr. & Maintain	08/20/02	-	(13)
WT-20-020-3621	COE	Constr. & Maintain	09/17/02	-	(14)
LMNOD-SP (Bayou Plaquemine)	COE	Constr. & Maintain	09/26/77	-	(15)

(1) LDEQ obtained primacy and issued and LPDES permit with former NPDES number this year.
(2) LPDES* 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. State issued LPDES permit in May 2001.
(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.
(12) Install and maintain fill with culverts for parking. Permit authorized a construction period until 4/30/2007.

(13) Install and maintain culverts and fill to construct minor roadway crossings. Activity authorized under NWP-14 and provides a construction period until 8/20/2004.
(14) Replace, repair and maintain security fence with concrete footing and curbing. Activity authorized under NWP-3 and provides a construction period until 9/17/2004.
(15) Install and maintain 36-inch petroleum products pipeline under and across Bayou Plaquemine

3.3.2 Big Hill

Table 3-3 lists the permits at Big Hill. In 2002, the site appropriated 157,387.29m^3 (127.61 acre-feet) of water from the Intracoastal Waterway exclusive of water for fire protection. This represents only 0.4 percent of the recently revised total allowable withdrawal for a year. The certified affidavit and annual report of water usage was forwarded to the TCEQ as required in 2002.

The NPDES renewal application, forwarded to Region VI EPA in November 1993 and accepted as administratively complete on December 22, 1993. Direct contact with Region VI Performance Track personnel was initiated early in 2002 that resulted in permit writing activity throughout the remainder of the year.

The Railroad Commission of Texas successfully renewed the state TPDES water discharge permit for Big Hill in 1999 and this permit remains current until 2004. Renewal activity for this permit must precede the expiration by 90 days or within CY 2003.

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. One maintenance notification was made to the U. S. Army Corps of Engineers Galveston District (GALCOE) during 2002 for the repair and replacement of a traveling screen on the permitted RWIS. The forms T-4C were forwarded to the appropriate branch of the Railroad Commission of Texas (RCT) in early November 2002, for the Big Hill crude oil

pipeline distribution system.

The permit required two brine line integrity test results were provided EPA Region 6 during the calendar year 2002. Hurricane damage and threats occurring in the Gulf just prior to performance of the second semi-annual test in the November timeframe required extension until mid-December to complete. This activity was closely coordinated with Region 6 US EPA NPDES Enforcement personnel.

Both agencies holding water discharge permits for the Texas sites concurred with the addition of corrosion inhibiting chemicals in low concentrations in the raw water ahead of the heat exchanger units under the condition of Presidential drawdown in 2001 and the additional bench scale environmental chemical testing data provided in CY 2002 will be acted upon officially by each agency in subsequent permit renewal actions.

The site's new replacement package sewage treatment plant (STP) was commissioned and began processing the site's sanitary sewage for discharge on November 6, 2002. Both the federal and state agencies were prior notified of this switchover.

Region 6 US EPA sent along a DMR enforcement check correspondence to the site which was successfully responded to on September 27, 2002. This was a routine audit-check for replacement archival reports.

The Big Hill site received a credit to their annual water appropriation fee for overpayments made to the state's underground storage tank (UST) program. This activity has

spanned a three-year period. The site's SPCC plan was successfully revised and updated in 2002 representing those minor changes occurring over a 3 year period in this routine compliance related triennial update.

A Standard Air Permit application was submitted to TCEQ for the construction and operation of the new Degas II Plant at Big Hill. TCEQ issued Standard Air Permit No. 51839 on 8/15/02.

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) (4)
P-7	F&WS	Constr. & Operate	07/31/86	06/30/2036	(5)
9256	TCEQ	Air	04/22/98	04/22/2008	Site Air Permit
51839	TCEQ	Air	08/15/02	08/15/2012	Degas Permit
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	09/30/2004	(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 TCEQ 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 2002, the site used a total of 242,216.83 m^3 (196.39 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 2002.

During CY 2002 one 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 and action was initiated in 2002. Required reporting for 2002 involved requirements for semi-annual brine line integrity tests to Region 6 EPA (two tests were sent in 2002); wastewater operators' reports to TCEQ; and crude oil pipeline system operations renewal. The second brine line integrity test for the year was delayed due to hurricane damage and threat preceding the November test interval. An extension was closely coordinated with Region 6 US EPA Enforcement personnel for the test completed in mid-December when a rental jack-up barge became available.

Both agencies holding water discharge permits for the Texas sites concurred with the addition of corrosion inhibiting chemicals in low concentrations in the raw water ahead of the heat exchanger

units under the condition of Presidential drawdown in 2001 and the additional bench scale environmental chemical testing data provided in CY 2002 will be acted upon officially by each agency in subsequent permit renewal actions.

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 2002.

Region 6 US EPA sent along a DMR enforcement check correspondence to the site which was successfully responded to on September 27, 2002. This was a routine audit-check for replacement archival reports.

The site's annual water systems fee was paid as required in December 2002.

A renewal air permit application was submitted to TCEQ for the Bryan Mound Air Permit No. 6176B. TCEQ issued the renewed permit on June 12, 2002. 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.

A Standard Air Permit application was submitted to TCEQ for the construction and operation of the new Degas II Plant at Bryan Mound. TCEQ issued Standard Air Permit No. 52962 on November 7, 2002.

Table 3-4. Permits at Bryan Mound.

PERMIT NUMBER	ISSUING AGENCY	PERMIT TYPE	EFFECTIVE DATE	EXPIRATION DATE	COMMENTS
TX0074012	EPA	NPDES	05/22/00		(1)
NOI	EPA	NPDES*	01/24/01	09/2005	(2)
SWGCO-RP-12347 (03)	COE	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	TCEQ	Air	06/12/02	06/12/12	Site Air Permit
52962	TCEQ	Air	11/07/02	11/07/12	Degas Permit

(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 at project end, covers 52000 ac/ft/yr and MDR of 130 CFS per 2001 amendment.
(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.

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 2002. Sporadic and spurious elevated TPH readings identified in November and confirmed in early December were subsequently tested with a more specific gas chromatographic procedure. These later method confirmatory evaluations suggest that the former infrared broad spectrum method was subject to naturally occurring interferences not associated with crude oil or crude oil components. The former sinkhole No. 1, held in abeyance by maintenance of a subsurface freeze plug, reappeared in June 2001, as the freeze plug thawed. The reactivation was closely monitored throughout CY2002 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 as proposed upon final decommissioning in 1999. At this 5-year

anniversary point, the overall monitoring program will be re-visited and revised with LDNR.

3.3.6 West Hackberry

A closure-complete report was prepared and filed with LDNR in February 2000 for the decommissioning work for the interconnected brine pond system and in petition for revocation of the permits. The report documented completion of all the closure actions and provided the post-clean testing for review. In addition, a year-long ground water evaluation period was proposed prior to resumption of routine site wide ground water monitoring. The report was not acted upon in 2002, however, the recovery pumping was authorized to cease and a yearlong evaluation commenced in April 2001 which concluded with a final Summary Report mailed in September 2002. The Summary Report provided detailed analyses of the physical and chemical data during the initial 5 quarters of recovery cessation and again proposed a resuming long-term site-wide ground water detection monitoring. That report was not acted upon during the remaining portion of the calendar year.

LDNR issued a concurrence in June 2002 for the addition of corrosion inhibiting chemicals in low concentrations to lifted raw water for drawdown per a request made after bench scale environmental chemical testing had been completed.

LDEQ issued a determination in 2002 that no separate permit would be required for the remote Lake Charles Meter Station (LCMS), whose discharges have been authorized and reported against the site's LPDES permit. Region 6 had issued a separate

number for this locale historically. This action successfully closed the database on this issue.

Two COE permits were issued during CY 2002 for the West Hackberry site for construction and maintenance activities.

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	LPDES	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)
SDS-9	LDNR	Injection	08/07/79	Open	(9)
None	LDNR	Injection	01/11/83	Open	(10)
971198-9	LDNR	Injection	09/27/83	Open	(11)
0560-00019-02	LDEQ	Air	11/24/97	Open	-
SWGCO-RP-12342	COE	Constr. & Maintain	03/28/78	-	(12)
LMNOD-SP (Cameron Parish Wetlands) 152	COE	Constr. & Maintain	03/16/78	-	(13)
LMNOD-SP (Cameron Parish Wetlands) 276	COE	Constr. & Maintain	02/11/80	-	(14)
WN20-000-3972-0	COE	Constr. & Maintain	8/31/00	-	(15)
WO-20-020-1136	COE	Constr. & Maintain	01/25/02 02/19/02	-	(16)
WO-20-020-3607	COE	Constr. & Maintain	10/23/02	-	(17)

(1) LDEQ obtained primacy and issued and LPDES permit with former NPDES number.
(2) LPDES *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 State issued LPDES permit in May 2001.
(3) Maintenance dredging for raw water intake.
(4) Maintenance dredging for firewater 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) Restore riprap along the north perimeter dike adjacent to Cavern 6 and Black Lake. Permit authorized a construction period until 1/25/2007.
(17) Deposit fill in the fire ditch. Permit authorized a construction period until 10/23/2007.

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 2002. The SPR sent 0.3 metric tons mt (674 lbs.) of hazardous waste off site for disposal during CY2002. The SPR also sent 209.3 mt (461,402 lbs.) of sanitary waste off site for disposal during CY2002. The SPR met their hazardous and non-hazardous sanitary waste generation targets of 3,140 and 1,000,000 lbs respectively. DM environmental staff members were able to assist in this success by a thorough review of the potential waste streams, evaluation of all possible recycling alternatives, communication with SPR site personnel, and consultation with federal and state regulatory agencies as required. An example of this is illustrated by the remediation of crude oil contaminated soil at the SUNOCO Terminal. On March 15, 2002 a spill of 15 gallons of crude oil occurred at the SUNOCO meter skid.

As a result of clean up actions, 20 cubic yards of crude oil

contaminated soil was excavated from the area. DM environmental staff members consulted with the RCT agency to obtain approval to bioremediate the soil and return it to the area. This initiative prevented the generation of a solid waste and associated transportation and disposal costs.

The SPR expanded the recycling program to include more cardboard, file stock and newspaper. The Secretary of Energy P2 Goal #4 requires the SPR to recycle 45% of sanitary waste from all

operations by 2005 and 50% by 2010. New Orleans Warehouse was the first SPR location to receive a cardboard baler as part of this pollution prevention initiative to reduce sanitary waste through recycling. Since expanding the NOLA recycling program, the NOLA complex has produced an average of 1,070 lbs of cardboard per month. The baler is designed to compress loose cardboard into 900-pound bales. A baling system is an improvement from a recycling and safety perspective but will also reap benefits in cost savings. Over time, a reduction in waste

handling fees and dumpster rental will be realized. The process of eliminating cardboard from dumpster trash will save landfill space.

As a result of the September 9, 2001 terrorist events, the SPR enhanced security. NOLA installed a fence to enclose the parking lots for buildings 850 and 900. As with most activities, whether it is construction or demolition, there is waste generated. During installation of the fencing (June 2002), the cardboard packing was accumulated. The SPR was successful in diverting approximately 30 cubic yards of cardboard from the landfill back into recycling. The project was coordinated through Legacy Project, Inc (recycling vendor).

Other materials and respective amounts recycled or reclaimed during CY 2002 are delineated in Table 3-7.

Table 3-7. 2002 Materials Recycled from all SPR Sites

Recycled Material	**Amount Recycled/Reclaimed**
Aluminum Cans	0.31 mt (677 lbs.)
Antifreeze	0.10 mt (223.5 lbs.)
Binders	0.06 mt (132 lbs.)
Bulbs	0.24mt (522.2 lbs.)
Cardboard	15.41mt (33,905 lbs.)
Concrete	34.6 mt (76,000 lbs.)
Diskettes	.17 mt (369 lbs)
Fire Extinguishers	.12 mt (264 lbs)
Freon	.004 mt (8 lbs)
Fuel Filters	.005 mt (10 lbs.)
Lead Batteries	2.090 mt (4601.1 lbs.)
Mardi Gras Beads	0.10 mt (229 lbs.)
Nickel-Cadmium Batteries	0.02 mt (43.2 lbs.)
Oil Filters	0.02 mt (53.0 lbs.)
Pallets	4.9 mt (10,825 lbs)
Paper	451.6 mt (99,350.0 lbs.)
Plastic Bottles	1.72 mt (379 lbs.)
Scrap Metal	2.9 mt (6379 lbs.)
Spirals	0.002 mt (4 lbs.)
Tank Residue	.05 mt (100 lbs)
Toner Cartridges	1.09 mt (2,397 lbs.)
Transformer Oil	.09 mt (200 lbs)
Used Oil Burned for Energy Recovery	6.73 mt (14,813 lbs.)
Total	522.33 mt (1,149,128.2 lbs.)

3.5 POLLUTION PREVENTION (P2)

The DM project manager and his staff, in support of the DOE Project Management Office (PMO), administer and implement the SPR P2 Program. The program's purpose is to unite SPR P2 activities into one program, integrate these activities into all SPR operations, support technology development programs aimed at minimizing multimedia waste generation, and coordinate P2 efforts with SPR sites. The P2 Team is composed of all SPR employees.

The P2 Advocates Team, composed of staff from each site, several departments in New Orleans, and a DOE representative, disseminate awareness throughout the SPR. P2 announcements and suggestions are communicated via monthly conference calls and the SPR electronic banner. Minutes are published on the outlook public folders and the Environmental Webpage, which are available to all SPR employees.

In 2002, the SPR Behavioral Safety Process was fully integrated into the Pollution Prevention Program. Pollution prevention definitions were entered into each sites behavioral database to support tracking of behavioral environmental observations. The DM Environmental Department kicked off the first P2 focused observation initiative in the Engineering and Construction Directorate. The initiative was designed to build environmental awareness of positive behaviors involved in reducing paper waste through source reduction, reuse, and the proper use of paper recycling receptacles.

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.

In August 2002, Bryan Mound implemented a Pollution Prevention (P2) project. The site replaced six-volt battery-operated barricade flashers with solar-powered flashers to reduce waste. The battery-operated flashers each held two 6-volt batteries and were attached to security road barriers or used to mark an excavation near a road or walkway. On average, the batteries were being replaced monthly. By installing alternative solar-powered lighting, waste being generated from batteries was eliminated. The solar-powered option is providing sufficient lighting and has a life expectancy of 2 years. After running a cost benefit analysis of the replacement project, it was determined that there would be an additional benefit in a net savings over 2-years of $ 3,366.00.

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. In 2002,

the SPR streamlined the tracking system of purchases in the SAP system.

As a result of 9/11 security enhancements, Bryan Mound in 2002 was one of the first sites to install their parking lot using crushed recycled concrete as part of the foundation fill material. They successfully ordered 5,160 cubic yards or 6,966 tons of concrete for a total of $ 97,524. In addition to the concrete, the site also ordered 140 parking bumpers, which were made of re-cycled plastic milk bottles. Bayou Choctaw site also utilized 2,766.8 tons (2050 cu yds) of crushed recycled concrete for a parking lot and included new concrete containing fly-ash for the parking stops and foundations. The Bayou Choctaw concrete cost approximately $60,000. These jobs successfully satisfy the requirement for the purchasing of specific EPA-designated recycled materials mandated by Executive Order 13101. It also helps fulfill the SPR target Pollution Prevention 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. These activities were reported in the Annual Pollution Prevention Accomplishments report submitted to DOE HQ in November 2002.

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.

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 of

1992, which calls for programs designed to incorporate energy heating/cooling initiatives and accelerate the introduction of alternative fuel vehicles to reduce the nation's dependence on imported oil.

In 2002, the SPR continued implementation of an aggressive vehicle replacement program. Additional electric vehicles were purchased to replace small gasoline powered utility vehicles, bringing the total to 23 electric vehicles last year. The SPR also received an additional 8 liquefied petroleum gas powered pick-ups, bringing the total to 17 alternate fuel vehicles.

In addition to making major contributions with regard to the success of the SPR P2 program, SPR M&O environmental staff members also participated its second consecutive beach sweep program in September 2002. Beach Sweep is a nationally organized shoreline clean-up event sponsored in New Orleans, LA by the Lake Pontchartrain Basin Foundation. SPR staff members collected debris and documented the types. This information was

incorporated into a national database to document the progress of the program.

3.6 INTEGRATED SAFETY MANAGEMENT (ISM)

The Environmental Management System (EMS) is the environmental leg of ISM that is 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.

Due to the accomplishments of the EMS, a refocus of management attention and employee involvement since 1999 has reduced hazardous waste generation costs by $17,318 sanitary waste disposal expenditures by $154,243, and spill clean-up costs by $186,295. This savings equates to approximately $119,000 savings annually ($357,856 since 1999) for pollution prevention efforts targeted directly at reducing spills, hazardous waste, and reducing sanitary waste through source reduction and expansion of recycling programs.

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, 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 and receive refresher training annually.

All site personnel and unescorted site visitors receive compliance awareness training via "The Active Force of Protection" videotape which provides 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.

All site personnel also receive computer based ISO 14001 EMS training anally. The training provides an overview of those elements of the ISO 14001 standard that involve all personnel. It also identifies environmental aspects and impacts of SPR activities.

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.

In order to better assist the SPR sites with regard to performing SPR site assessments, and TSD facility due diligence inspections, two M&O environmental staff members completed ISO 14001 Lead Auditor certification training during CY 2002.

4. ENVIRONMENTAL RADIOLOGICAL PROGRAM INFORMATION

Radioactive sources at the SPR consist of X-ray that is used in laboratory and scanning equipment or other sealed sources 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. In addition the SPR is subject to inspections by the state implementing agencies (Louisiana Department of Environmental Quality and Texas Department of Health) and required notices to employees are posted on each X-ray scanning device.

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. During CY 2002 there were two sealed sources on the Big Hill site that were used for monitoring activities.

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.

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5. ENVIRONMENTAL NON-RADIOLOGICAL PROGRAM INFORMATION

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

Effluent and surveillance monitoring are conducted at the SPR sites to assess the impact of SPR activity on air, surface water, and ground water. 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)

In CY 2002 DM maintained the certification of its EMS to the ISO 14001 standard. The EMS was certified in May of 2000. The DM EMS includes; the necessary organizational structure, activity planning, designation of responsibilities, practices, procedures, processes, and resources to support and validate the Environmental Policy, DM ASP5400.2 (Appendix B).

The conformance of the EMS to the ISO 14001 standard is illustrated through the ISO 14001 Environmental Management System Manual, ASI5400.55. This document provides description or reference to DM policies, plans, procedures, environmental aspects and impacts, and objectives and targets that are the foundation of the EMS. Activities performed to achieve environmental objectives are briefly described in Table 5-1 EMS Program Achievement.

Table 5-1 EMS Program Achievement

Environmental Objective	How Achieved
Reduce hazardous waste generation	A P2/E2 Leadership goal. Refer to Item 1, Table 2-1.
Reduce sanitary waste generation	A P2/E2 Leadership goal. Refer to Item 3, Table 2-1.
Increase recycling of sanitary waste through waste diversion	A P2/E2 Leadership goal. Refer to Item 4, Table 2-1.
Meet environmental actions on/before milestone dates	Milestone dates are agreed upon with environmental personnel prior to discussion with DOE and their subsequent establishment. They are tracked by environmental personnel and DOE via DM's weekly environmental Summary of Significant Environmental Impacts and Activities.
Review publications by due dates	Each department has a focal point for receiving publications for review. The publications are distributed by the focal point to subject matter experts for review and comment.
Reduce environmental permit exceedances	Personnel involved with activities that involve environmental permits are aware of permit limitations that can be affected by their activities. When they do occur, exceedances are formally addressed real time in an Occurrence Report. The reports prompt a description of occurrence, cause, and corrective action. To provide awareness and promote corrective action, the information is also provided monthly in a report to the DM President and to upper management at the monthly project review meeting for discussion.
Reduce violations to the Clean Air and Clean Water Acts	Awareness is provided to site personnel through spill prevention training. Reportable releases are documented and managed like permit exceedances.
Reduce the number of reportable occurrences of releases	During a release, trained emergency response personnel respond to control and minimize spill impact. Releases are documented and reviewed in the same manner as permit exceedances and violations to the Clean Air and Clean Water Acts.
Submit quality documents to DOE and regulators on time	Documents that have delivery dates are managed and tracked as milestones. Drafts are distributed to affected DM personnel for review and feedback prior to final completion.

Table 5-1 EMS Program Achievement (continued)

Environmental Objective	How Achieved
Maintain EMS certification to the ISO 14001 Standard	Money and time are budgeted to accommodate third party audits by an RAB accredited registrar. Audit dates are scheduled with the registrar and participating sites months in advance to assure that a minimum of two audits are completed by the end of June and December.
Increase purchasing of EPA designated recycled content products (affirmative procurement)	A P2/E2 Leadership goal. Refer to Item 6, Table 2-1.
Maintain a high Maintenance Performance Appraisal Report (MPAR) score for the maintenance program	A well-maintained facility should equate to fewer environmental impacts such as spills. MPAR is a weighted average that is calculated and published monthly in a detailed report. It is used to measure performance related to quality of maintenance, preventive maintenance completion, maintenance support, scheduling effectiveness, productivity, corrective maintenance backlog, and readiness of critical must-operate equipment. Maintenance related criteria that are measured include quality, support to other areas, mission readiness, scheduling effectiveness, productivity, preventive maintenance completion, and backlog. Each criterion has a goal, and failure to achieve a goal serves as an indicator for attention.
Sample and test equipment motor oil.	Oil in equipment is routinely sampled and tested for performance. Oil is changed in equipment when it fails to meet performance requirements. This promotes waste oil minimization.
Complete planned community outreach projects.	A community outreach planned is developed and implemented each year by DM Public Affairs. The plan for FY 2002 included 23 line items and charitable projects submitted for support by employees. Corporate contributions were made to each site community. Examples include scholarships and educational assistance, sponsoring the DOE Science Bowl, the New Orleans Police Foundation, voluntary fire departments in each site area, the Nature Conservancy of Louisiana, and the Audubon Institute. In addition each site is provided a DM corporate budget for site-specific outreach programs that best fit their community needs.

Table 5-1 EMS Program Achievement (continued)

Environmental Objective	How Achieved
Complete milestones associated with cavern integrity testing.	Cavern integrity tests are completed to identify and prevent leakage from subterranean cavern piping into geological formations. Meeting milestones of a regimented test program is a proactive approach to preventing releases.
Maintain site physical protection (security) systems.	A physically secure site should be less vulnerable to environmental impact by subversive elements. Security systems are constantly monitored for performance by the site's protective force. Discrepancies are reported daily to the site security specialist for review and initiation of a work order for repair. Work orders for the PPS systems are given very high priority – the same as drawdown critical equipment. Also, the site security specialist champions the work orders during the work scheduling meetings.
Complete and submit semi-annual piping and pipeline assurance reports on schedule.	Piping and pipeline assurance reports culminate pipe integrity inspection and testing activities. These activities support spill prevention. Site piping undergoes ultrasonic testing every six months. Pipeline integrity is measured through the following inspections: cathodic protection, quarterly rectifier, annual ground potential, close interval (ground potential) every 3 years, six-month corrosion coupon, 3-5 year smart pig, 5–year navigable water way, and pipeline over flights every two weeks.
Ensure key spill equipment are available.	Each site has key spill equipment that is tailored to site conditions. The equipment is inventoried quarterly by the site's emergency management coordinator. Any operational discrepancies are noted and corrective action is taken.
Ensure basic order agreements are in place for spill response and clean up at each site.	Each site has agreements with at least two spill response contractors - a primary and an alternate – but basic ordering agreements were established with 13 response contractors in CY 2002. When choosing contractors, factors such as company location, available/type of equipment, and available manpower are considered. The contractors are called out to participate in annual drills where their performance is evaluated.

Table 5-1 EMS Program Achievement (continued)

Environmental Objective	How Achieved
Ensure emergency response capabilities through training emergency response team (ERT) members.	Each site has a group of well-trained ERT personnel who can respond to emergencies such as spills and fire. Training is budgeted annually. New ERT members receive 40 hours of fire training independent of the SPR. The New Orleans Emergency Preparedness group and the site emergency coordinators develop refresher training annually. All pertinent topics are covered within a three-year cycle, with specific topics receiving more emphasis than others. Refresher training has been conducted at Texas A&M University. Unannounced and scheduled site drills are also conducted at each site to test skills and strategies.
Ensure that the Incident Commander/Qualified Individual at each site is trained in Incident Command.	Due to the potential size and complexity of SPR emergencies, and the probability that emergency response will include outside agencies and other entities, many key management at all sites (including New Orleans) who could serve as the incident commander or qualified individual have received computer based training in Incident Command. Incident management is tested during every drill.
Ensure fire protection capabilities at each site through prompt Priority One and Two fire protection system repairs.	Work orders to repair fire protection equipment are tracked weekly to assure that they receive sufficient attention for prompt resolution. The site fire protection specialist reviews open work orders during regularly scheduled work planning meetings and champions work orders for fire system repair. The level of response to repair fire equipment is gauged against the level of response provided to must-operate equipment. Fire system repairs are to be completed as promptly or sooner than the time for vital operational equipment repairs.
Reduce the amount of Halon 1301 (a Class I ozone depleting substance) on the SPR	A P2/E2 Leadership goal. Refer to Item 10, Table 2-1. Removal will be included in a later project that will replace of Halon fire suppression systems with early fire detection systems. Work is scheduled for FY 2004.

Table 5-1 EMS Program Achievement (continued)

Environmental Objective	How Achieved
Complete a review of alternative of in-service alternative fuel vehicle site utilization.	A P2/E2 Leadership goal. Refer to Items 12, 13, and 14, Table 2-1. Site vehicle utilization is examined to determine current transportation needs.
Complete or design energy efficient projects.	A P2/E2 Leadership goal. Refer to Item 7, Table 2-1.
Minimize utility costs by controlling overall electric loads and reduce energy consumption through efficiency improvements.	A P2/E2 Leadership goal. Refer to Item 7, Table 2-1.
Gather quality subsidence data from undamaged, available subsidence monuments.	Subsidence monitoring was included in the EMS due to impact of subsidence on site equipment and water encroachment. Effort is made to protect all subsidence monuments from damage so that they can be used in site surveys.
Ensure active continuance of local law enforcement agency (LLEA) programs.	Monthly contact is made with nine law enforcement agencies (from federal to local) that support the SPR. In CY 2002, the Louisiana and Texas National Guard and the FBI made site visits.
Conduct joint tactical operations with local law enforcement agencies.	Field tactical exercises are held annually at each site, and supporting agencies are invited to participate.

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 have received training on wildlife rescue and rehabilitation techniques. Select DM employees have attended Oiled Wildlife Response training presented by Wildlife Rehab & Education, Inc. An oil spill at the SPR sites 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 in support of the emergency incident command structure organization.

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 powered emergency electrical 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

Located in a serious non-attainment area for ozone, Bayou Choctaw is permitted to emit 7.4 metric tpy (8.14 tpy) of VOC. Since this site emits less than nine metric tpy (10 tpy), it is not required to use an emissions inventory summary (EIS) to report its annual emissions.

Although Bayou Choctaw is exempt from reporting emissions, effluent monitoring was conducted in 2002 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 2002. Table 5-2 is a summary of the permitted limits for Bayou Choctaw.

Table 5-2. 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

Located in a moderate non-attainment area for ozone, Big Hill is permitted to emit 13.7 metric tpy (15.1 tpy) of VOC. Since it emits more than nine metric tpy (10 tpy), it is required to use an emissions inventory questionnaire (EIQ) to report its annual emissions. Effluent monitoring was conducted in 2002 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 2002. Table 5-3 is a summary of the permitted limits for Big Hill.

Table 5-3. 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

Located in a severe non-attainment area for ozone, is permitted to emit 16.2 metric tpy (17.9 tpy) of VOC. Since the site emits more than nine metric tpy (10 tpy), it is required to use an EIQ to report its annual emissions. Effluent monitoring was conducted in 2002 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 2002. Table 5-4 is a summary of the permitted limits for Bryan Mound.

Table 5-4. Parameters for the Bryan Mound Emission Points

Emission Point Description	Parameter	Permit Limits, Metric tpy (tpy)
Crude Oil Tanks	VOC	9.35 (10.31)
Gasoline & Diesel Fuel Tanks	VOC	0.38 (0.42)
Brine Tank	VOC	4.92 (5.42)
Fugitive Emissions	VOC	0.89 (0.98)
Paints & Solvents	VOC	0.62 (0.68)
Emergency Generators/Pumps	VOC PM_{10} SO_2 NO_x CO	0.06 (0.07) 0.06 (0.07) 0.50 (0.55) 1.62 (1.79) 0.37 (0.41)

5.3.4 West Hackberry

Located in an ozone attainment area, West Hackberry 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 is not required to use an EIS to report its annual emissions.

Although West Hackberry is exempt from reporting emissions, effluent monitoring was conducted in 2002 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 2002. Table 5-5 is a summary of the permitted limits for West Hackberry.

Table 5-5. 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 2002. 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 8.41 million m^3 (53.26 mmb) of brine (mostly saturated sodium chloride solution with some infrequent discharges of lower salinities than normally attributed to brine) during 2002. Approximately 56.77 percent of the brine was

disposed in the Gulf of Mexico via the Big Hill (32.27 percent of the total) and the Bryan Mound (24.50 percent of the total) brine disposal pipelines. The remainder was disposed in saline aquifers via injection wells at the Bayou Choctaw (4.75 percent of the total) and West Hackberry (38.48 percent of the total) sites.

During 2002, 5,788 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 99.91 percent of the analyses performed. A total of five permit non-compliances were reported during CY 2002. This information is listed in (Tables 5-8 and 5-10).

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 the permits. The data measurement variations observed during CY 2002 is discussed in separate sections by site.

5.4.1 Bayou Choctaw

Bayou Choctaw personnel performed a total of 58 measurements on permitted outfalls and reporting stations to monitor LPDES permit compliance during 2002. Table 5-6 provides the permit required monitoring parameters and limits for the Bayou Choctaw outfalls. There were no noncompliances in 2002 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 5-6. 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 5-6. 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 2002, 2550 measurements were performed to monitor NPDES and state discharge permit compliance. Table 5-7 provides the permit required monitoring parameters and limits for the Big Hill outfalls. There were two noncompliances during 2002 (Table 5-8) resulting in a 99.92 percent site compliance performance level.

Water discharges at Big Hill are regulated and enforced through the EPA NPDES permit program and the similar RCT discharge permit program (TPDES). The discharges at the site involve brine to the Gulf of Mexico, hydroclone 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 2002 from the hydroclone 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 5-7. 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 5-8. 2002 Permit Noncompliances at Big Hill

Date	Outfall Location	Permit Parameter	Value (Limit)	Cause
7/11/02	003 Stormwater	TOC	No Sample	While preparing the monthly DMR it was noticed that the TOC sample test results were missing for a discharge from the secondary containment at the site's electrical substation. The sample was inadvertently missed or lost while awaiting analysis.
12/7/02	001 (Brine to the Gulf)	Oil and Grease	No Sample	On a flow to the Gulf the daily when discharging oil & grease sample was inadvertently missed.

5.4.3 Bryan Mound

Bryan Mound personnel made 2473 measurements on permitted outfalls for the purpose of monitoring NPDES and state discharge permit compliance during 2002. Table 5-9 provides the permit-required parameters and limits for the Bryan Mound outfalls. There were three (1 federal and 2 state permit) noncompliances during 2002 (Table 5-10) resulting in a 99.88 percent site compliance performance level.

Water discharges at Bryan Mound are regulated and enforced through the EPA NPDES permit program and the similar RCT discharge permit program for state waters (TPDES). Under provisions of the new federal permit, Bryan Mound was able to reduce the frequency of its biomonitoring to annual based on the lethal No Observed Effect Concentration (NOEC) being below the permitted limit. The requirement for Oil and Grease testing was reduced to weekly when flowing as part of the TPDES renewal last year. The four categories of permitted discharges are brine to the Gulf of Mexico; storm water from the tank farm, well pads, and

pump pads; recirculated water from the intake pumps; and package sewage treatment plant effluent.

Table 5-9. Parameters for the Bryan Mound Outfalls

Location/Discharge	Parameter	Frequency*	Compliance Range
Brine to Gulf	Flow	Continuously	report only
	Velocity	Per flow	>6.1 m/sec (20 ft/sec)
	Oil & Grease	1/wk	<15 mg/l max <10 mg/l avg.
	TDS	1/mo	(report only)
	TSS	1/mo	(report only)
	pH	1/mo	6.0 - 9.0 s.u.
	Copper	1/mo	<0.21 mg/l
	Biomonitoring	1/yr if no exceedance	Lethal NOEC 1.53%
	Integrity test	1/6 mo when flow	Offshore within 4% of onshore
Storm Water	Flow	1/wk	(report only)
	Oil and Grease	1/mo	<15 mg/l
	TOC	1/mo	< 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 5-10 2002 Permit Noncompliances at Bryan Mound

Date	Outfall Location	Permit Parameter	Value (Limit)	Cause
10/10/02	003 Stormwater Cavern Pads	TOC	Max observed 116 mg/l (50 mg/l)	TOC analysis for storm water discharged from six cavern pads on a single day of discharge exceeded the state's permit limit of 50 mg/l resulting in a permit noncompliance. The maximum observed value was 116 mg/l. This was attributed to an excessive amount of dead vegetation from mowing activities allowed to collect and compost in each of the containment moats. Maintenance personnel have been notified to remove the dead vegetation from this location to preclude a possible recurrence.
10/24/02	002 STP Sewage Treatment Plant	Flow	7133 gpd (6000 gpd)	Malfunctioning flapper valve in the warehouse restroom resulting in a leak-by produced a day of excessive flow on this weekend day. No upset to the plant operability was discovered.
10/25/02	002 STP Sewage Treatment Plant	Flow	6180 gpd (6000 gpd)	Second separate weekend day of excessive flow from the same cause. Warehouse restroom will be shut-in on weekends as it is not needed during this down period.

5.4.4 West Hackberry

West Hackberry personnel performed 707 measurements on permitted outfalls to monitor LPDES compliance during 2002. Table 5-11 provides the permit-required parameters and limits for the West Hackberry outfalls. There were no noncompliances during 2002; 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 5-11. 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 2002, surface waters of the Bayou Choctaw, Big Hill, Bryan Mound, and West Hackberry SPR sites were sampled and monitored for general water quality according to the SPR Environmental Monitoring Plan. Monitoring is conducted to provide early detection of surface water quality degradation resulting from SPR operations. It is separate from, and in addition to, the water discharge permit monitoring program

Data and statistics are presented in tabular form by site in Tables 5-12 through 5-15. All observed values that were below detectable

limit (BDL) were evaluated as one-half the detection limit for statistical calculation purposes. In addition to commonly used summary statistical methods, the coefficient of variation (CV) treatment was incorporated to evaluate the data. The coefficient of variation is used to quickly identify data sets with a high incidence of variation. Values approaching or exceeding 100 percent indicate that one standard deviation from the stated mean encompasses zero. This method draws attention to highly variable or skewed data sets for further evaluation. Extremely low values of CV (approaching or equal 0.0) indicate the standard deviation is small, relative to the mean, such as would be the case if a preponderance of measurements fell 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 5-12). A discussion of each parameter follows.

5.5.1.1 Hydrogen Ion Activity (pH)

The annual median values of pH for all the monitored stations ranged from 7.3 to 7.4 s.u. which is consistent with the ambient conditions of surrounding waters. The complete range for all measurements at all stations for 2002 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 9.4 ºC to 28 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 2002, 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 2002. 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 the past couple of years. The largest measurement (2.7 ppt) occurred at Station B this year. No explicable activities relating to salinity occurred upstream of the point. The spike was very short term as 8 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 2002 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 or affect 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 7.4

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 8.1 to 10.6 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 B and D both produced the higher CV percentages (~50%) indicating wider variability during the year. The highest value measured was only 21.2 mg/l occurring at Station D and is believed to reflect the normal range of background TOC in the area below the confluence of both the N-S and E-W canals which drain large areas of shallow swamps south and southeast of the main site. This measurement also occurred in late January and may have been affected by low flows over the winter as well. 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.

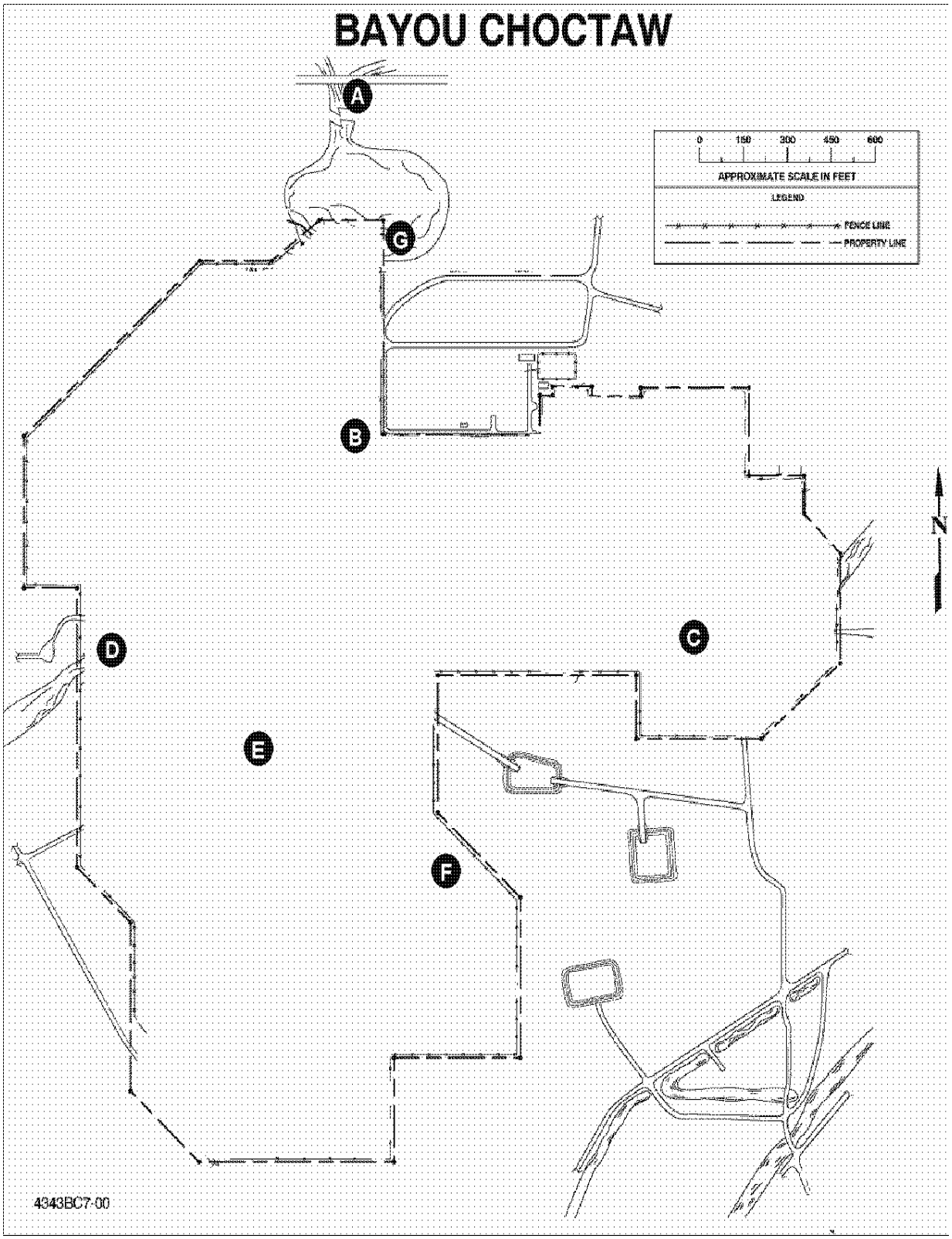


Figure 5-1. (Sheet 1 of 2) Bayou Choctaw Environmental Monitoring

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 5-12. 2002 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	13	13	13	5	13	13
	Number of BDL	0	NV	13	5	0	0
	Maximum	7.4	28.1	0.5	2.5	5.9	16.5
	Minimum	7.0	11.6	0.5	2.5	0.7	5.3
	Mean	NV	20.8	0.5	2.5	3.0	9.3
	Median	7.3	20.8	0.5	2.5	2.7	9.1
	Standard Deviation	NV	5.5	0.0	0.0	1.4	3.5
	Coefficient of Variation	NV	26.2	0.0	0.0	46.9	37.7
B	Sample Size	13	13	13	4	13	13
	Number of BDL	0	NV	8	4	0	0
	Maximum	7.6	28.0	2.7	2.5	4.7	16.5
	Minimum	7.0	12.0	0.5	2.5	1.0	2.2
	Mean	NV	20.4	1.0	2.5	2.6	8.1
	Median	7.3	19.2	0.5	2.5	2.7	7.6
	Standard Deviation	NV	4.7	0.7	0.0	1.1	3.9
	Coefficient of Variation	NV	23.1	73.2	0.0	44.9	47.8
C	Sample Size	11	11	11	4	11	11
	Number of BDL	0	NV	6	4	0	0
	Maximum	7.7	27.6	1.4	2.5	6.7	15.2
	Minimum	7.0	14.1	0.5	2.5	1.1	6.5
	Mean	NV	21.4	0.8	2.5	3.9	10.6
	Median	7.3	20.3	0.5	2.5	3.9	10.0
	Standard Deviation	NV	4.8	0.4	0.0	1.5	2.6
	Coefficient of Variation	NV	22.6	46.7	0.0	38.6	24.8
D	Sample Size	12	12	12	4	12	12
	Number of BDL	0	NV	11	4	0	0
	Maximum	7.5	27.5	1.2	2.5	7.0	21.2
	Minimum	7.0	13.3	0.5	2.5	1.1	2.0
	Mean	NV	20.5	0.6	2.5	3.8	10.4
	Median	7.3	20.1	0.5	2.5	3.4	10.3
	Standard Deviation	NV	4.6	0.2	0.0	1.7	5.3
	Coefficient of Variation	NV	22.5	36.2	0.0	46.5	50.7
E	Sample Size	12	12	12	4	12	12
	Number of BDL	0	NV	12	4	0	0
	Maximum	7.8	27.9	0.5	2.5	5.2	18.7
	Minimum	7.0	9.4	0.5	2.5	1.5	5.9
	Mean	NV	20.3	0.5	2.5	2.9	10.1
	Median	7.4	20.0	0.5	2.5	2.8	9.2
	Standard Deviation	NV	5.5	0.0	0.0	1.1	4.2
	Coefficient of Variation	NV	27.4	0.0	0.0	37.0	41.8

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

Table 5-12 2002 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	7.7	27.3	0.5	2.5	4.9	14.7
	Minimum	7.0	10.1	0.5	2.5	0.6	4.1
	Mean	NV	20.5	0.5	2.5	3.0	11.8
	Median	7.3	20.9	0.5	2.5	2.9	12.5
	Standard Deviation	NV	5.4	0.0	0.0	1.5	3.0
	Coefficient of Variation	NV	26.4	0.0	0.0	48.9	25.1
G	Sample Size	12	12	12	4	12	12
	Number of BDL	0	NV	12	4	0	0
	Maximum	8.5	28.0	0.5	2.5	7.4	16.0
	Minimum	7.2	13.6	0.5	2.5	0.9	5.2
	Mean	NV	20.5	0.5	2.5	4.4	9.1
	Median	7.4	19.4	0.5	2.5	4.7	8.2
	Standard Deviation	NV	5.0	0.0	0.0	2.0	3.4
	Coefficient of Variation	NV	24.3	0.0	0.0	45.8	37.3

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 data set.

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 for the second consecutive year.

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

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

e. The 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 5-13).

5.5.2.1 Hydrogen Ion Activity (pH**)**

The 2002 Data show the pH of site and surrounding surface waters remained between 6.2 and 8.6 s.u. The annual median values of pH for each of the monitored stations ranged from 7.8 to 8.0 s.u.

5.5.2.2 Temperature

Temperatures observed in 2002 ranged from 15ºC to 34ºC 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 throughout most of the year ranging from fresh on the site all year long to a maximum of 11.2 ppt at the Gator Hole location some 3 miles

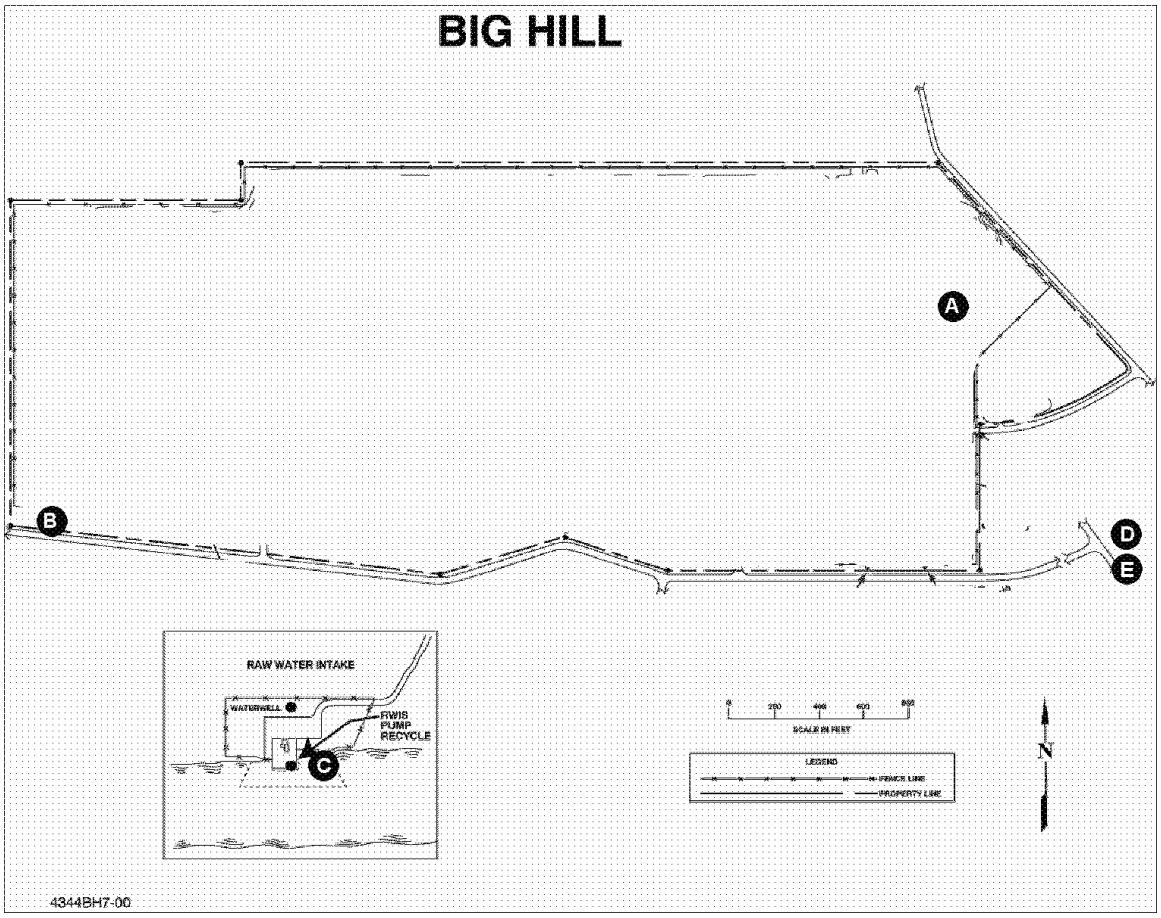
from the site in the marsh nearer the Gulf. Several stations recorded excessive to large CV's this year indicative of the low quantifications determined in a dataset predominated by values below the detectable limits. No brine releases or chronic impacts are indicated.

5.5.2.4 Oil and Grease (O&G)

All of Oil & Grease results made for all stations were below the detectable limit of 5 mg/l this year. 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 months of January and March and the lowest values were determined in June, August and November this year. The lowest valid variability was found at the RWIS where the greater flow and depth of the ICW provides a more constant dissolved oxygen level. The station with the most DO variability during the year was the Gator Hole sampling station E, about 3 miles southeast from the site. The overall range in DO was found to be 0.4 to 8.4 mg/l with a range of 3.0 to 4.9 mg/l in mean values from all sites tested during the year.



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 5-13. 2002 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	1	1	3
	Number of BDL	0	NV	3	1	0	0
	Maximum	7.9	29.0	0.5	2.5	3.3	9.1
	Minimum	7.0	24.0	0.5	2.5	3.3	5.4
	Mean	NV	26.3	0.5	2.5	3.3	7.0
	Median	7.8	26.0	0.5	2.5	3.3	6.5
	Standard Deviation	NV	2.5	0.0	NV	NV	1.9
	Coefficient of Variation	NV	9.6	0.0	NV	NV	27.0
B	Sample Size	12	12	12	8	10	12
	Number of BDL	0	NV	8	8	0	0
	Maximum	8.2	34.0	9.5	2.5	6.3	13.4
	Minimum	6.8	18.0	0.5	2.5	1.2	5.7
	Mean	NV	24.8	1.9	2.5	3.9	10.9
	Median	7.9	23.5	0.5	2.5	3.6	11.5
	Standard Deviation	NV	4.7	2.7	0.0	1.6	2.4
	Coefficient of Variation	NV	19.0	145.7	0.0	41.6	21.7
C	Sample Size	12	12	12	8	10	12
	Number of BDL	0	NV	4	8	0	0
	Maximum	8.4	33.0	9.9	2.5	8.4	14.0
	Minimum	6.2	17.0	0.5	2.5	3.0	6.1
	Mean	NV	23.3	3.2	2.5	4.9	8.6
	Median	7.8	22.5	2.1	2.5	4.5	8.5
	Standard Deviation	NV	5.7	3.2	0.0	1.8	2.1
	Coefficient of Variation	NV	24.5	98.2	0.0	36.9	23.9
D	Sample Size	12	12	12	8	10	12
	Number of BDL	0	NV	11	8	0	0
	Maximum	8.6	34.0	3.9	2.5	7.1	20.9
	Minimum	6.7	17.0	0.5	2.5	1.3	8.3
	Mean	NV	24.4	0.8	2.5	4.6	14.5
	Median	8.0	23.5	0.5	2.5	4.5	13.7
	Standard Deviation	NV	4.9	1.0	0.0	1.8	4.4
	Coefficient of Variation	NV	20.1	125.3	0.0	39.0	30.4
E	Sample Size	12	12	12	8	10	12
	Number of BDL	0	NV	2	8	0	0
	Maximum	8.2	33.0	11.2	2.5	7.3	20.3
	Minimum	6.4	15.0	0.5	2.5	0.4	7.4
	Mean	NV	23.9	3.4	2.5	3.0	12.5
	Median	7.8	23.0	2.4	2.5	2.5	10.8
	Standard Deviation	NV	4.9	3.1	0.0	2.3	3.9
	Coefficient of Variation	NV	20.7	91.9	0.0	76.8	31.5

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

5.5.2.6 Total Organic Carbon (TOC)

Average annual TOC concentrations varied from 7.0 to 14.5 mg/l over the year at the five monitoring stations, ranging from 5.4 to 20.9 mg/l. The higher TOC levels observed are believed 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 2002. 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 5-14).

Area-wide drought conditions affecting the annual sampling routine by lowering lake levels beyond the established sample points for about half the year last year were not in effect this year as abundant but sporadic rainfall has returned to the area.

A fish die-off occurring in Blue Lake was noticed and investigated closely by the site's ES&H Manager in association with the local office of Texas Parks and Wildlife. Initially eutrophic conditions were suspected in a portion of Blue Lake but later sampling revealed that levels of naturally occurring toxic algae were the likely causative factor.

5.5.3.1 Hydrogen Ion Activity (pH)

In 2002 the pH of Blue Lake and Mud Lake was slightly basic, ranging from 7.0 to 8.9 s.u. for the dataset and the same range for

both the control stations. All stations in Blue Lake were generally found to be slightly 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 formerly drought-affected surface waters are comparable to the normal range of variability seen at the Bryan Mound site historically.

5.5.3.2 Temperature

Temperatures observed in 2002 ranged from 9.5º C to 33º C and reflect almost a complete year of ambient surface water testing. The deduction can be made however that the range of fluctuations are attributed to meteorological events.

5.5.3.3 Salinity (SAL)

Observed salinity fluctuations ranged from below the detection limit <1.0 to only 4.2 ppt in Blue Lake and from <1.0 to 18.6 ppt in Mud Lake. Salinity fluctuations are attributed to meteorological and tidal conditions rather than site operations, since salinity observed at control sample stations D 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 reflects the advent of a return to more normal rainfall patterns as the ambient salinity measurements were noticeably fresher than last year’s, which was skewed by the limited episodic rainfall occurring then.

5.5.3.4 Oil and Grease (O&G)

All of the O&G measurements made during the course of the 2002 calendar year 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 2002, DO was measured nine or ten times from all stations during the year. Sufficient water was available for measurement in both Blue and Mud Lakes throughout all the seasons this year. This year, presumably in response to the abundant and regular rainfall, both locations revealed no differences or significant seasonality in terms of oxygen content. All measurements reflect adequate ambient DO throughout the year and indicate “no apparent impact” from SPR operations.

5.5.3.6 Total Organic Carbon (TOC)

In 2002 the observed TOC values ranged from 2.9 mg/l to 53.6 mg/l. In Blue Lake the measurements ranged from 3.0 to the 53.6 mg/l. The TOC observations in Mud Lake were generally lower but more variable ranging from the 2.9 mg/l to 33.1 mg/l. 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.

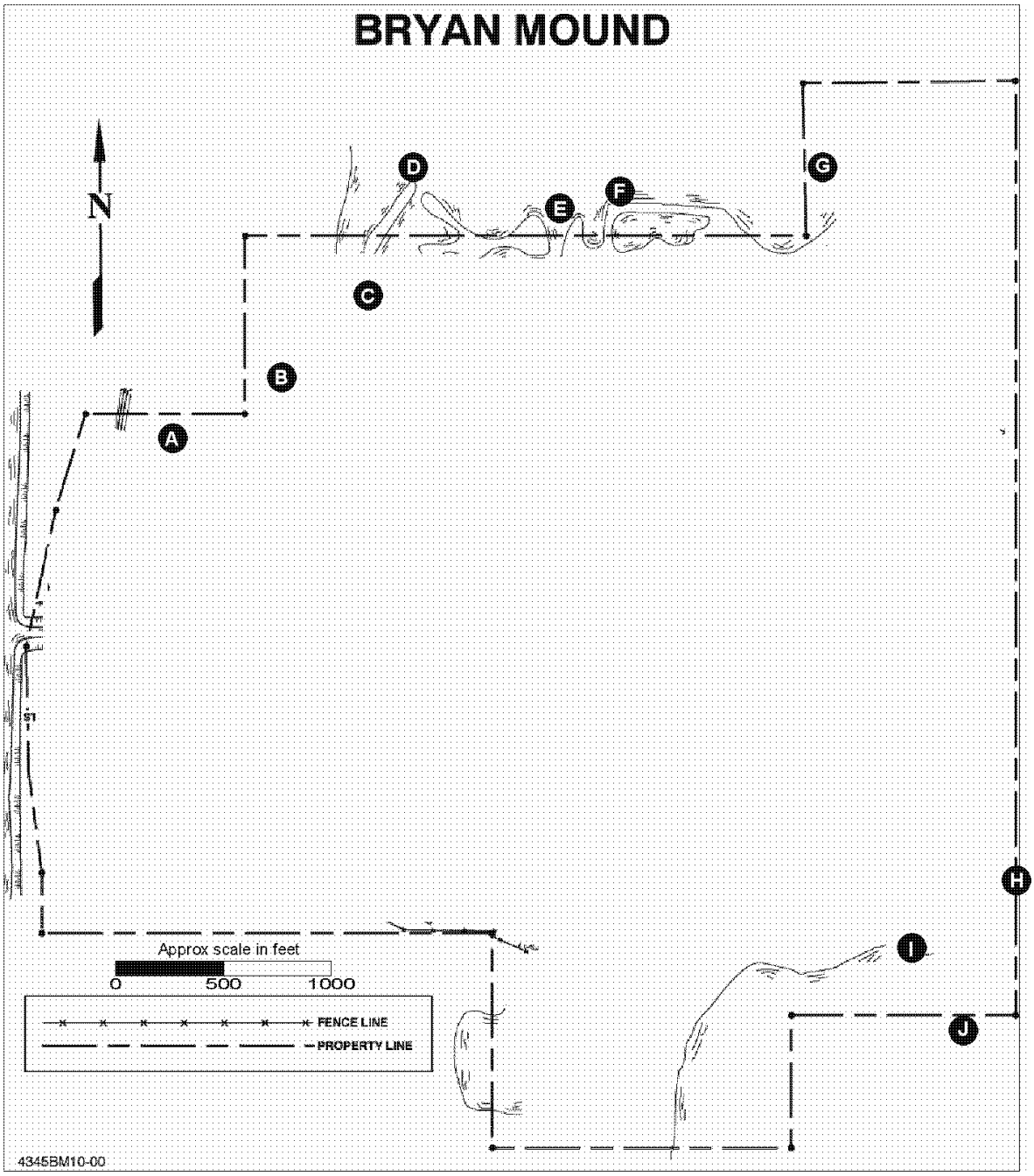


Figure 5-3. (Sheet 1 of 2) Bryan Mound Environmental Monitoring Stations

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 5-14. 2002 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	11	11	11	4	10	11
	Number of BDL	0	NV	1	4	0	0
	Maximum	8.5	29.5	4.0	2.5	12.4	53.6
	Minimum	7.6	18.4	0.5	2.5	1.1	11.1
	Mean	NV	24.2	2.9	2.5	6.2	21.8
	Median	8.2	24.0	3.2	2.5	5.0	17.5
	Standard Deviation	NV	4.1	1.1	0.0	4.7	11.9
	Coefficient of Variation	NV	16.8	38.8	0.0	76.0	54.6
B	Sample Size	11	11	11	4	10	11
	Number of BDL	0	NV	2	4	0	0
	Maximum	8.6	31.2	4.0	2.5	11.2	46.1
	Minimum	7.3	18.6	0.5	2.5	2.4	12.3
	Mean	NV	24.7	2.8	2.5	7.2	22.9
	Median	8.4	24.2	3.1	2.5	7.3	17.4
	Standard Deviation	NV	4.7	1.3	0.0	3.7	10.9
	Coefficient of Variation	NV	19.2	45.6	0.0	51.7	47.5
C	Sample Size	11	11	11	4	10	11
	Number of BDL	0	NV	0	4	0	0
	Maximum	8.8	30.8	4.0	2.5	12.8	47.7
	Minimum	7.9	18.3	1.0	2.5	3.6	3.3
	Mean	NV	24.6	2.9	2.5	8.6	19.4
	Median	8.4	24.2	3.1	2.5	9.2	16.0
	Standard Deviation	NV	4.5	1.0	0.0	3.4	11.5
	Coefficient of Variation	NV	18.4	34.4	0.0	39.7	59.5
D	Sample Size	11	11	11	4	10	11
	Number of BDL	0	NV	0	4	0	0
	Maximum	8.9	31.7	4.0	2.5	12.7	49.1
	Minimum	7.9	18.3	1.0	2.5	3.6	13.2
	Mean	NV	24.9	3.0	2.5	9.0	22.5
	Median	8.5	24.7	3.1	2.5	9.3	16.4
	Standard Deviation	NV	5.2	1.0	0.0	3.5	11.6
	Coefficient of Variation	NV	20.9	33.0	0.0	38.3	51.5
E	Sample Size	11	11	11	4	10	11
	Number of BDL	0	NV	0	4	0	0
	Maximum	8.8	32.0	4.2	2.5	13.5	50.8
	Minimum	7.7	18.0	1.0	2.5	4.4	12.3
	Mean	NV	24.9	3.0	2.5	9.3	22.7
	Median	8.5	24.7	3.1	2.5	9.4	16.8
	Standard Deviation	NV	5.3	1.0	0.0	2.9	11.7
	Coefficient of Variation	NV	21.4	33.7	0.0	31.6	51.7

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

Table 5-14 2002 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	11	11	11	4	10	11
	Number of BDL	0	NV	0	4	0	0
	Maximum	8.9	32.0	4.0	2.5	12.9	49.4
	Minimum	7.7	17.8	1.0	2.5	4.1	3.3
	Mean	NV	24.7	2.9	2.5	8.6	19.3
	Median	8.5	25.0	3.0	2.5	8.0	14.9
	Standard Deviation	NV	5.4	1.0	0.0	3.0	11.7
	Coefficient of Variation	NV	21.8	33.2	0.0	35.5	60.8
G	Sample Size	11	11	11	4	10	11
	Number of BDL	0	NV	0	4	0	0
	Maximum	8.9	38.9	8.9	2.5	13.4	50.6
	Minimum	7.6	18.1	1.0	2.5	2.5	4.3
	Mean	NV	25.4	3.4	2.5	9.4	20.5
	Median	8.4	25.6	3.1	2.5	9.9	15.1
	Standard Deviation	NV	6.5	2.0	0.0	3.5	12.7
	Coefficient of Variation	NV	25.5	59.9	0.0	36.9	61.9
H	Sample Size	10	10	10	6	9	10
	Number of BDL	0	NV	0	6	0	0
	Maximum	8.9	33.5	18.6	2.5	12.4	33.1
	Minimum	7.7	10.1	1.6	2.5	5.0	3.0
	Mean	NV	24.7	10.8	2.5	9.5	9.0
	Median	8.0	26.3	11.2	2.5	10.0	5.5
	Standard Deviation	NV	6.9	6.5	0.0	2.7	9.6
	Coefficient of Variation	NV	27.8	60.3	0.0	28.2	106.5
I	Sample Size	10	10	10	6	9	10
	Number of BDL	0	NV	1	6	0	0
	Maximum	8.2	33.0	18.1	2.5	12.2	32.4
	Minimum	7.1	9.7	0.5	2.5	4.6	2.9
	Mean	NV	24.7	10.5	2.5	9.4	8.3
	Median	7.9	25.9	11.6	2.5	10.2	6.5
	Standard Deviation	NV	6.7	6.6	0.0	2.7	8.6
	Coefficient of Variation	NV	27.3	63.1	0.0	29.0	104.0
J	Sample Size	10	10	10	6	9	10
	Number of BDL	0	NV	1	6	0	0
	Maximum	8.3	32.9	18.2	2.5	12.4	27.2
	Minimum	7.0	9.5	0.5	2.5	4.4	4.4
	Mean	NV	25.7	9.4	2.5	9.2	7.8
	Median	7.9	26.2	8.3	2.5	9.9	5.3
	Standard Deviation	NV	6.4	6.2	0.0	2.7	7.0
	Coefficient of Variation	NV	24.8	65.9	0.0	28.7	88.8

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 2002, six surface water quality stations (Figure 5-4) were monitored monthly (where practicable) at West Hackberry. Parameters monitored include pH, temperature, salinity (SAL), dissolved oxygen (DO), oil and grease (O&G), and total organic carbon (TOC) (Table 5-15).

5.5.4.1 Hydrogen Ion Activity (pH)

The pH of site and surrounding waters ranged between 6.7 and 9.4 s.u., and annual median values ranged from 7.2 to 8.3 s.u. from all stations. The ambient waters measured were slightly more basic this year versus last. And two stations (D&E) located in stormwater ditches eventually exiting the main site produced maximum values above 9.0 s.u. These fleeting numbers reflect travel paths and long but intermittent travel times over crushed limestone placed for erosion control and trafficability. And these two stations generally reveal more basic run-off than those of the larger volume and free-flowing receiving water stations.

Fluctuations observed are relatively minor and attributed to environmental and seasonal factors such as variation in rainfall, temperature, algae and biotic growth, aquatic system flushing and the buffering effects of crushed limestone gravel on slightly acidic rainfall.

5.5.4.2 Temperature

Observed temperatures in 2002 were consistent with observations at other sites and were indicative of regional climatic effects. No off-normal measurements were observed. Recorded temperatures ranged from 10.0º C to 33.0º 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 (Station F). Salinity ranges observed in these water bodies (1.8 to 9.4 ppt in Black Lake) and (<1 to 9.0 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 (3.5 ppt) was lower than that of Black Lake (5.4 to 5.5 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. Salinity means 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 and 0.6 ppt, respectively, which indicates values routinely almost 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 1.3 ppt. Eleven of the twelve monthly measurements, however, were BDL during the year and indicates the limited drips sustained were frequently flushed through the system with the advent of more normal rainfall patterns 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 2002. 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 more variable overall at the two site stations as opposed to the open and flowing receiving water 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 2002.

5.5.4.6 Total Organic Carbon (TOC)

The range of TOC concentrations for 2002 ranges from <1.0 to 47.9 mg/l with Station D experiencing the highest single value of 47.9 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 8.3 to 14.2 mg/l with main site station D experiencing the most variability throughout the year producing both the highest mean and maximum values as well as the lowest value overall. 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 a little warmer overall and were only affected by seasonal factors.

b. The salinity measurements made throughout 2002 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 2002, 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 with the exception of station D throughout the year suggesting no substantial transient bio-contamination or ecological events. The increased variability noted at site run-off station D results from the wider range of measurements made there during the year but nothing indicative of impact or impairment.

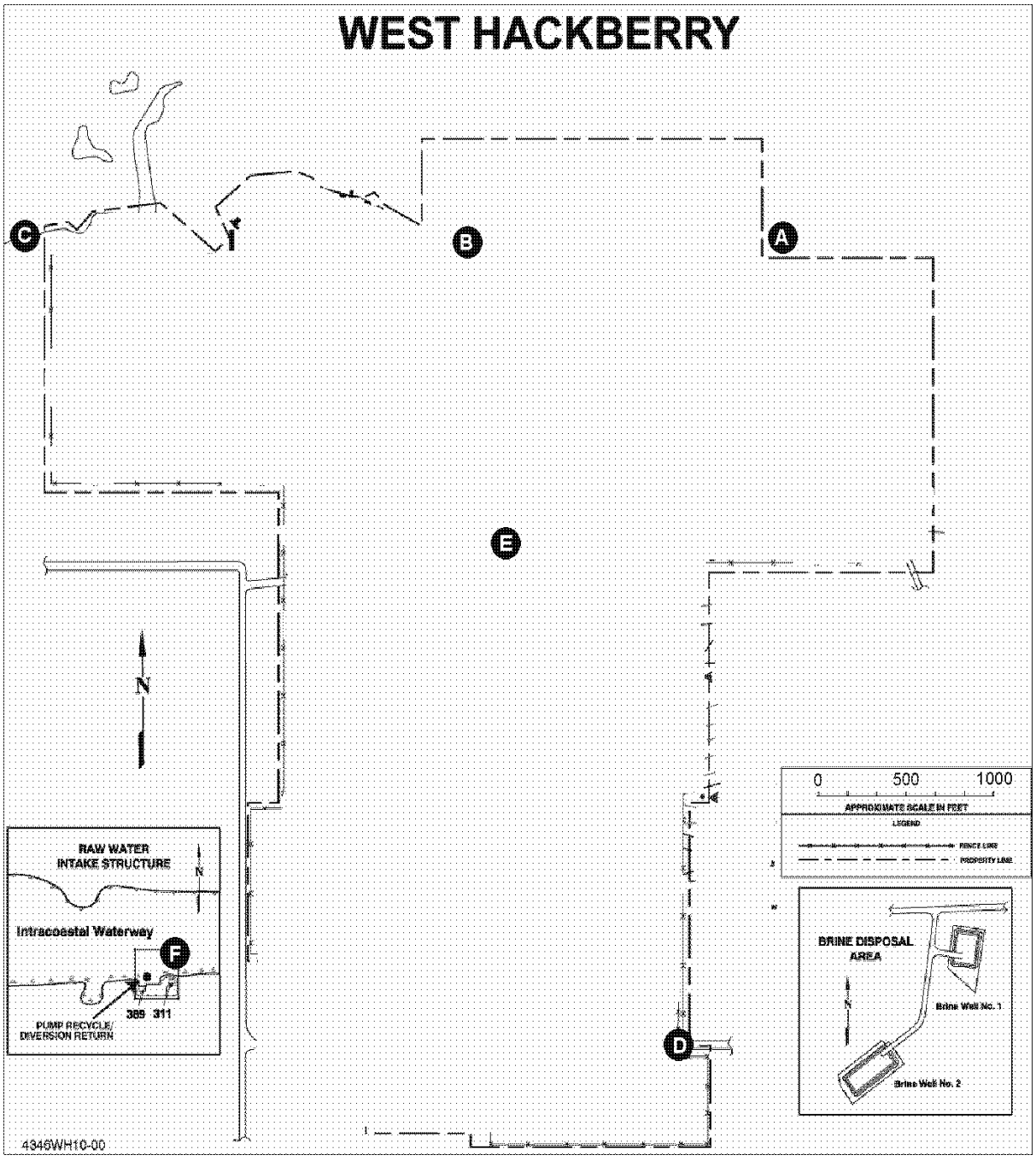


Figure 5-4. (Sheet 1 of 2) West Hackberry Environmental Monitoring

StationsWater Quality Monitoring Stations

A Black Lake

B Black Lake

C Black Lake

D Southeast drainage ditch

E High-pressure pump pad

F Raw water intake structure (Intracoastal Waterway)

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

Table 5-15. 2002 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	11	11	11	3	7	11
	Number of BDL	0	NV	0	3	0	0
	Maximum	7.9	30.0	9.4	2.5	9.8	19.9
	Minimum	7.2	10.0	1.8	2.5	4.0	6.2
	Mean	NV	21.1	5.4	2.5	7.3	9.7
	Median	7.5	20.0	5.5	2.5	8.0	8.2
	Standard Deviation	NV	6.3	2.5	0.0	2.0	3.9
	Coefficient of Variation	NV	30.1	45.8	0.0	27.3	40.6
B	Sample Size	12	12	12	3	7	12
	Number of BDL	0	NV	0	3	0	0
	Maximum	7.9	30.0	9.4	2.5	9.8	19.2
	Minimum	6.7	10.0	2.0	2.5	3.9	5.9
	Mean	NV	21.8	5.5	2.5	7.2	9.5
	Median	7.7	20.5	5.7	2.5	7.9	8.2
	Standard Deviation	NV	6.8	2.4	0.0	1.9	3.8
	Coefficient of Variation	NV	30.9	43.5	0.0	26.8	40.0
C	Sample Size	12	12	12	3	7	11
	Number of BDL	0	NV	0	3	0	0
	Maximum	8.0	30.0	9.2	2.5	9.6	15.7
	Minimum	7.2	10.0	1.8	2.5	3.9	6.5
	Mean	NV	21.7	5.5	2.5	7.5	9.2
	Median	7.6	20.5	5.8	2.5	7.8	8.2
	Standard Deviation	NV	6.7	2.4	0.0	1.9	2.8
	Coefficient of Variation	NV	30.9	44.3	0.0	25.7	30.2
D	Sample Size	11	11	11	3	4	11
	Number of BDL	0	NV0	11	3	0	1
	Maximum	9.3	33.0	0.5	2.5	7.9	47.9
	Minimum	7.6	17.0	0.5	2.5	5.0	0.5
	Mean	NV	24.8	0.5	2.5	6.3	14.2
	Median	8.2	24.0	0.5	2.5	6.2	11.0
	Standard Deviation	NV	5.1	0.0	0.0	1.5	12.7
	Coefficient of Variation	NV	20.5	0.0	0.0	24.4	89.6

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

Table 5-15 2002 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	3	4	12
	Number of BDL	0	0	11	3	0	1
	Maximum	9.4	33.0	1.3	2.5	9.1	25.2
	Minimum	7.5	11.0	0.5	2.5	5.7	0.5
	Mean	NV	24.5	0.6	2.5	6.8	9.2
	Median	8.3	25.5	0.5	2.5	6.3	7.6
	Standard Deviation	NV	6.1	0.2	0.0	1.5	6.9
	Coefficient of Variation	NV	25.0	40.8	0.0	22.6	74.3
F	Sample Size	12	12	12	3	6	11
	Number of BDL	0	0	4	3	0	0
	Maximum	8.0	30.0	9.0	2.5	8.3	13.8
	Minimum	6.7	11.0	0.5	2.5	4.6	5.5
	Mean	NV	21.7	3.5	2.5	7.0	8.3
	Median	7.2	21.0	4.4	2.5	7.4	8.3
	Standard Deviation	NV	6.8	2.8	0.0	1.4	2.2
	Coefficient of Variation	NV	31.1	81.0	0.0	20.6	26.7

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 450.1, and in the case of Weeks Island and West Hackberry, a state agency agreement. Salinity is measured and the potential 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 2002. 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 has been conveyed annually via separate copy of this report to 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 2002, follow-on studies taken have indicated the presence of only trace quantities of remnant crude oil contamination in a limited area of backfill soils there. Because of this, there are no permanent site wide ground water monitoring stations located at the leased St. James facility although the monitored crude oil attenuation continued throughout 2002.

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 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 more recent 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 or is stable 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. The former steep decline observed at well BC MW3 indicative of the passage of small plume is now flattened and appears to be slowly responding to 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.

This year's 5-year historical graph of BCMW3 indicates that the salinity is now slightly rising with this 5-year window and the transient effects of the historic spill has become either dilute or has moved 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. With the exception of the stable to slightly rising trend at BC MW3 each of the five-year trending charts for 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 2002.

The variability evident with the data sets previous to and including 1998 attest to the consistency associated with the advent of the low-flow sampling 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, would be up gradient of and therefore not 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 essentially stable in salinity over time now. The slightly upward sloping five-year salinity trend evident at BC MW3 apparently confirms the passage of an 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 was recovered to ambient for this position and the year 1996 reflected the majority of that change. In addition, the variability noted commencing in mid-year 2001 may be the advent of some trailing effects of that historical event.

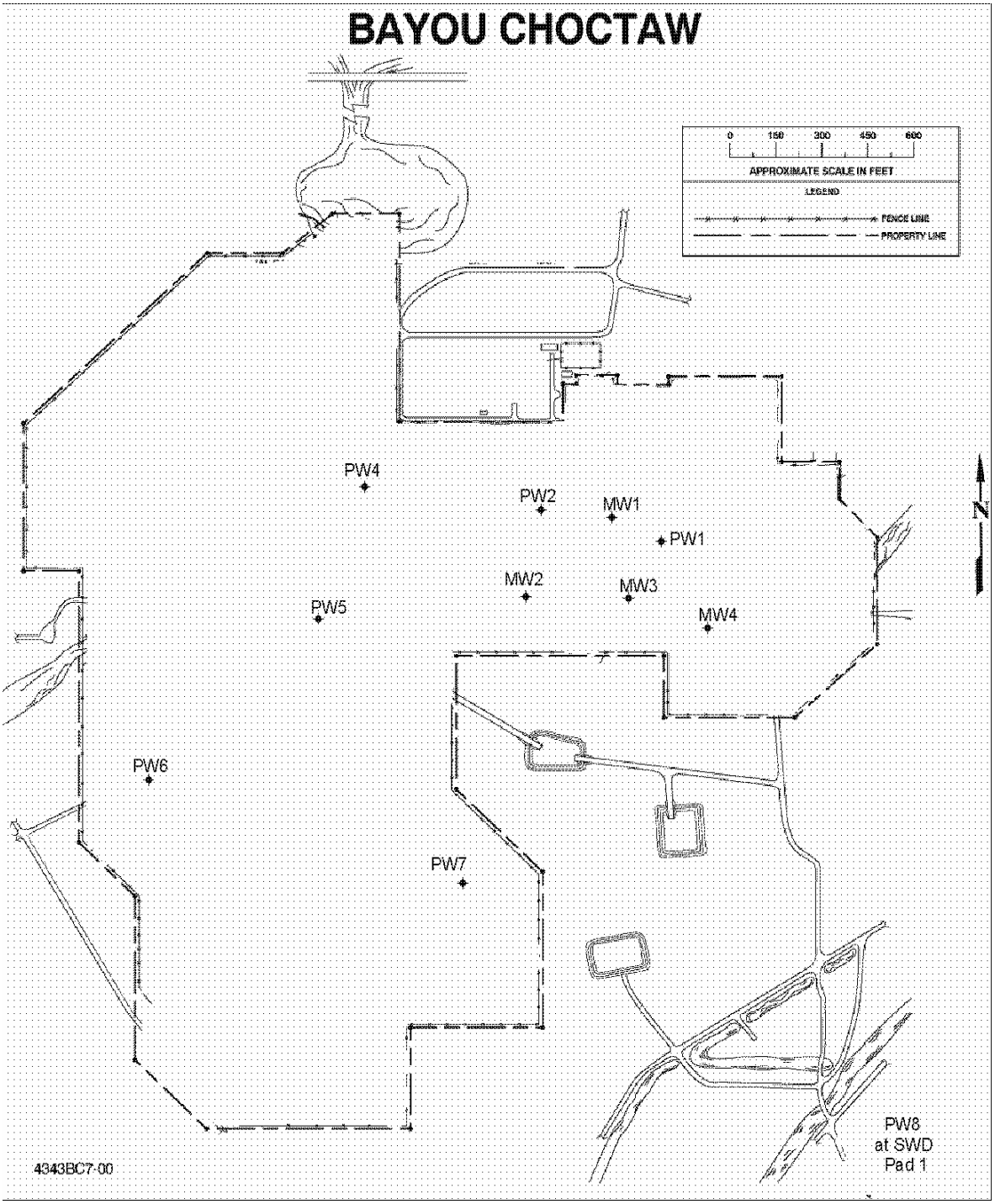


Figure 6-1. Bayou Choctaw Ground Water Monitoring Stations

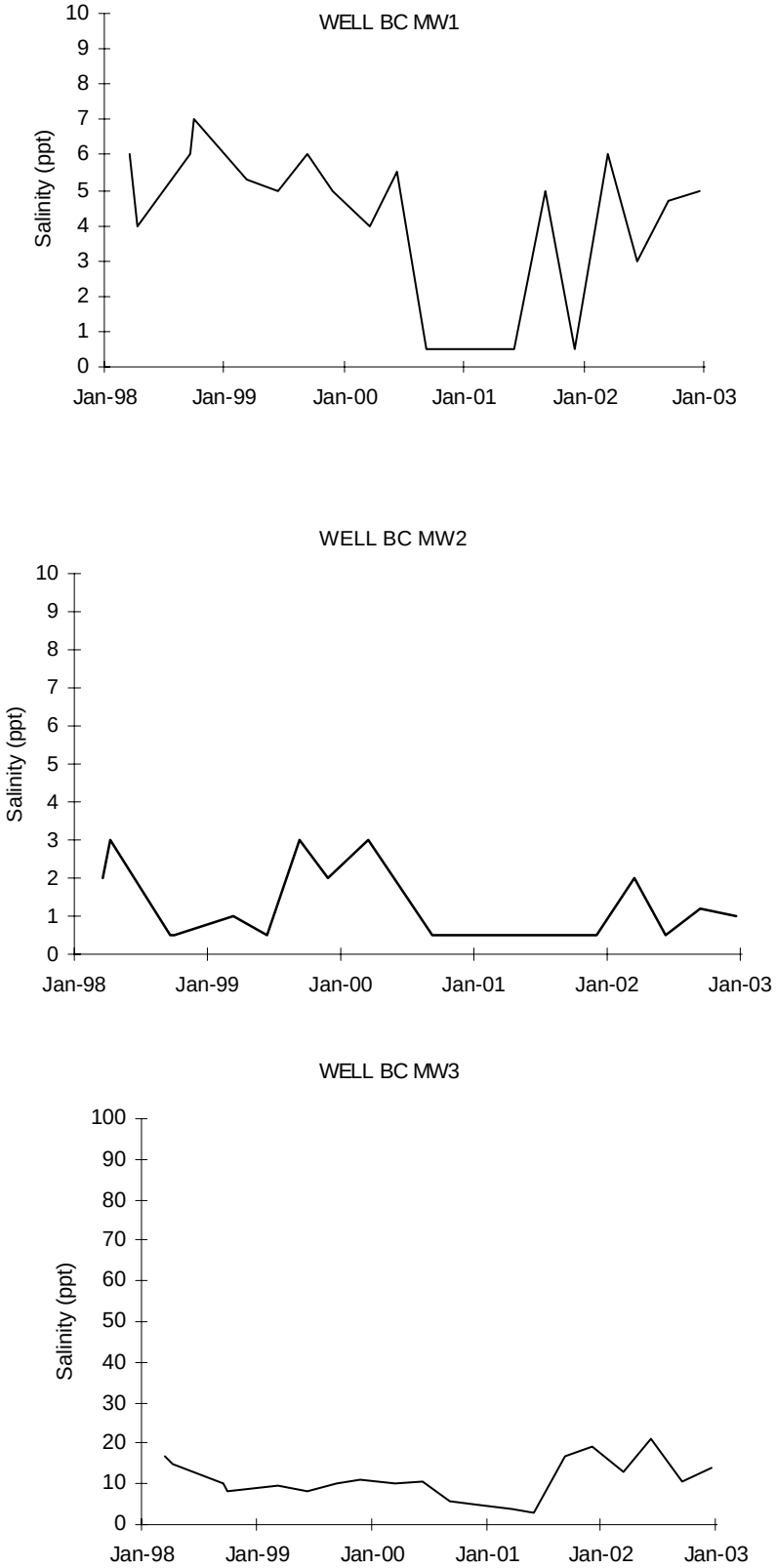


Figure 6-2. Bayou Choctaw Ground Water Monitoring Well Salinities

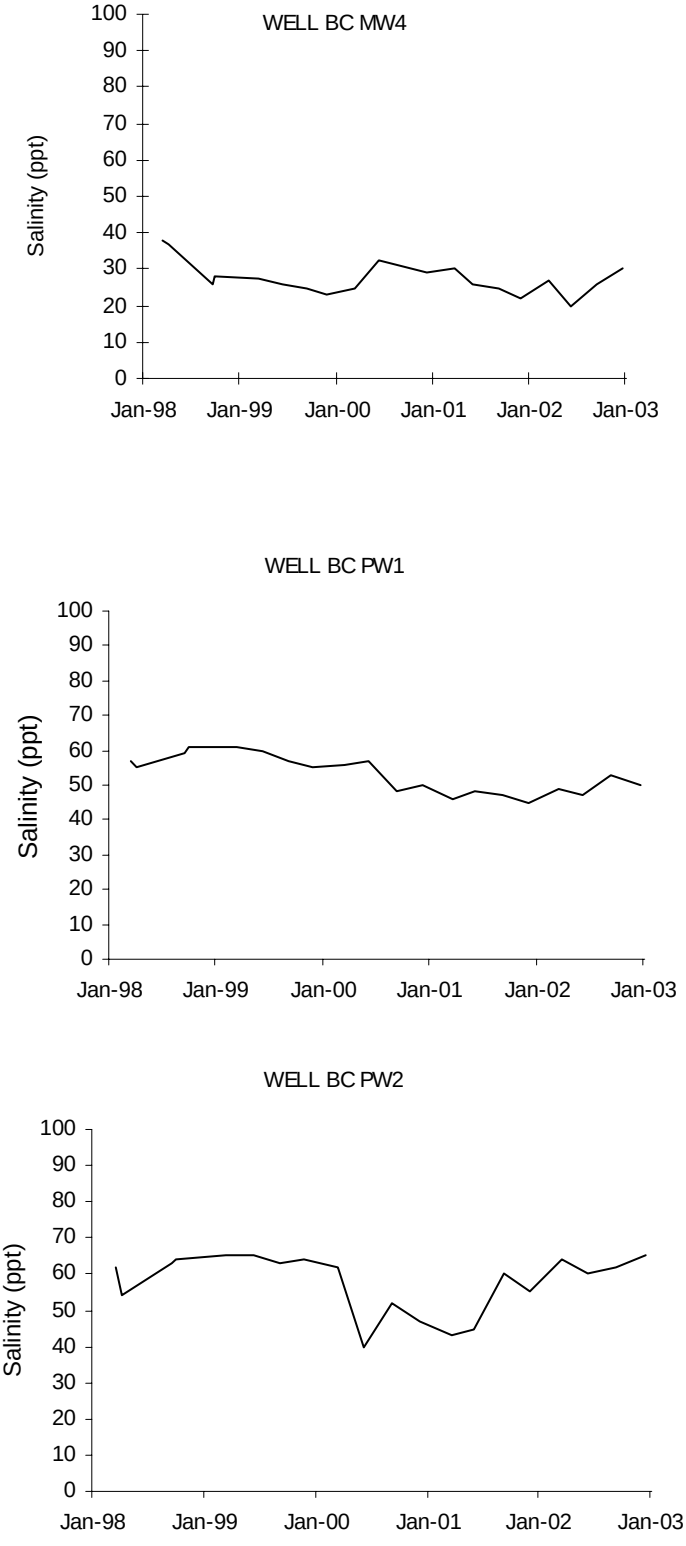


Figure 6-2. Bayou Choctaw Ground Water Monitoring Well Salinities (continued)

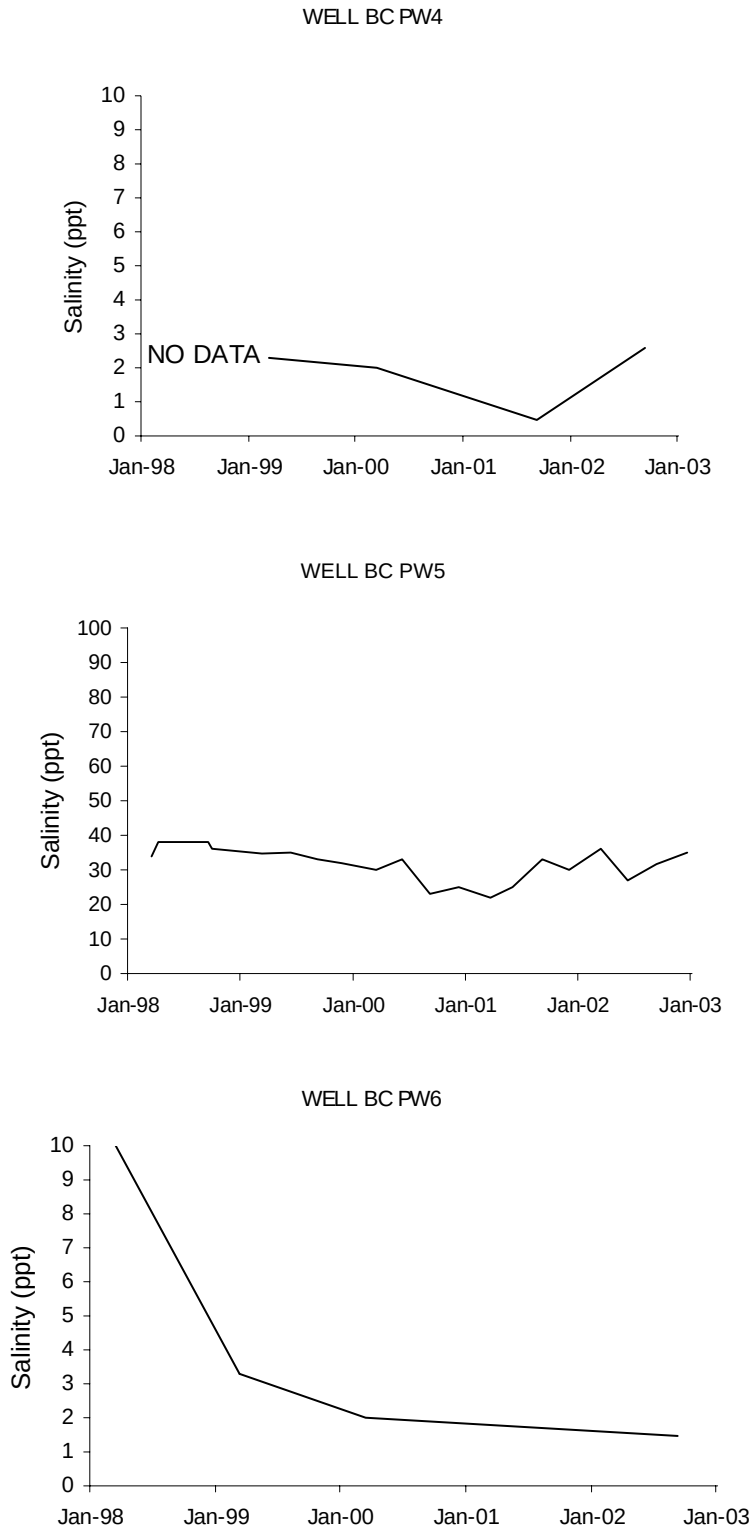


Figure 6-2. Bayou Choctaw Ground Water Monitoring Well Salinities (continued)

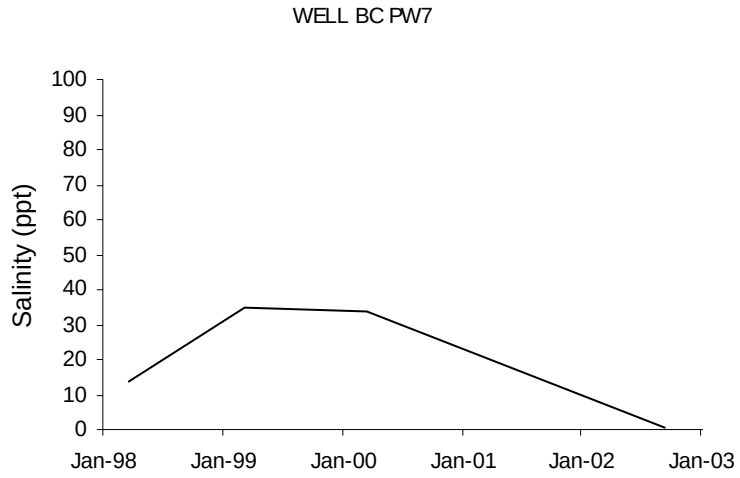


Figure 6-2. Bayou Choctaw Ground Water Monitoring Well Salinities (continued)

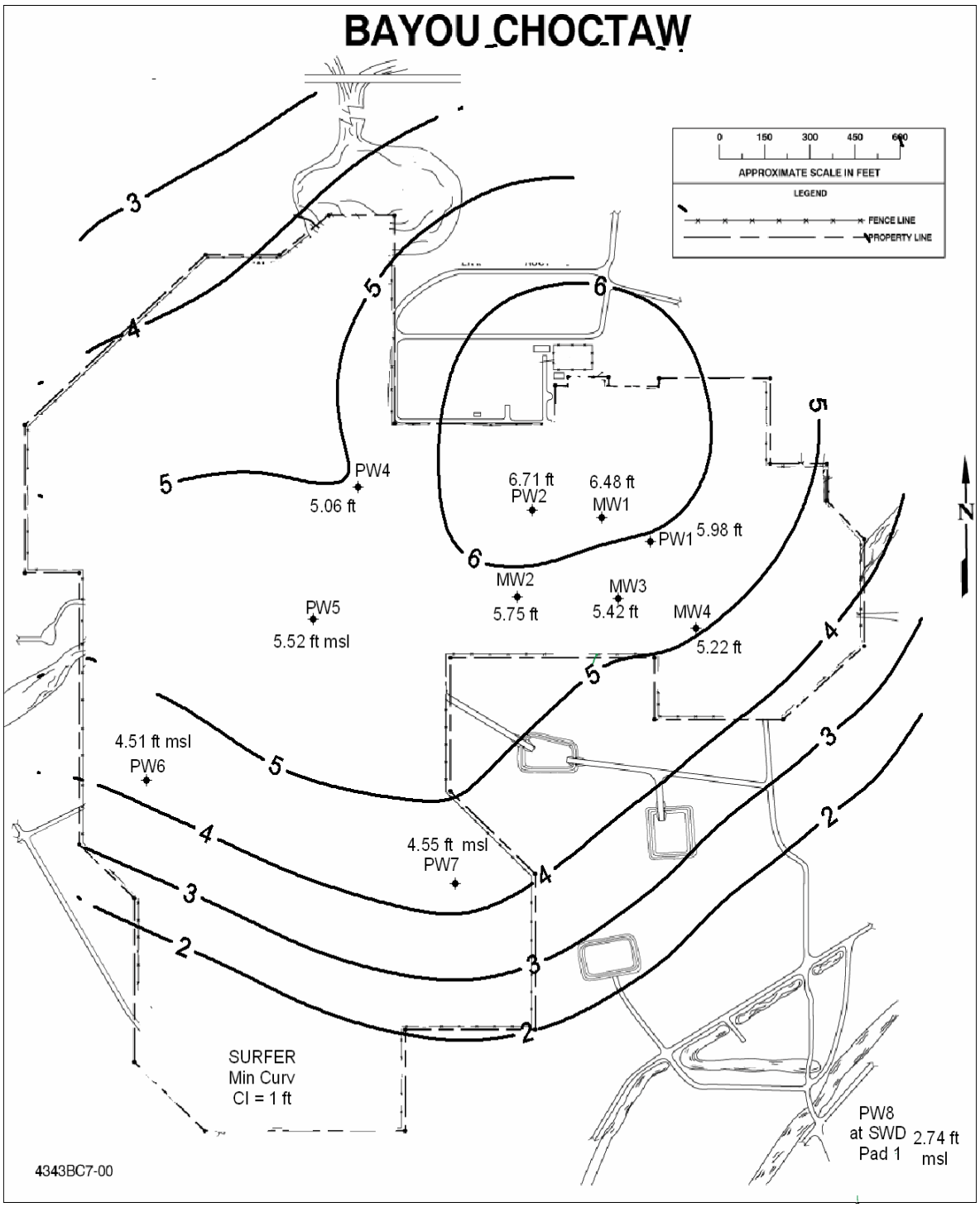


Figure 6-3. Bayou Choctaw Shallow Ground Water Contoured Elevations Winter 2002

The present five-year salinity trend of well BC MW4 defines a moderating salinity with time. The trend now seen is 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. The overall general five-year decreasing trend is definitely evident with this year’s 5-year window and the more reliable data set.

All of PW well series data obtained beyond the original scope of that project indicate decreasing salinity trends over these 5-year window data sets. All of these monitored locations appear to fluctuate regularly over the period of record, but in general, decreasing trend lines are evident with each of the wells. 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 identifying any contamination originating 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 hydrogeological formations in the Big Hill site vicinity are the Chicot and Evangeline aquifers and the Burkeville aquitard. The major source of fresh water is the Chicot Aquifer, which is compressed from uplift and piercement 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.

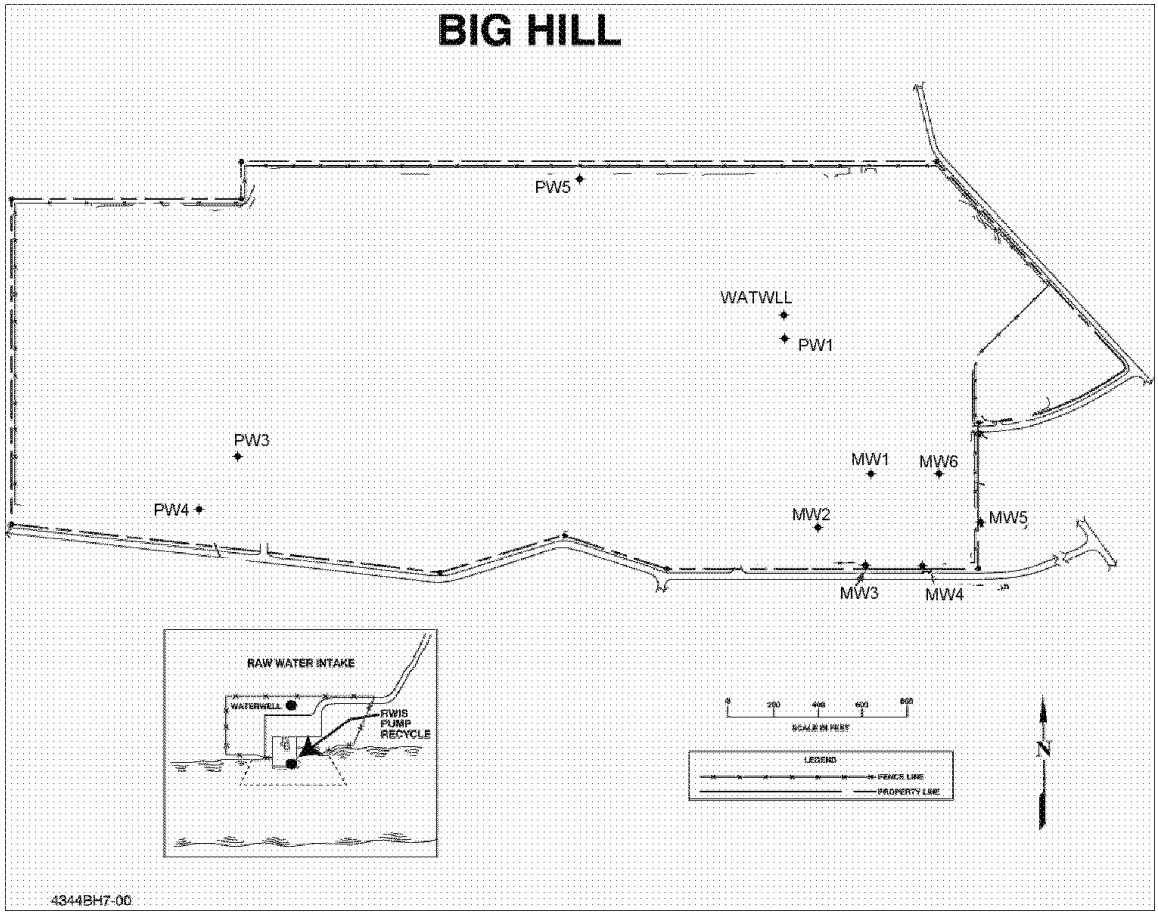


Figure 6-4. Big Hill Ground Water Monitoring Wells

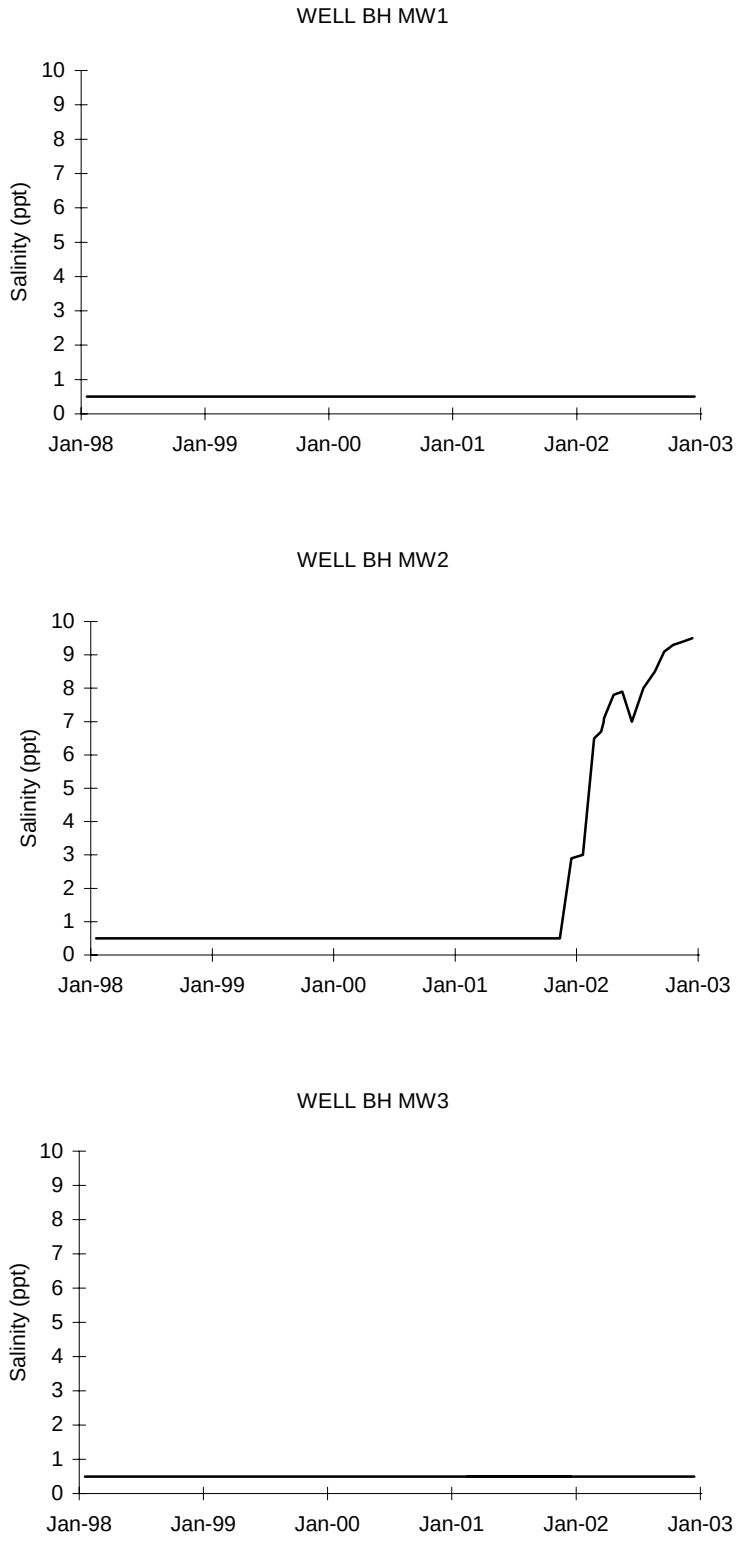


Figure 6-5. Big Hill Ground Water Monitoring Well Salinities

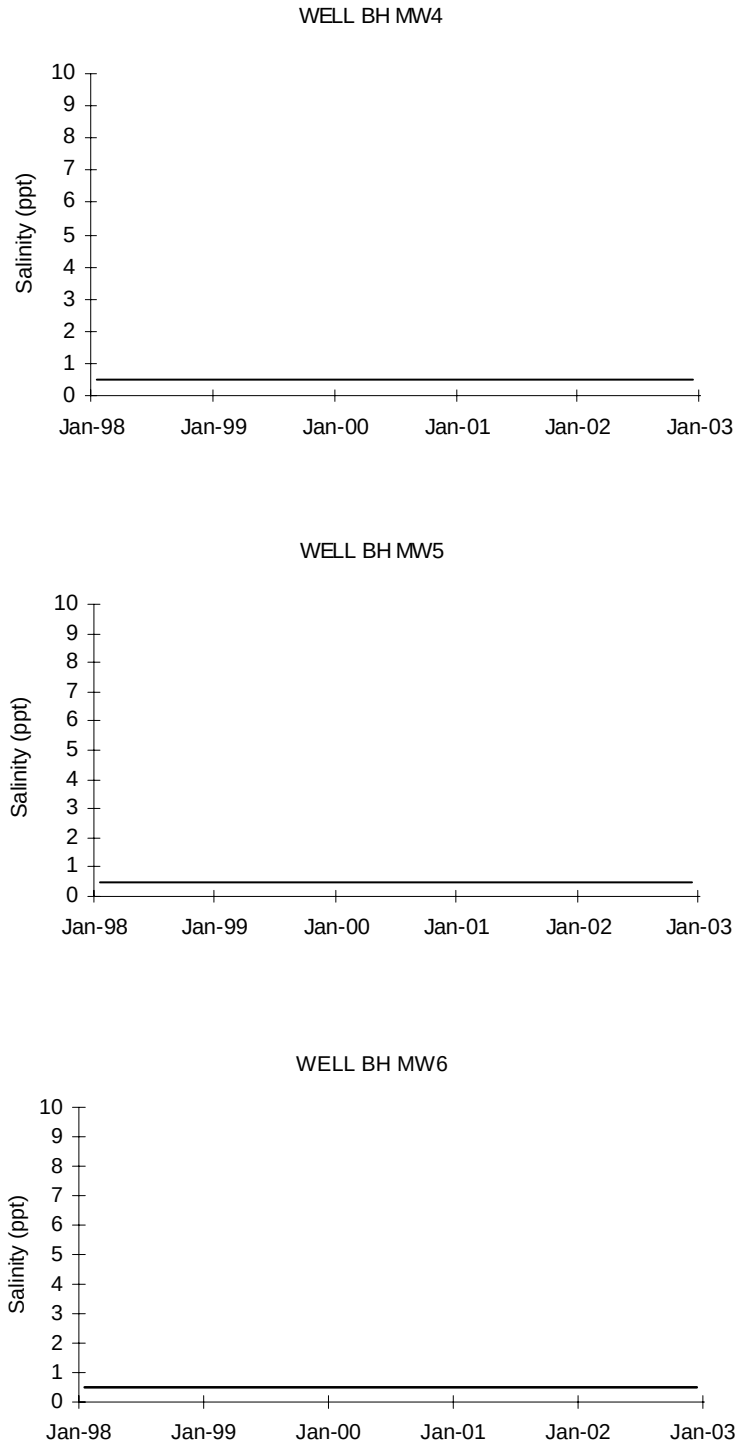


Figure 6-5. Big Hill Ground Water Monitoring Well Salinities (continued)

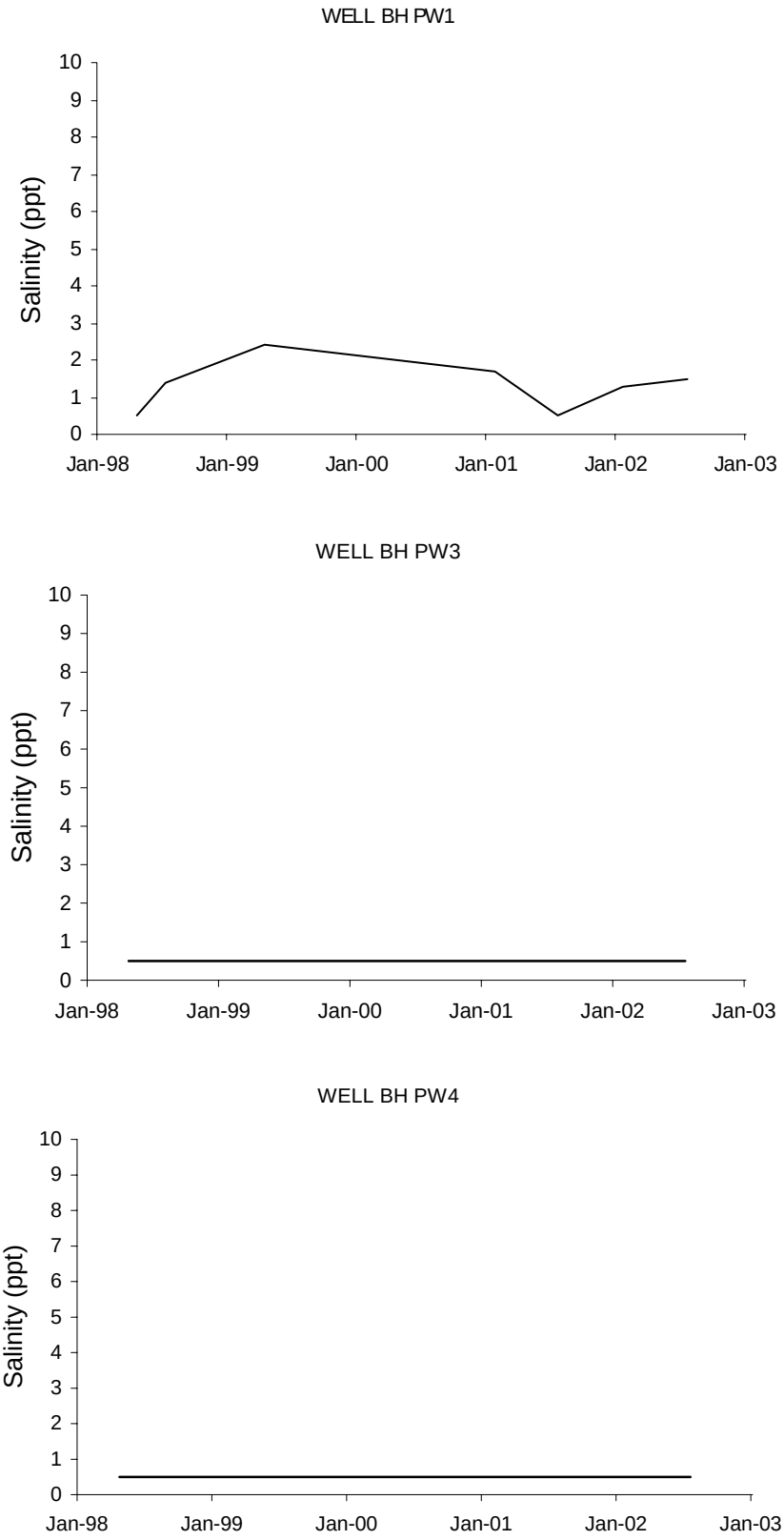


Figure 6-5. Big Hill Ground Water Monitoring Well Salinities (continued)

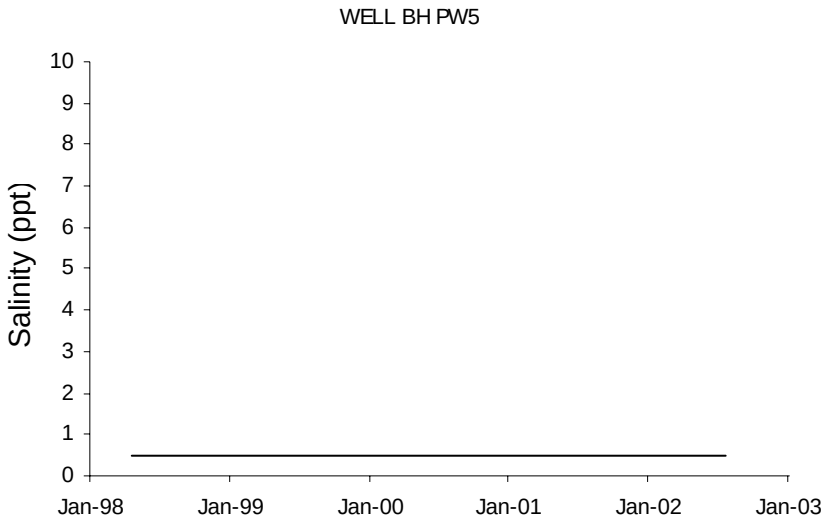


Figure 6-5. Big Hill Ground Water Monitoring Well Salinities (continued)

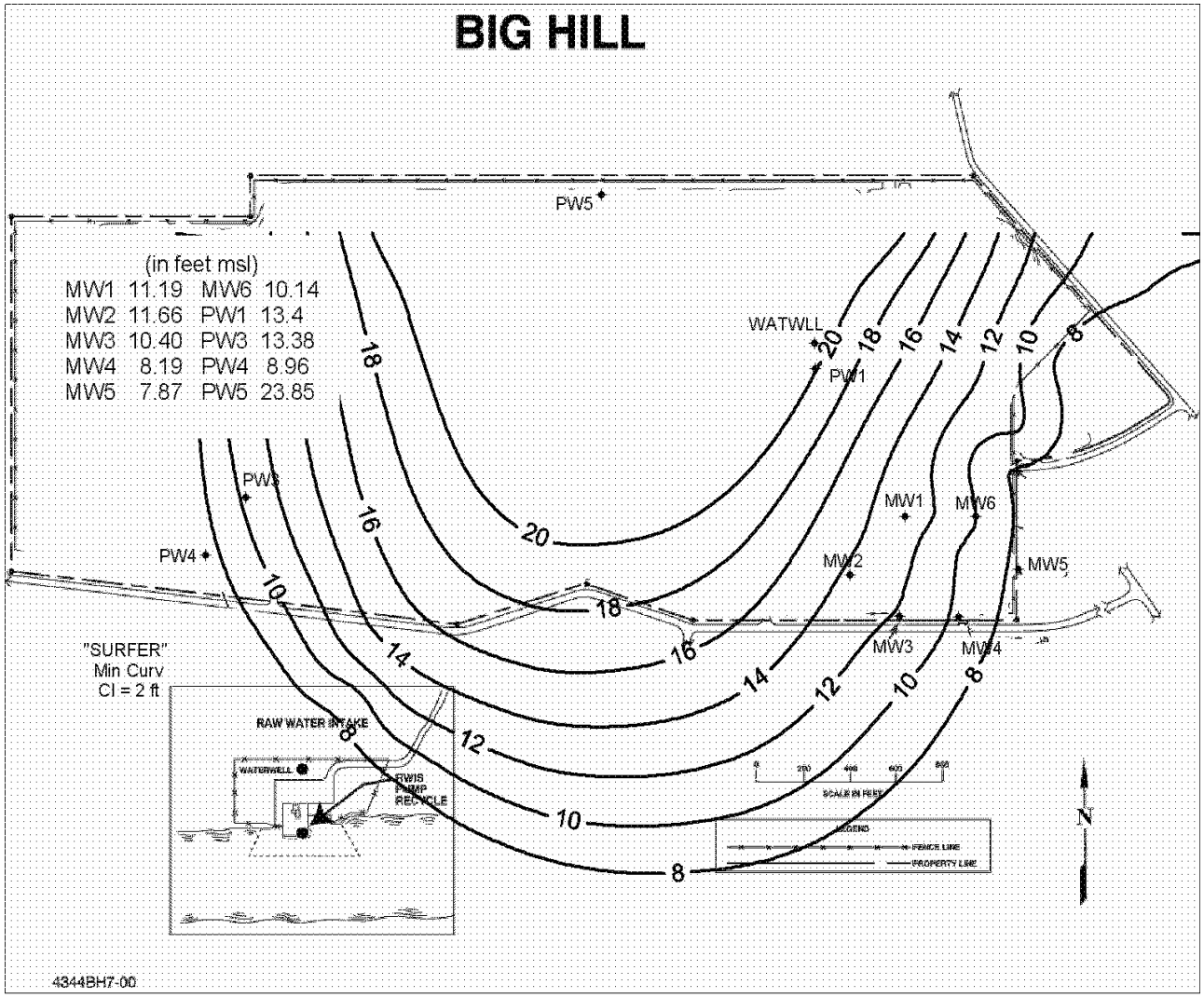


Figure 6-6. Big Hill Shallow Ground Water Contoured Elevations Summer 2002

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 2001 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 BH MW2, beginning at the close of 2001, no measured impacts have been determined in the current five-year history graphically presented. No ground water effects associated with the pond operation are evident since monitoring was begun in 1987 as BH MW2 is up gradient of that pond. 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 again 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 and last year's summer quarter contours. 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 well (BH MW2) showing salinity, beginning in 2001 is now interpreted as a first arrival of some remnant impacts from an upgradient buried brine piping release that occurred in 1990 just outside of the southeast corner of cavern pad 111. This well is, and has historically remained, on the up gradient flow side of the brine pond storage operations. The up gradient source of salinity attributed to this elevated date has been identified from the historical files as a below ground pipeline leak that was discovered, reported, and remediated in 1990. This 90-barrel leak was repaired and the salty soils were thought to have been over-excavated. It is now obvious that 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 was monitored closely in the field during 2002 and has been compared to historical file information that aid our continued observations. 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 elevated salinity passing this monitored position. In addition, both the salinity and pH values measured are too low for the values associated with the continuous saturated brine source represented by the brine pond holding system.

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 upgradient 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 sampling technique for 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 1998 through 2002 for the first time covers only low-flow method sampling data. The low flow method has produced less data variability attributed to more consistent sampling techniques across the SPR. The resulting data trending graphs are now believed to more accurately reflect the site’s ground water conditions. Over the site as a whole, all shallow zone wells reveal stable or freshening conditions for this 5 –year window. This same general trend is evident with all of the deep zone wells too.

Salinity trends are evident in both salt-affected and unaffected areas. Elevated ground water salinity measurements in both the deep and shallow zones near the former 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 decreasing over the long term and not indicative of any significant or noteworthy recent releases or events. Salinity observed in the unaffected (<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 2002. BM MW3, also remaining under 10 ppt, shows a slight freshening trend over this 5-year period.

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 upthrusting and the data from the VWS wells remaining after the study provide additional site

coverage for a more reliable re-evaluation. With these new, more peripheral well locations, it is believed that the shallower zone is influenced more by the topography and appears to be flowing radially (in all directions) off the dome (see Figure 6-9, 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). The water level data for 2002 were contoured using a completely new set of re-leveled measuring points. The surveying was completed in the late spring of 2003. The new survey was needed, as many of the original site monitoring wells had not been leveled since before the VWS in 1995/1996. The survey data did not produce any dramatic changes in flow direction interpretation but the gradients appear to have steepened on portions of the site near the edges of the dome. Most notably the area of generalized mounding in the shallow zone near well BM PZ1S is now revealing a trough-like tendency versus last year. These shallow zone conditions will be watched for subtle changes, as a return to more normal rainfall amounts and patterns, could also produce the same effect through localized recharge.

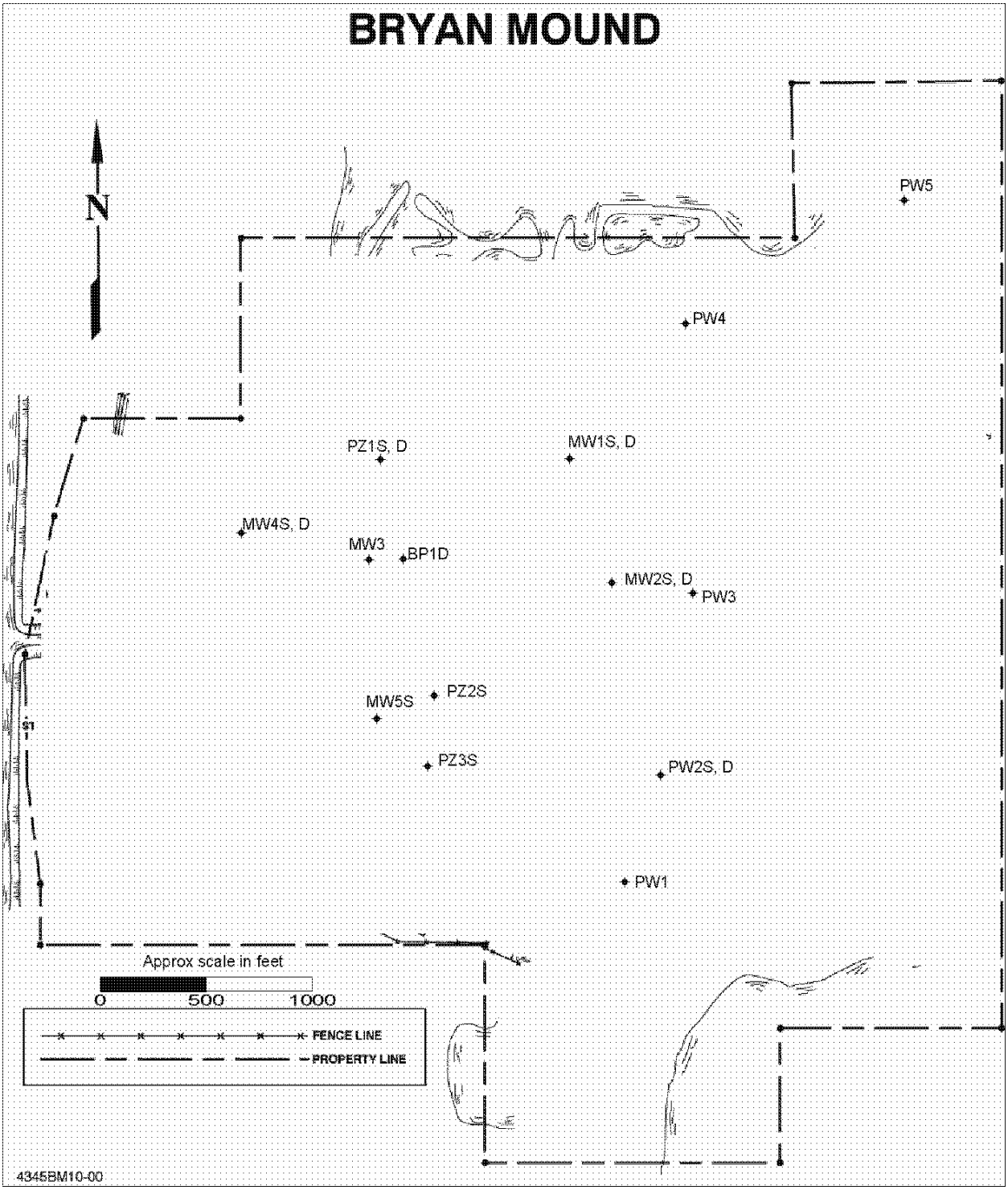


Figure 6-7. Bryan Mound Ground Water Monitoring Wells
(Deep and Shallow Shown)

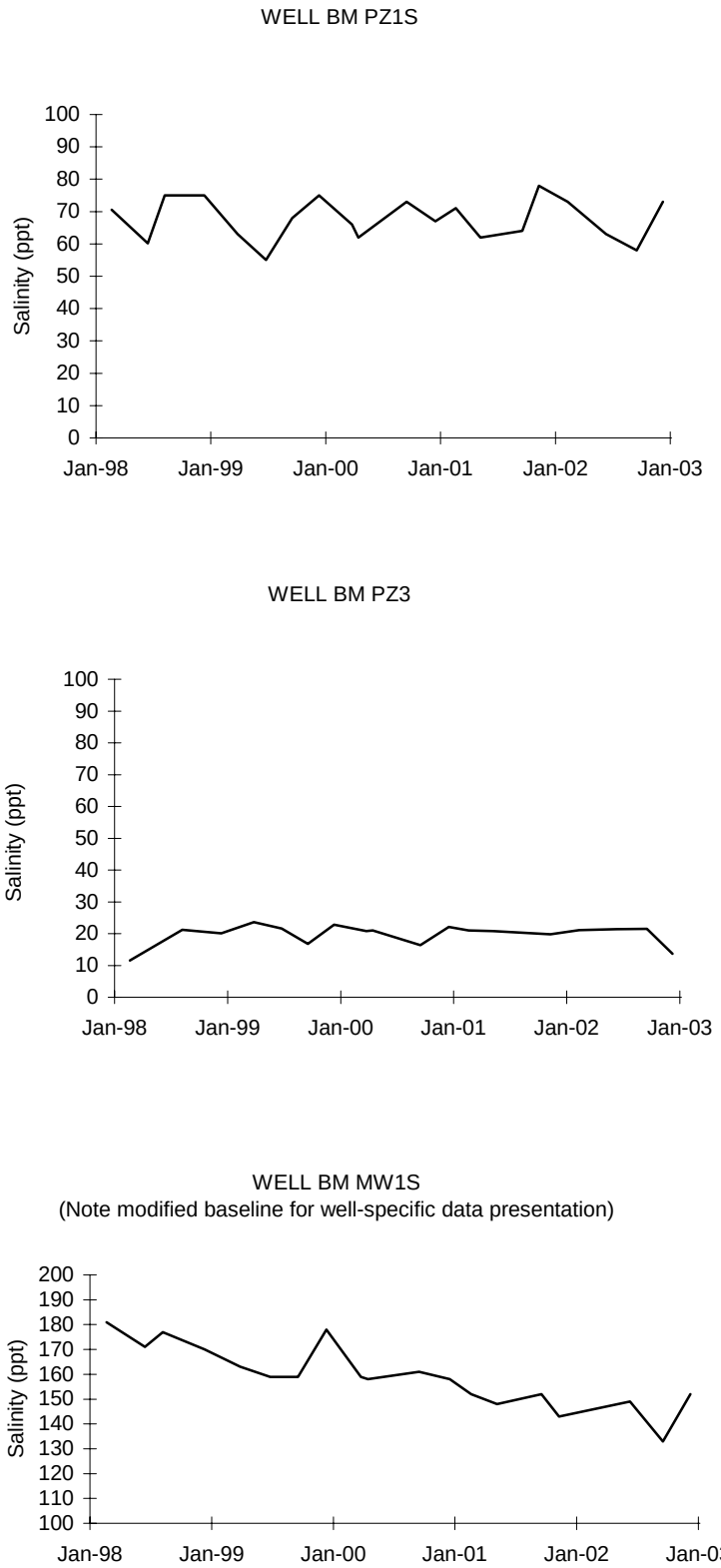


Figure 6-8. Bryan Mound Ground Water Monitoring Well Salinities

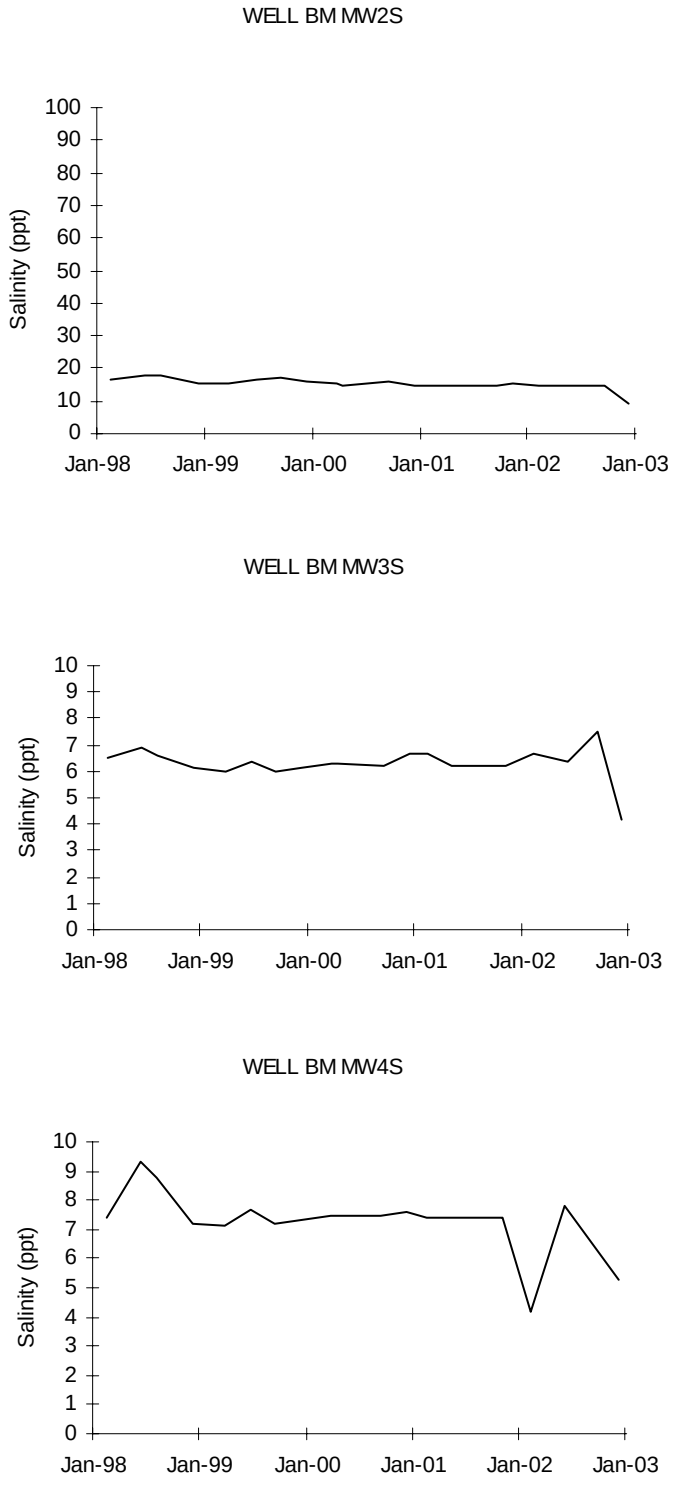
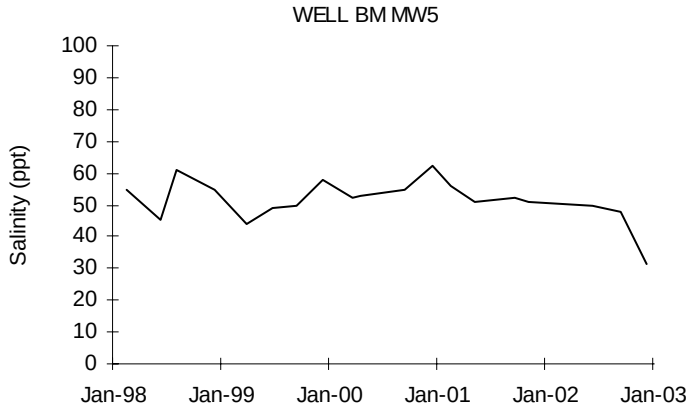
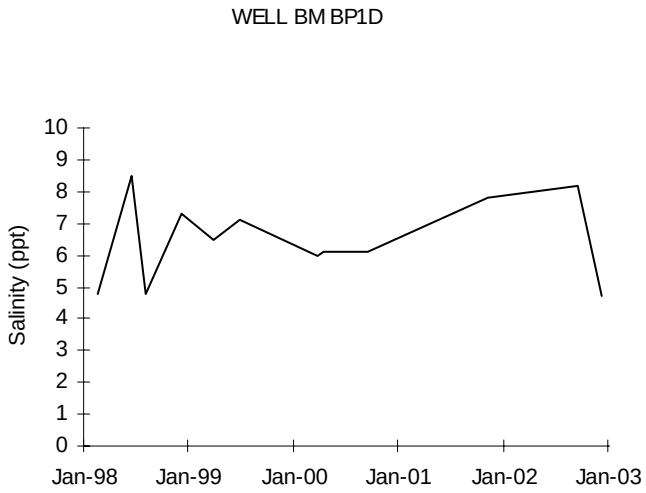


Figure 6-8. Bryan Mound Ground Water Monitoring Well Salinities (continued)





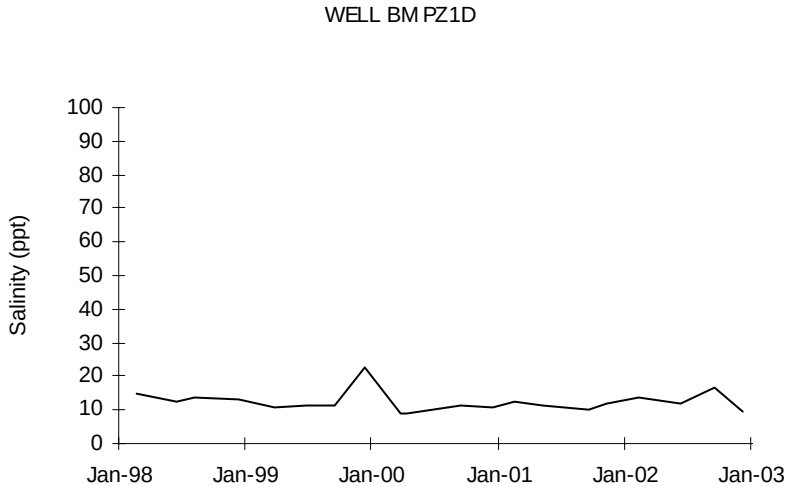


Figure 6-8. Bryan Mound Ground Water Monitoring Well Salinities (continued)

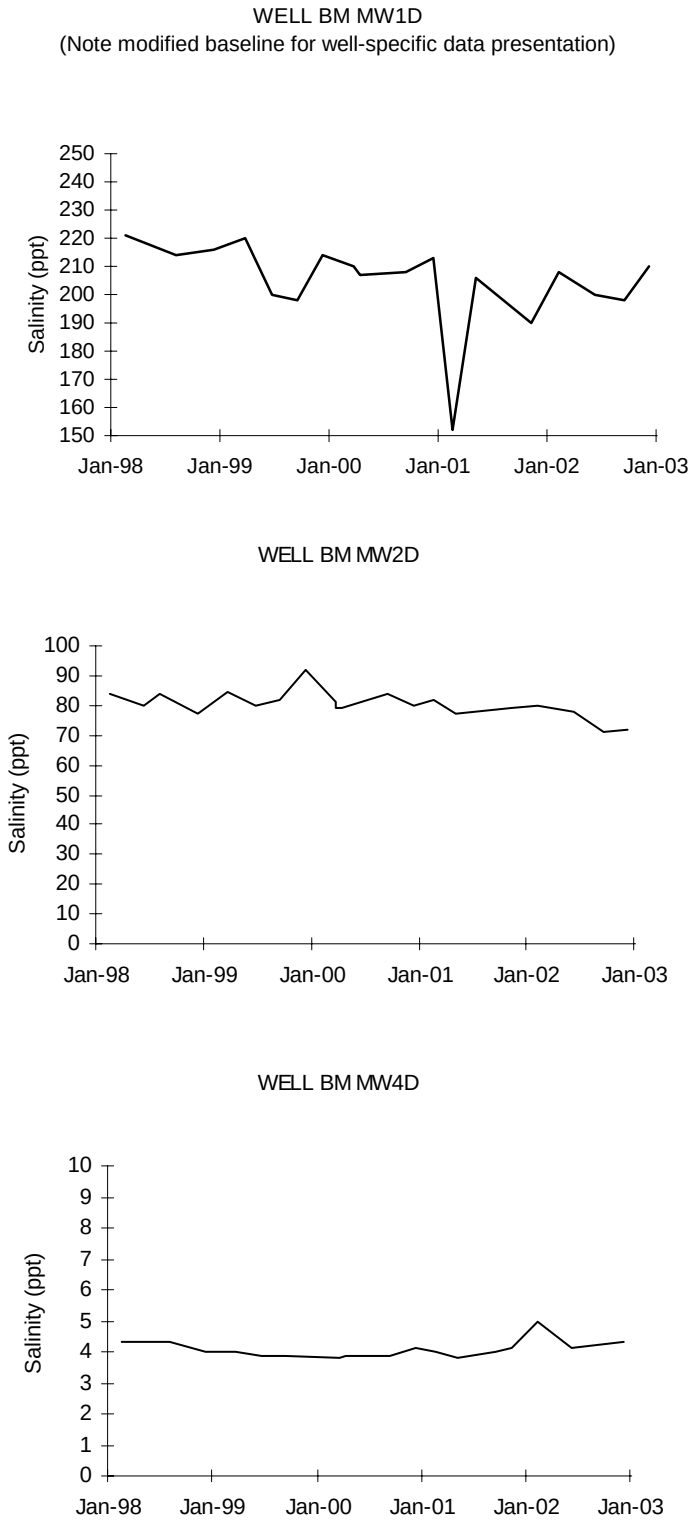


Figure 6-8. Bryan Mound Ground Water Monitoring Well Salinities (continued)

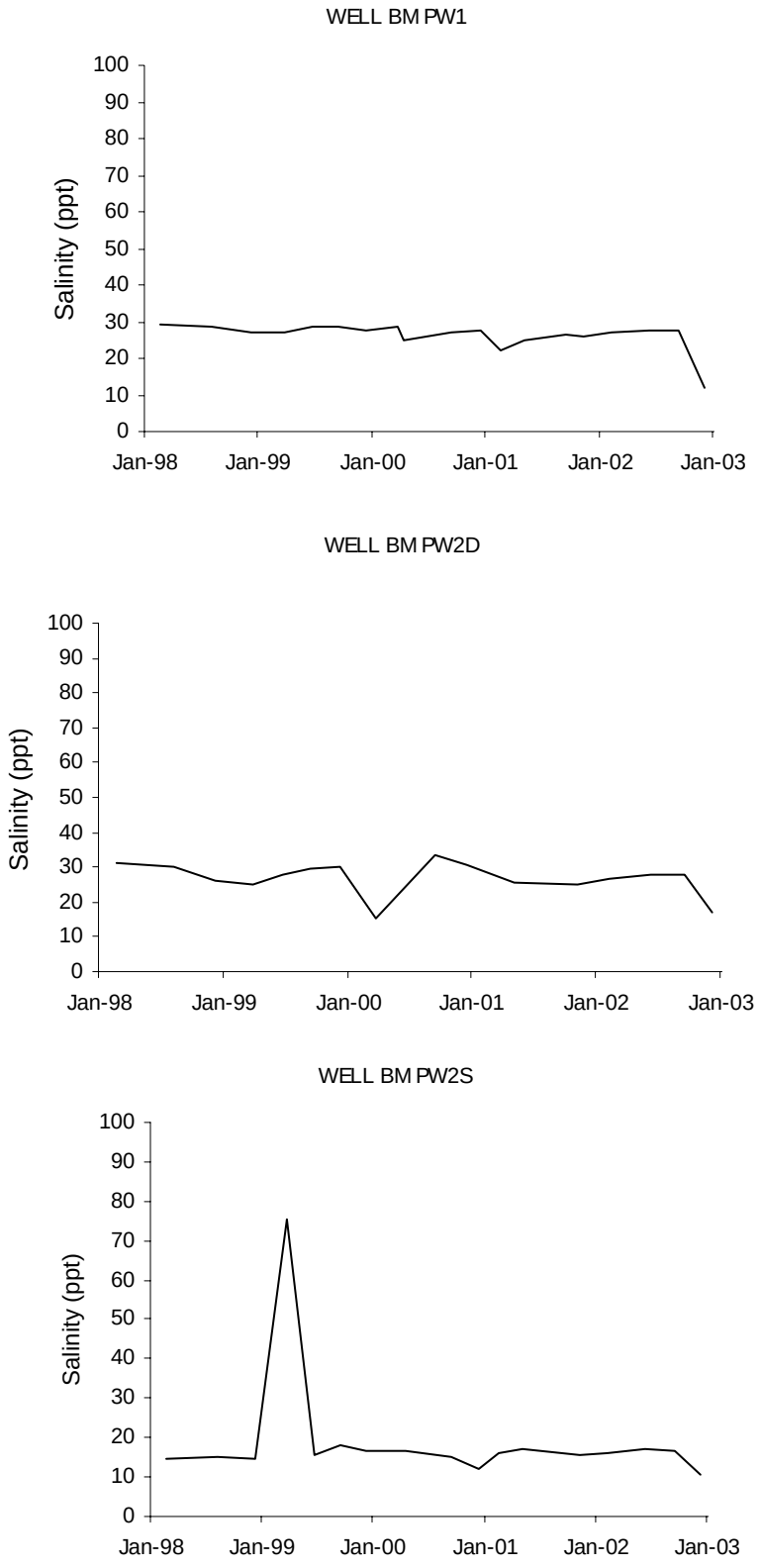


Figure 6-8. Bryan Mound Ground Water Monitoring Well Salinities (continued)

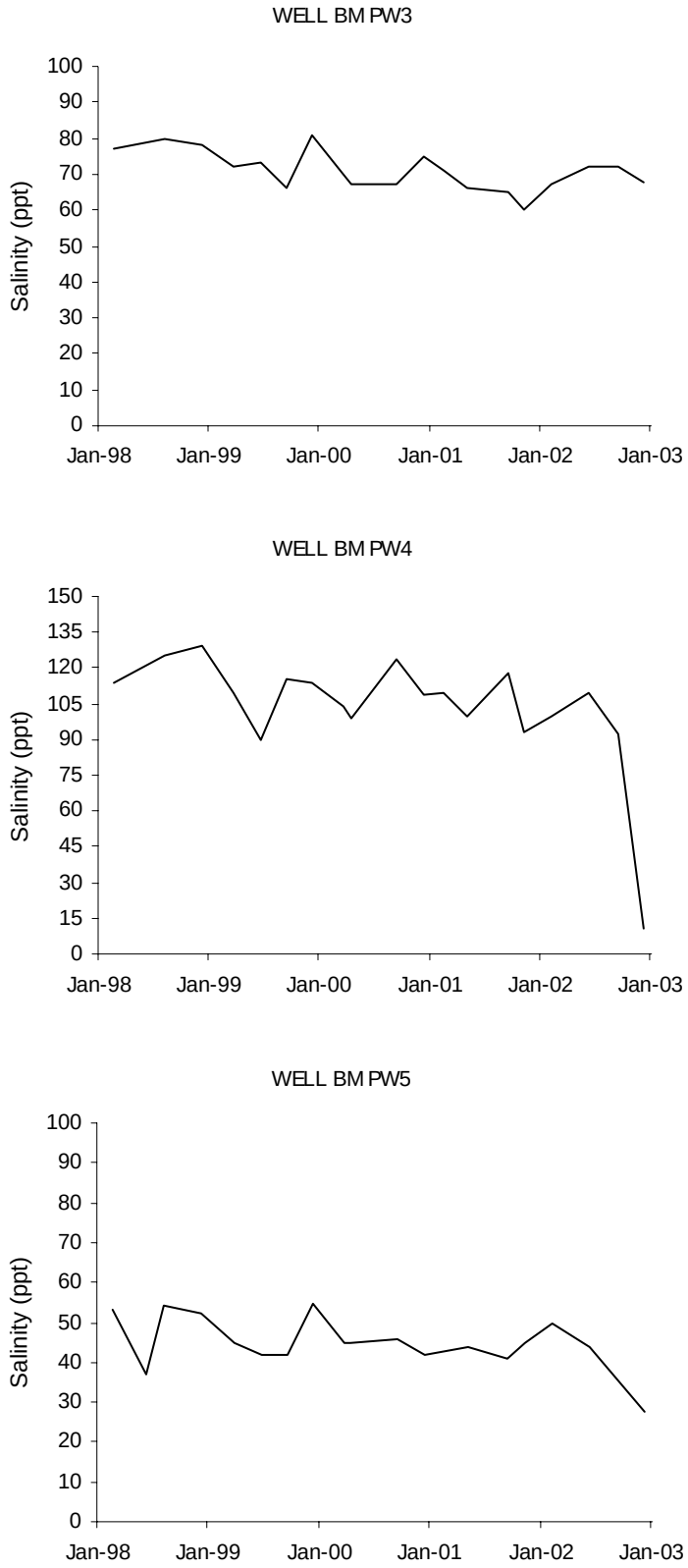


Figure 6-8. Bryan Mound Ground Water Monitoring Well Salinities (continued)

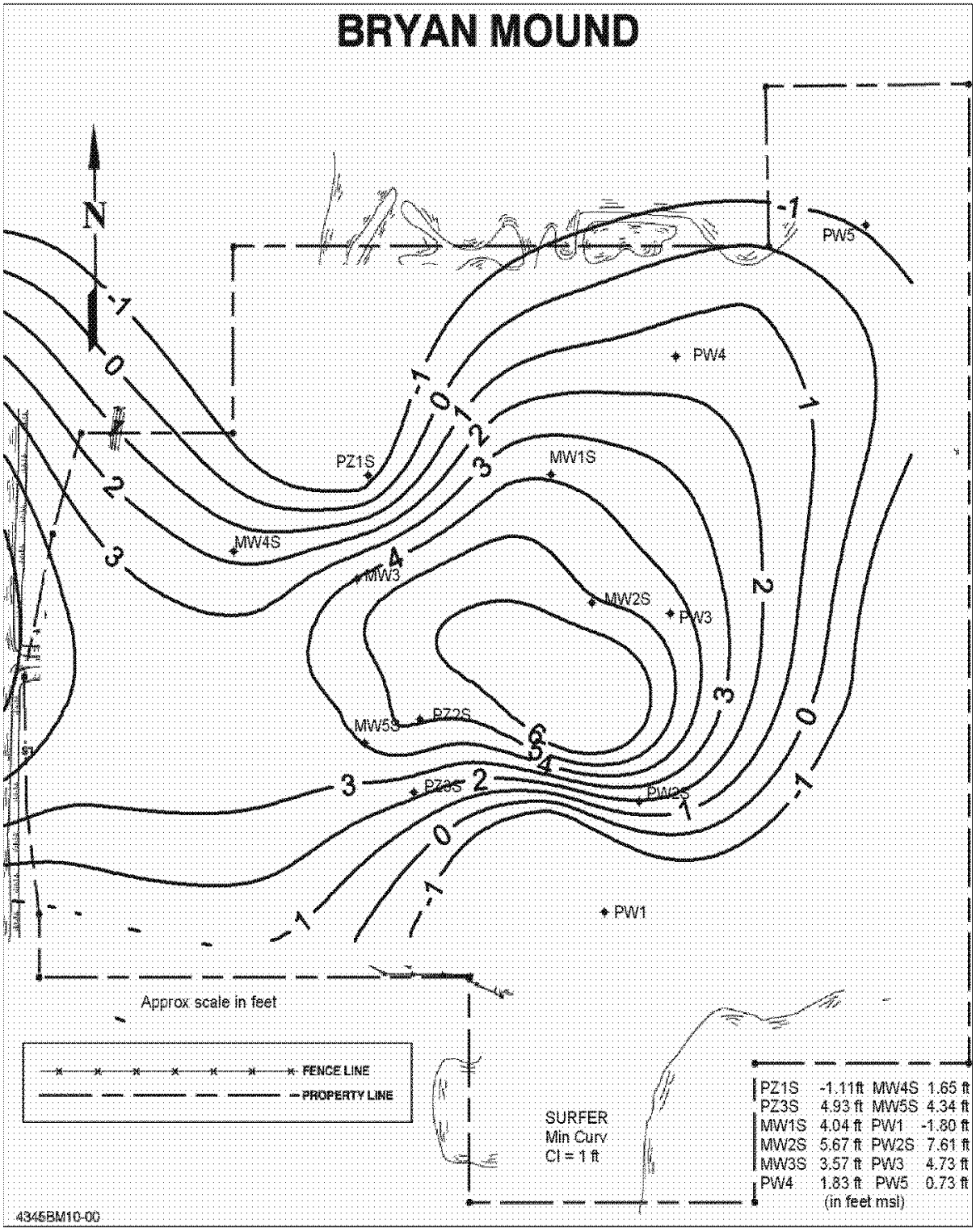


Figure 6-9. Bryan Mound Shallow Ground Water Zone Contoured Elevations
Winter 2002

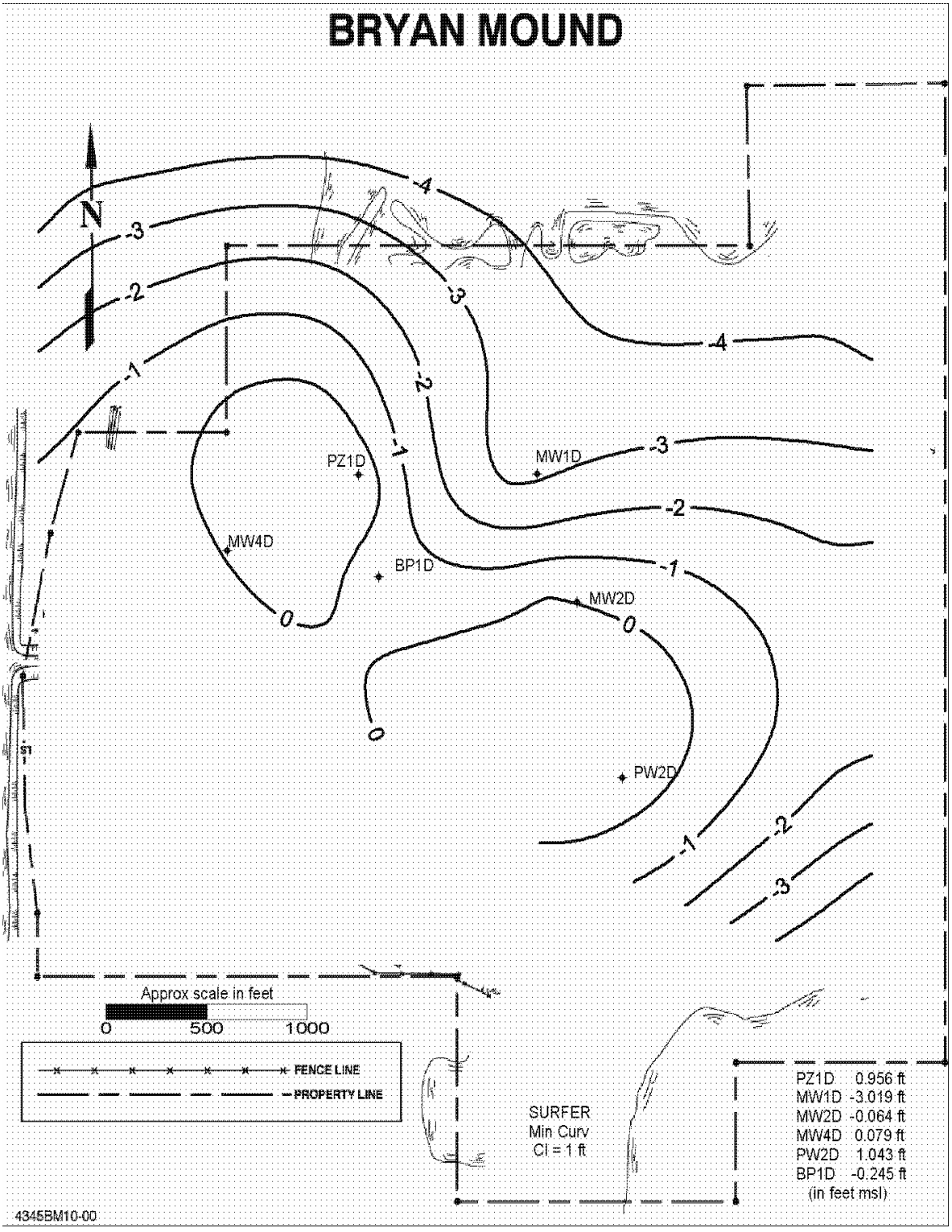


Figure 6-10. Bryan Mound Deep Ground Water Zone Contoured Elevations
Winter 2002

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. 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 been 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 in 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 well BM MW1S reveals a downward or freshening trend now with the consistent sampling regimen and the downgradient shallow zone well BM PZ1S shows a flat or stable trend for the current 5-year trending window.

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 below grade unlined brine retention ponds from pre-SPR

operations. The high salinity of the deep well may also indicate limited hydraulic communication of the two ground water zones in or just upgradient of that location. It is also possible that complete saturation and permeation of the clayey separation layer between the two zones by a dense and strongly ionic salt solution has occurred 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 late in 1998 until the close of CY 2002 the shallow ground water has not moved more than about 25 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 1998 through 2002 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 only the new consistent sampling technique now being depicted on the 5-year graphs we find that only one well BM BP1D on the Bryan Mound site reveals a slightly upward sloping trend line. This well, however, remains well below the arbitrary ambient or unaffected 20 ppt cut-off suggested for this site. With this year's trending, all wells, save BM BP1D, appear to be stable (flat) or depict long-term freshening conditions. This observation reinforces the interpretation that current activities are not a contributing factor to

the salinity levels observed at this site. Returning rainfall may also be recharging the wells locally but any surface soil sources would percolate downward. And most wells at this site are showing marked improvements with increasing regular rainfall.

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 on 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, the pig trap area was approved as “no further action needed” by the state. Crude oil removal efforts, continued through CY 2001 at the booster pump

station where since the inception of the recovery operation, 3.8 gallons of oil have been removed.

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).

Based on the last set of analytical data from the December 2001 sampling event, DOE proposed to LDEQ in October 2002 to cease remediation efforts. This proposal seemed logical since the analytical data from a period of four years provided evidence that the area of impact met the MO-1 criteria with only 3 of the 13 RECAP parameters for groundwater slightly above the RECAP standards. In December 2002 LDEQ submitted correspondence to DOE that would allow DOE to petition for the consideration of a No Further Action determination if four consecutive sampling events indicate levels of constituents of concern below applicable RECAP standards beginning CY 2003.

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 that occur 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 rather 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).

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.

Late in 2002, TPH above the historic 5 mg/l action limit, was observed in two of the wells. This occurrence, was confirmed in a routine re-testing step implemented on December 16, 2002. The contract laboratory data for the retest were received on December 24th and the data, although sporadic in the well net, were sufficient to warrant further more detailed investigative action. To evaluate the potential for chemical interference with the infrared method being used, a second more specific gas chromatographic analytical method was identified for comparisons. A subsequent sampling

was proposed which would include duplicate samples from the affected wells to be tested by the two methods TPH IR and TPH

8015 (oil). In addition, a field operable GC unit was dispatched from LSU via coordination through the SPR's Environmental Advisory Committee (EAC). Dr. Ed Overton, the current EAC Chairman, visited the site for field evaluations with a portable GC device to augment the laboratory testing. These field and laboratory data suggest that the IR method was experiencing some form of interference. GC split samples and field data, although indicating the presence of something not necessarily in the crude oil range, found minute traces of compounds which when summed were collectively below 1 mg/l. These spurious and variable concentrations just above the 8015 method detection limit refute the larger concentrations indicated by the IR tested samples and support the conclusions that some form of organic interference is affecting the broader spectrum IR methodology. These sporadic occurrences have been reported and will continue to be investigated in a systematic fashion with our routine quarterly monitoring schedule although the levels do not indicate any containment problems with the closed mine. The low concentrations measured thus far by both methods coupled with the rather low gradient and resultantly slow ground water movement on this portion of the Weeks Island dome support this approach as a prudent response to the values thus far determined.

On June 4, 2001, Morton Salt personnel discovered the surface expression of the former sinkhole location. The progress of the sinkhole's expansion and eventual quiescence was followed throughout the 2002 calendar year. By the close of 2002 the subsidence rate had leveled off to something approaching about an inch per week. Morton personnel mounded fill-sand over the former hole on a monthly or less frequent basis based on the subsidence rate. The field observation program for the sinkhole returned to a quarterly schedule to coincide with the quarterly ground water sampling episodes.

The sinkhole remains cordoned-off and is backfilled with sand as-needed for safety precautions. A program of physical observations of this and the remaining decommissioned DOE facilities on the island is now maintained with the ground water monitoring program activities.

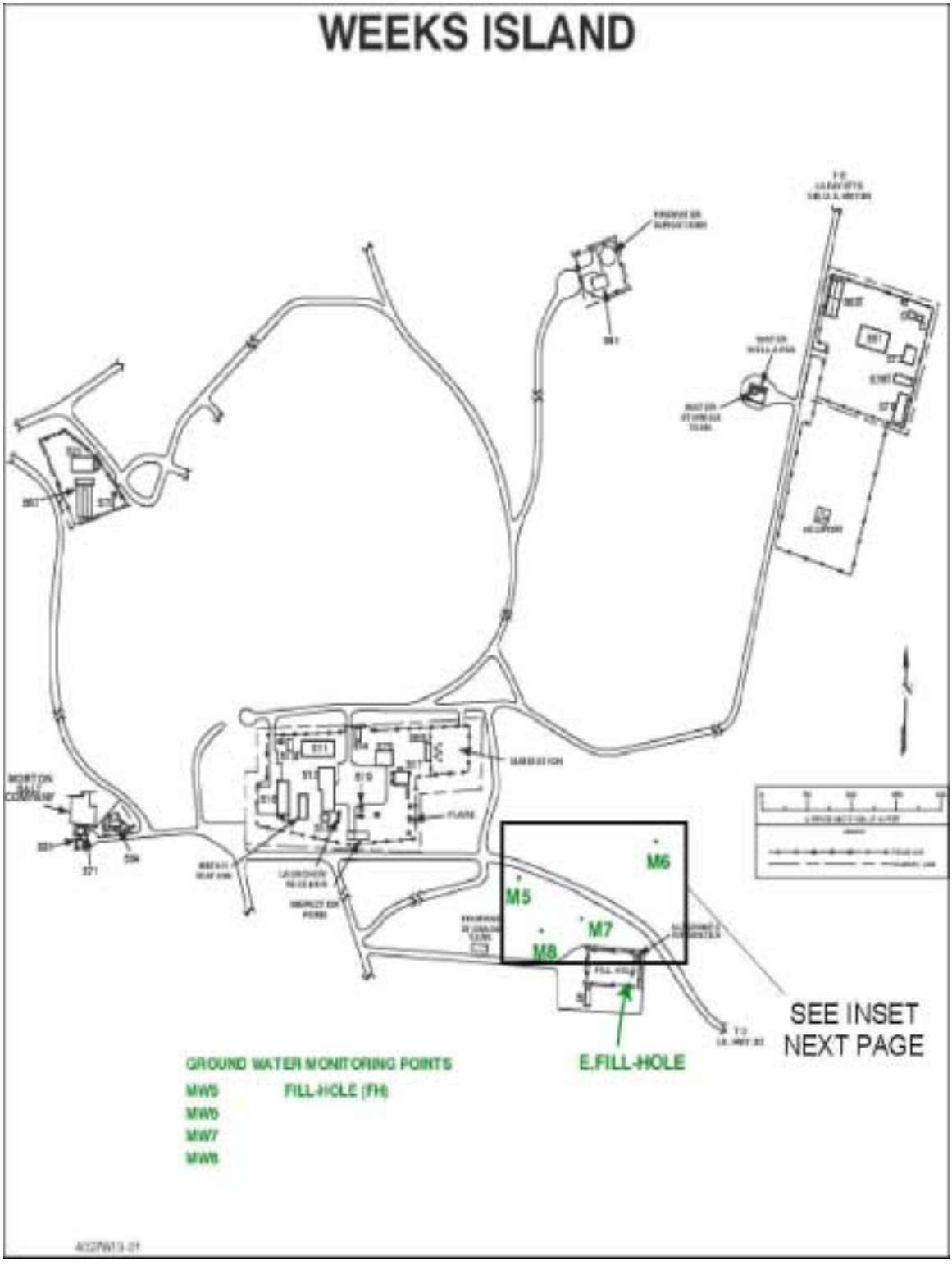


Figure 6-11. Weeks Island Long Term Monitoring

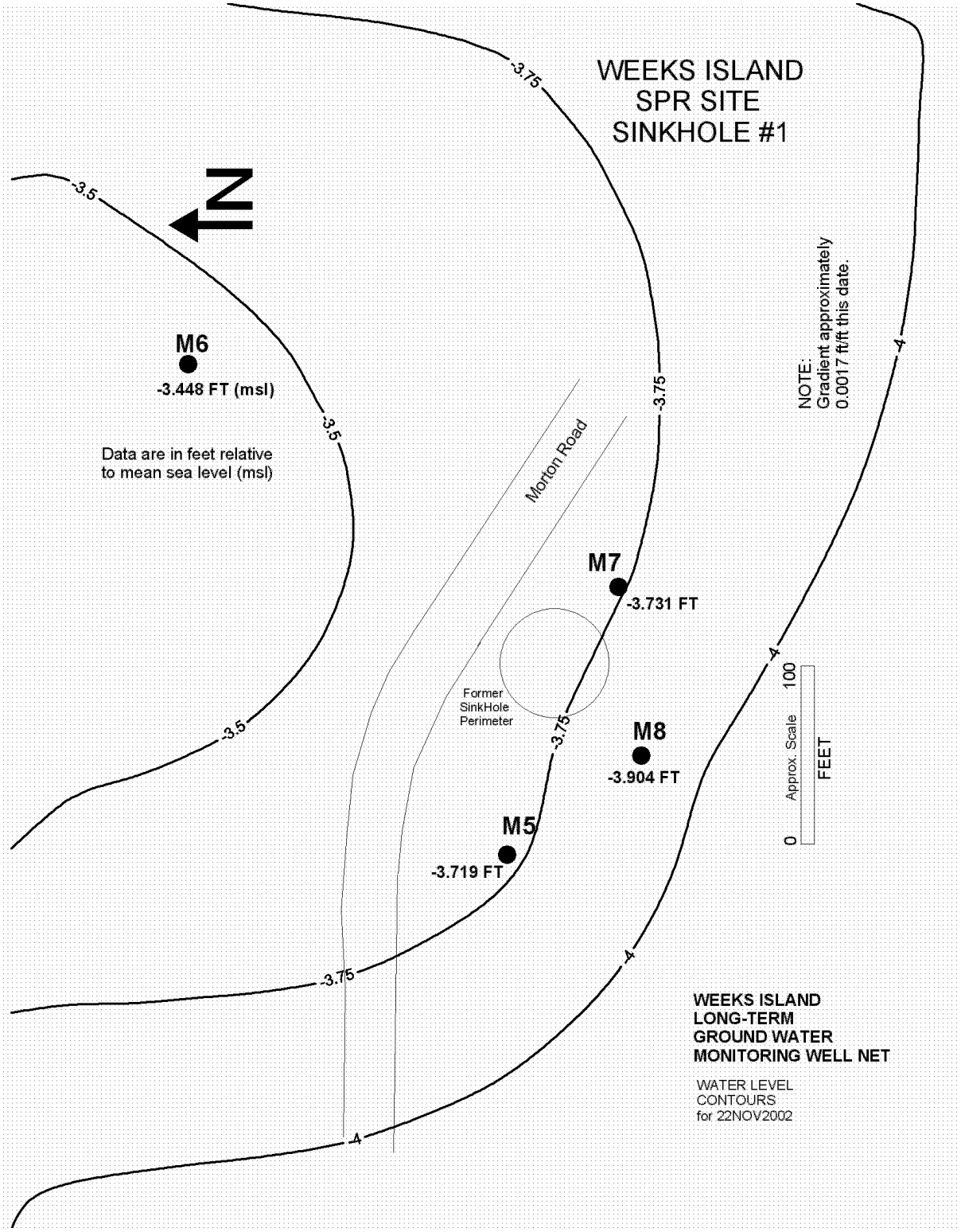


Figure 6-12. WILT 23 Flow Direction and Gradient Winter 2002

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 anticipated "mine-creep" from the decommissioned and brine backfilled storage chambers. Fluid level trending and salinity data gathered at the submerged sampling point of the EFH are prepared and evaluated with each trip. All of these data are compiled, evaluated, and reported on a regular basis for outside agency review.

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 winter quarter timeframe of 2002 have been reduced to elevations, contoured, and are presented as Figures 6-15 and 6-16, Shallow Zone and Deep Zone, respectively. The effects of the long-term pumping were still somewhat evident in both zones at the time the measurements were made in November, 2002 and appear to have finally dissipated since 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. The contour map of the water levels in the underlying deep zone reveals a rather flat pressure derived gradient within the semi-confined water bearing zone. The low permeability of the deeper zone routinely produced very pronounced draw down levels at the pumping wells, which in turn produced an unusually deep and pronounced cone of depression as an artifact of the contouring. The slow recharge to this lower permeability zone has been monitored closely throughout the calendar year. The pressure gradient evident is very low and continues to maintain very slow travel times and indecisive (ephemeral) travel paths with no hard and fast direction beneath the site. The general appearance is that of a fully recovered (or nearly so) confined water bearing zone, ostensibly receiving some recharge potential in the vicinity of wells WH P1D, WH P4D, and WH P2D.

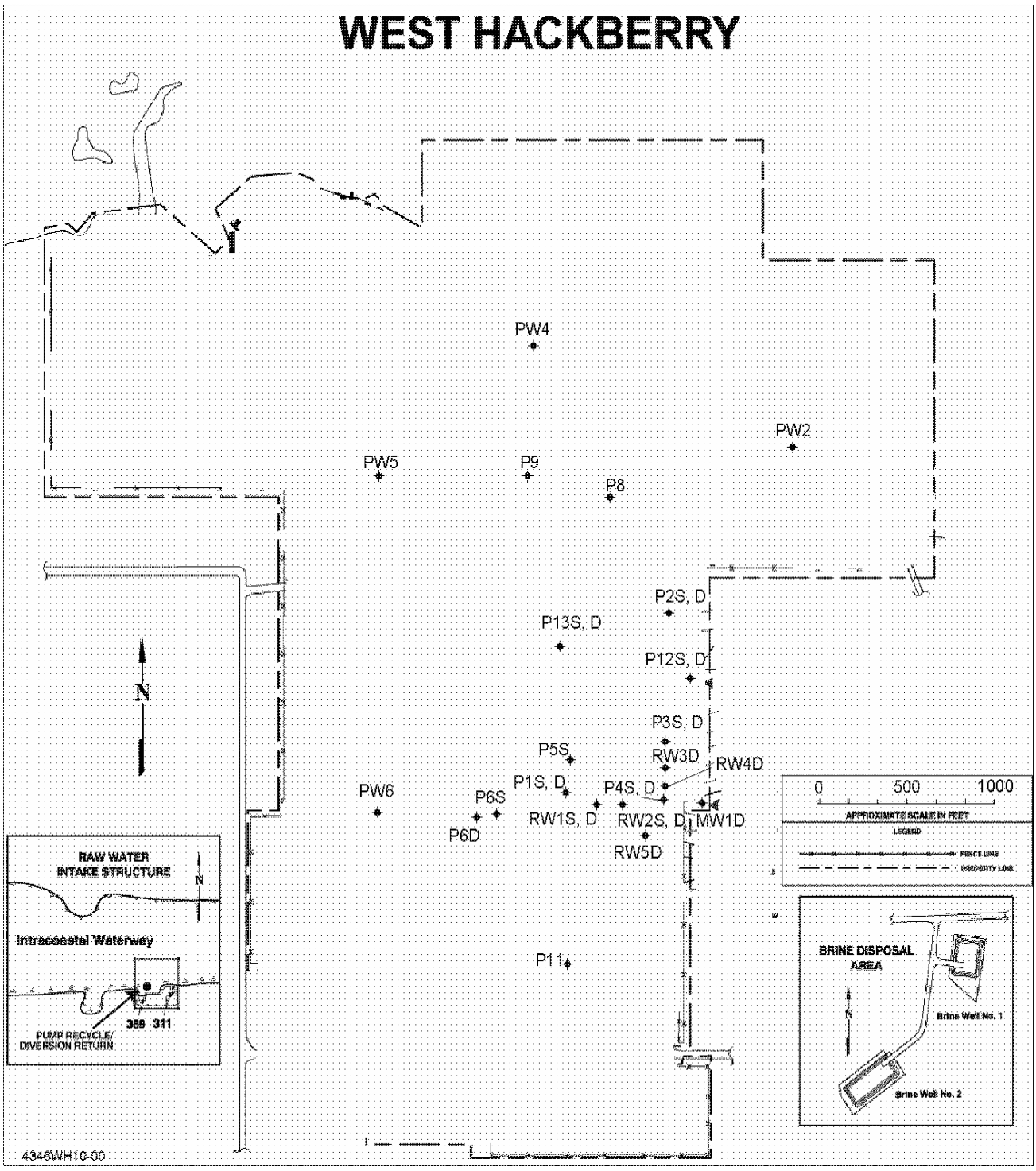


Figure 6-13. West Hackberry Ground Water Monitoring Wells
(Deep and Shallow Shown)

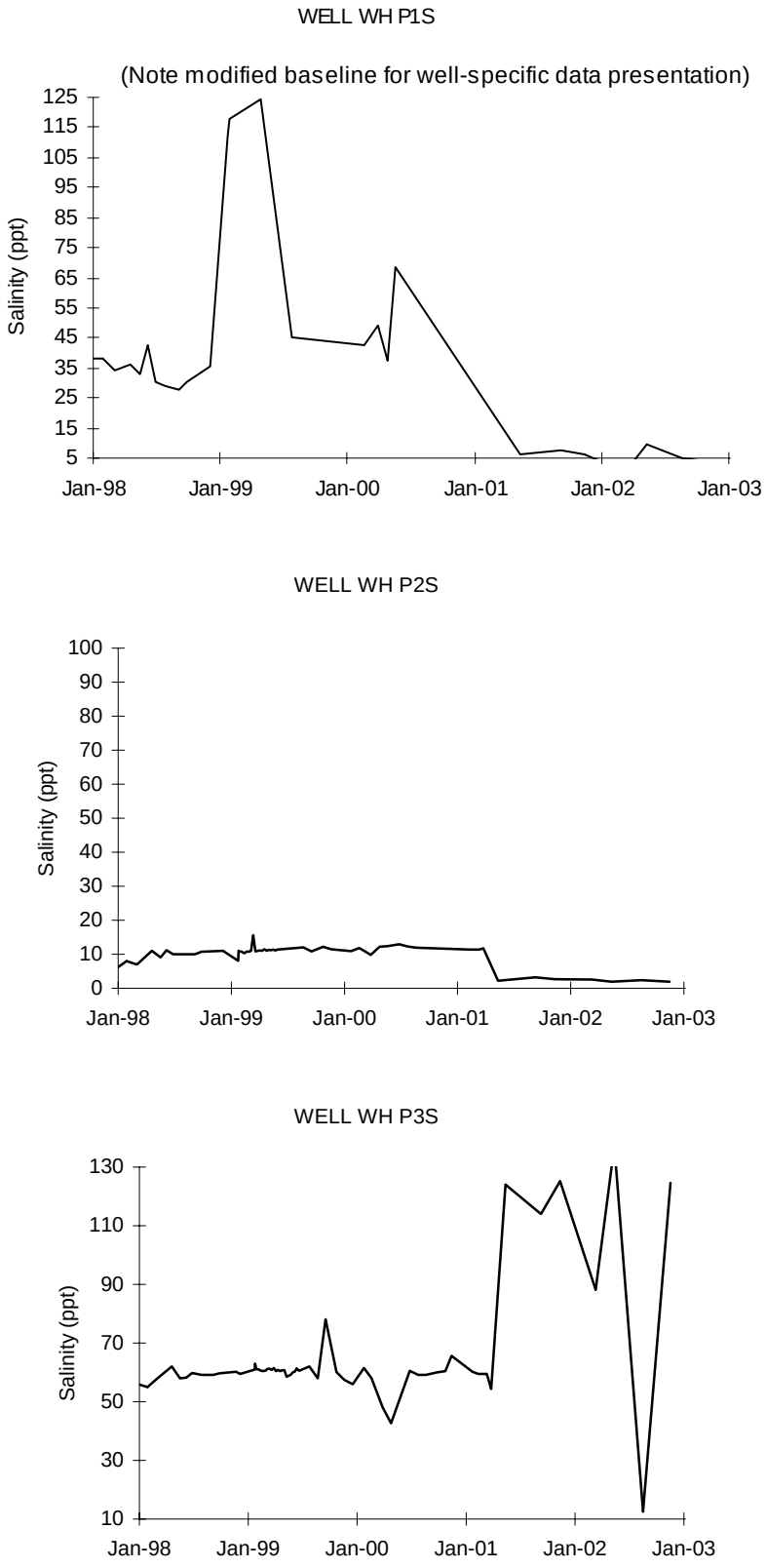


Figure 6-14. West Hackberry Ground Water Monitoring Well Salinities

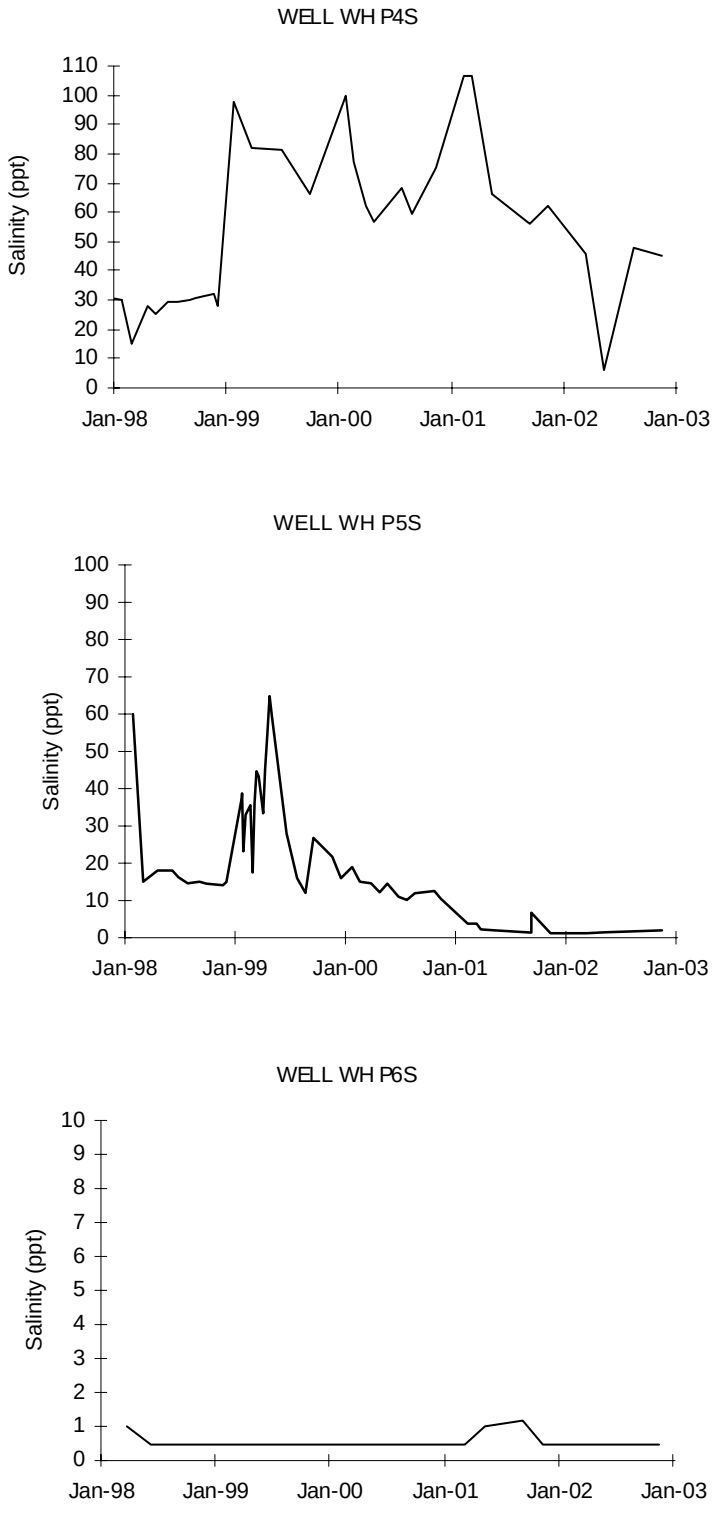


Figure 6-14. West Hackberry Ground Water Well Salinities (continued)

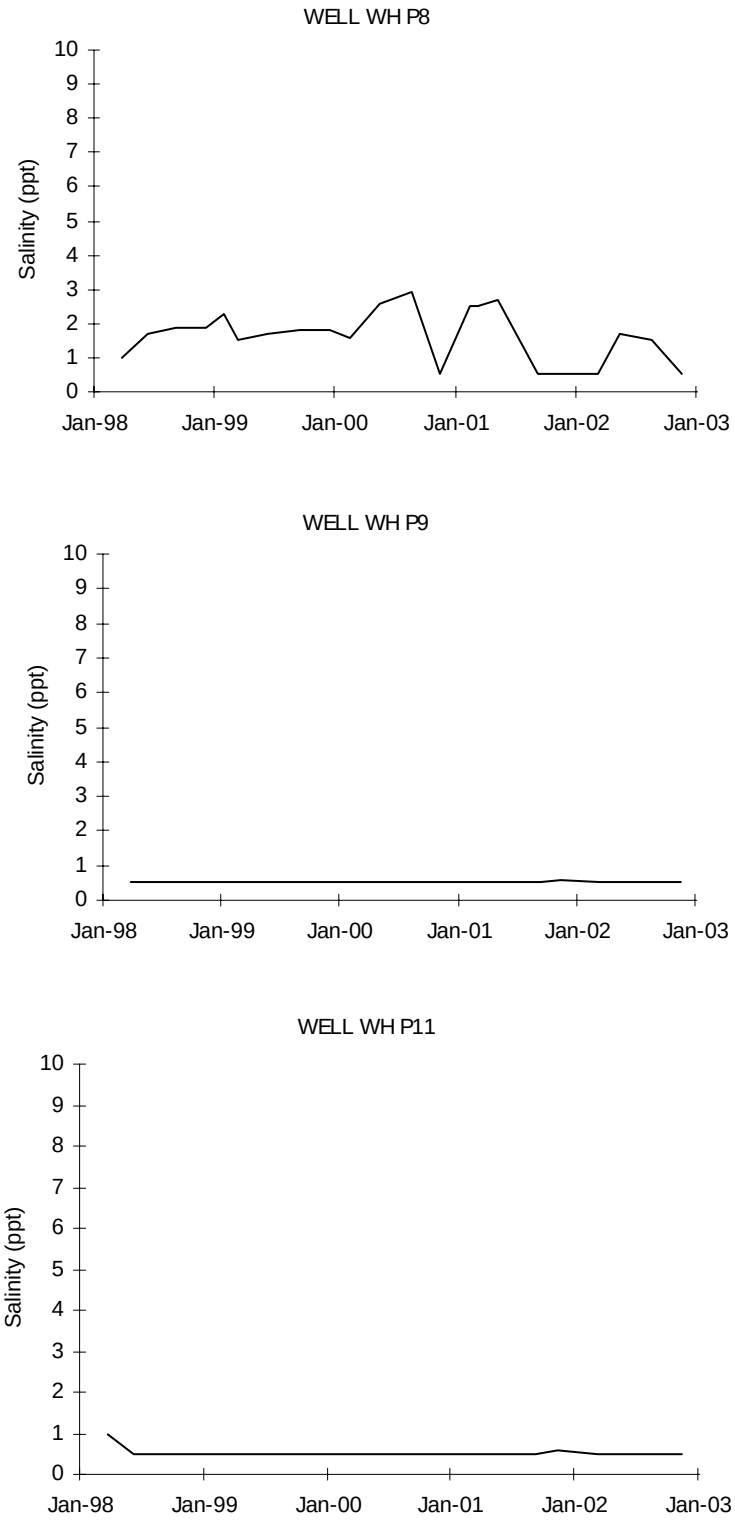


Figure 6-14. West Hackberry Ground Water Well Salinities (continued)

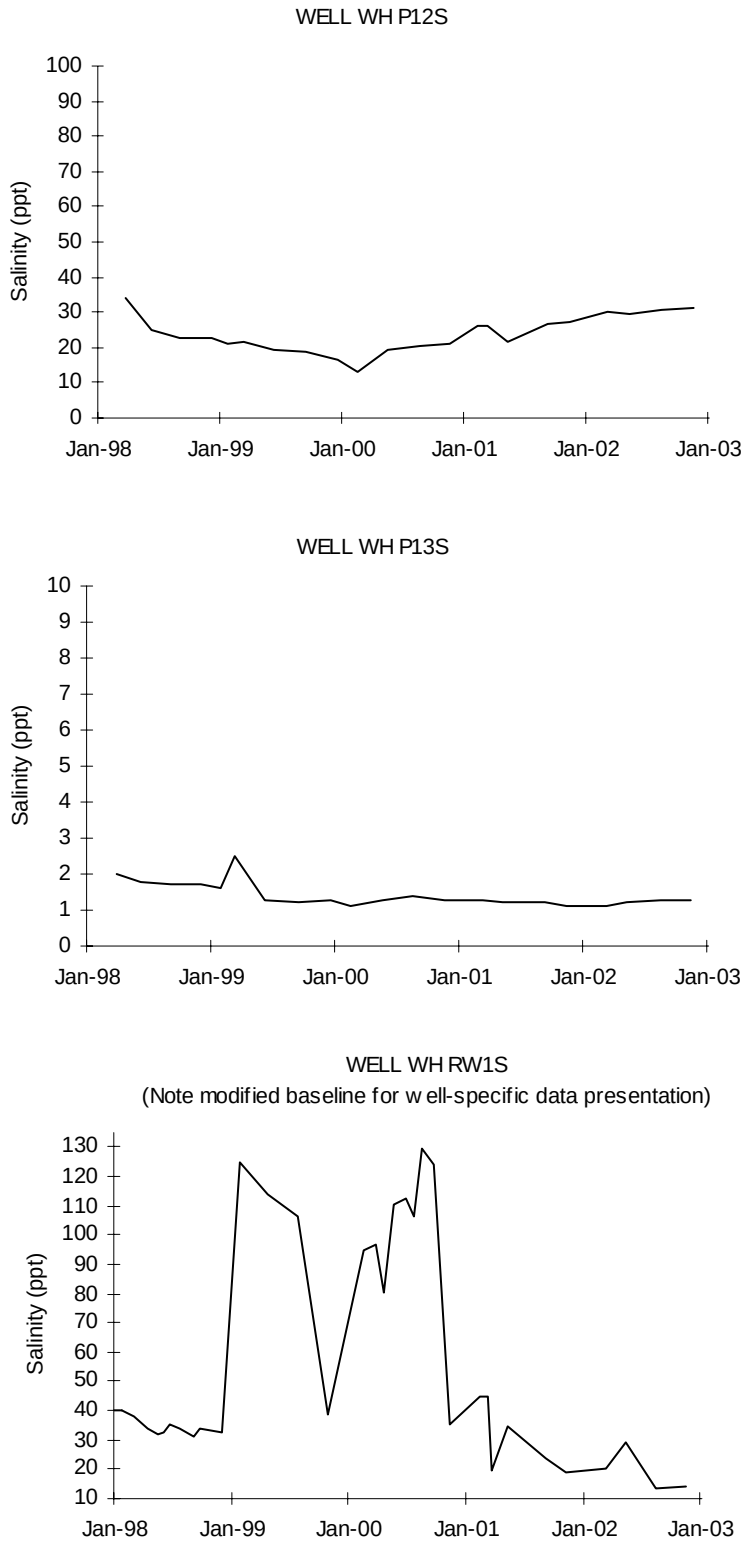


Figure 6-14. West Hackberry Ground Water Well Salinities (continued)

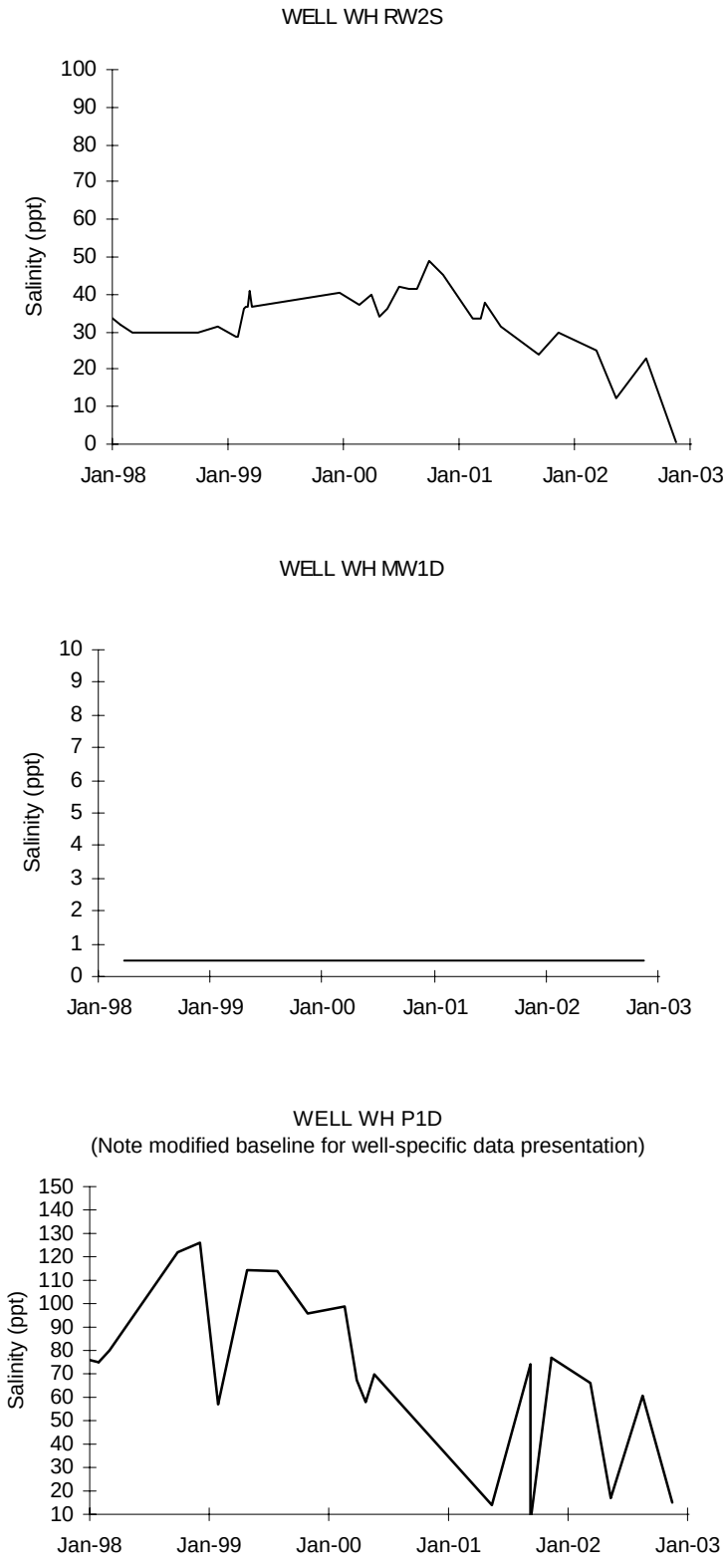


Figure 6-14. West Hackberry Ground Water Well Salinities (continued)

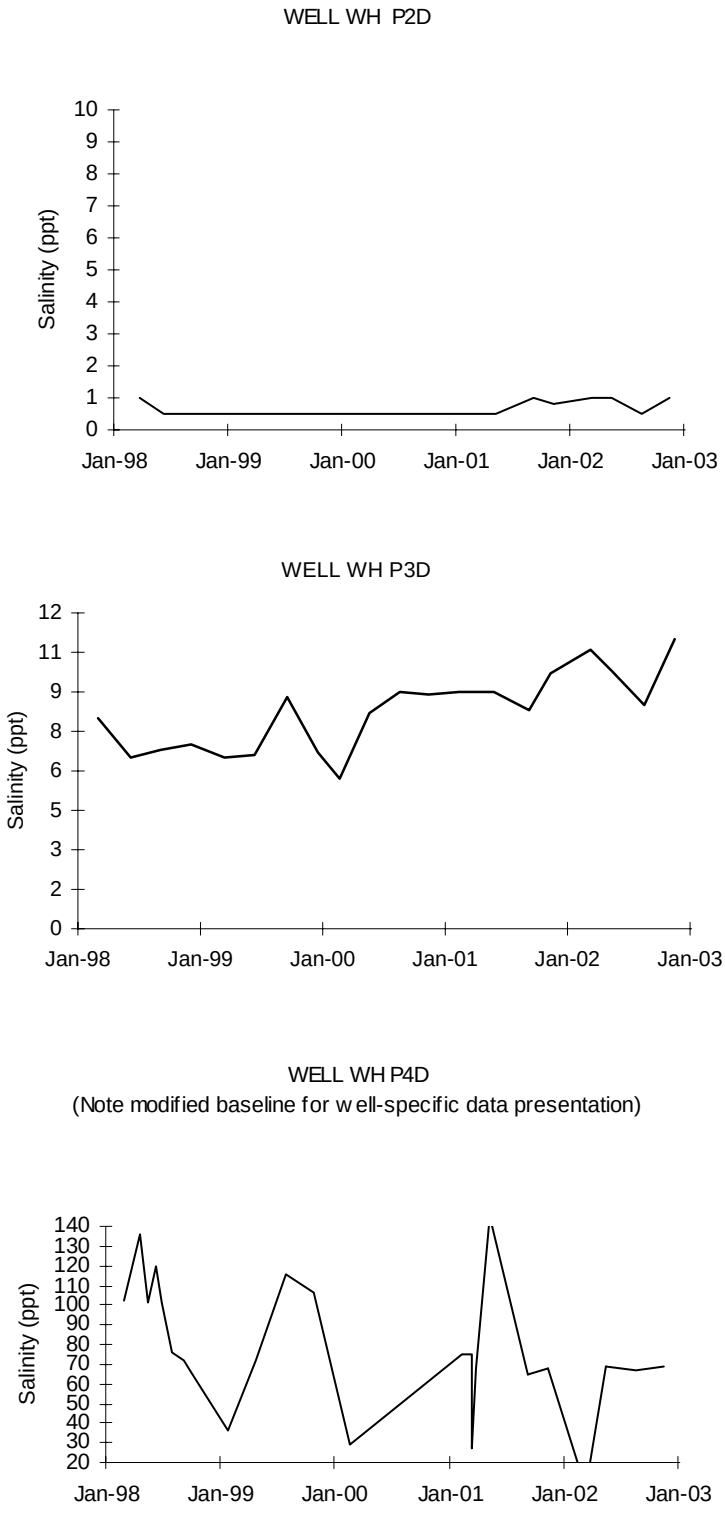


Figure 6-14. West Hackberry Ground Water Well Salinities (continued)

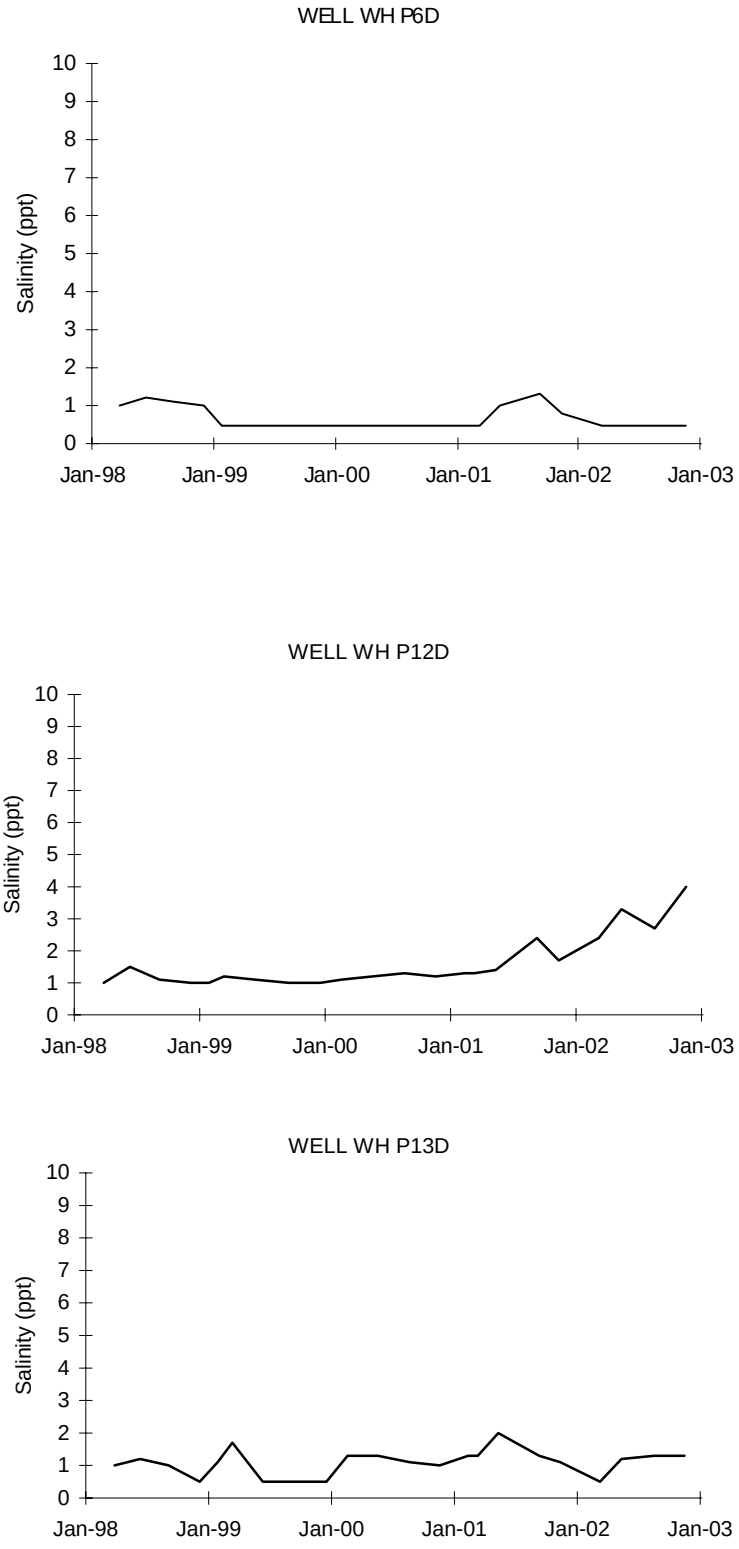


Figure 6-14. West Hackberry Ground Water Well Salinities (continued)

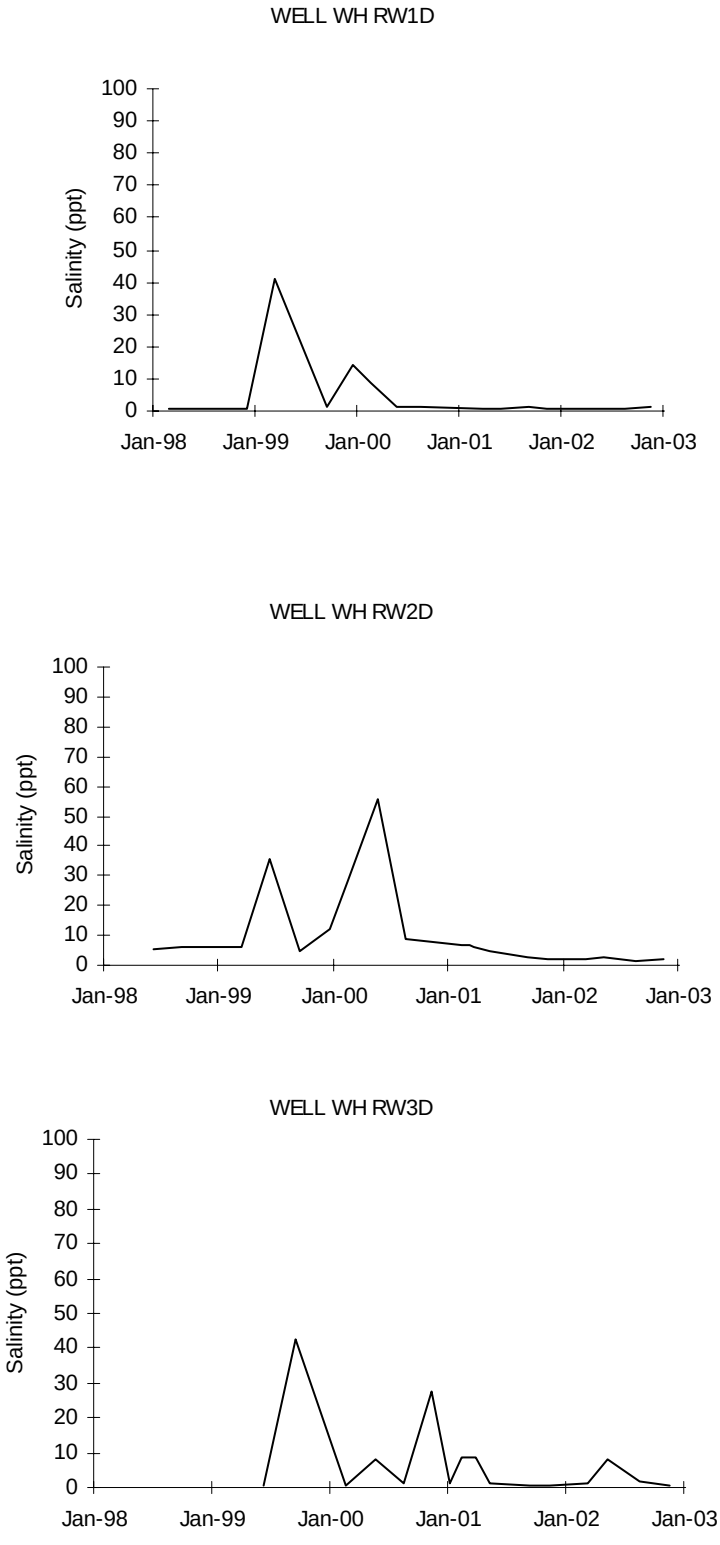


Figure 6-14. West Hackberry Ground Water Well Salinities (continued)

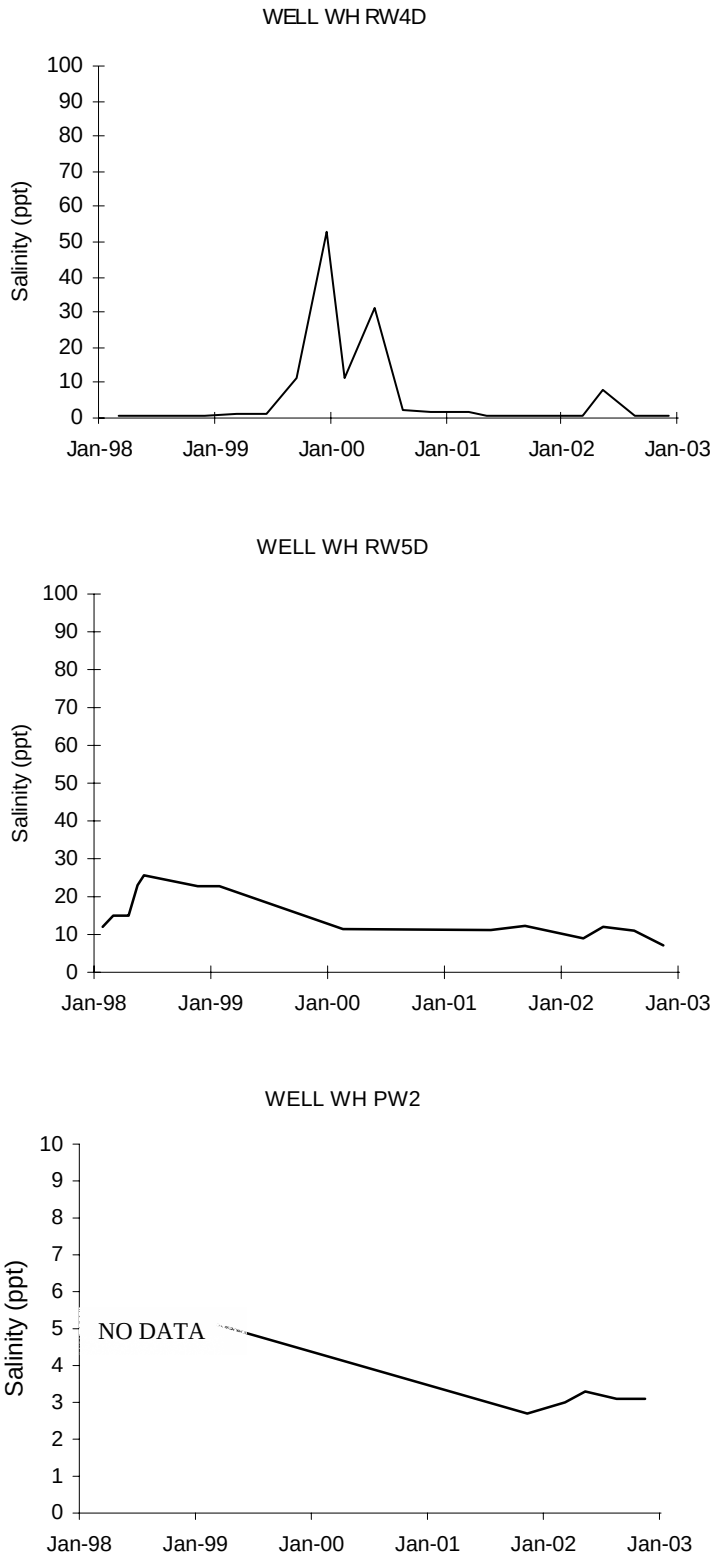


Figure 6-14. West Hackberry Ground Water Well Salinities (continued)

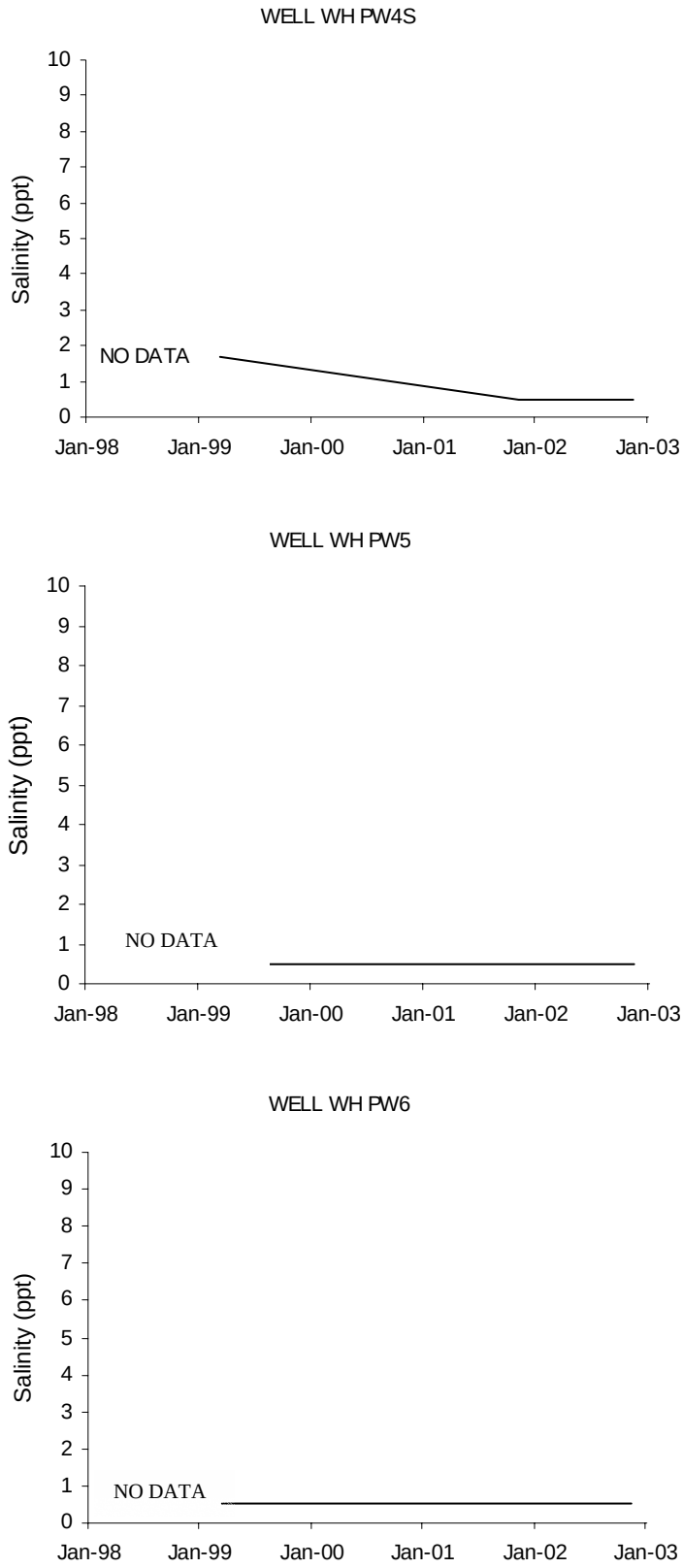


Figure 6-14. West Hackberry Ground Water Well Salinities (continued)

Ground water recovery from both affected zones beneath the brine pond system was once a very 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 of the 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 a need for a new form of manifold discharge piping to the aboveground tanks. Manifolding also necessitated backflow prevention devices at each well location connection which required high maintenance due to mineralization and salts crystallization.

Once the pumping wells were shut-in commencing the first week of April 2001, the "Year Long Evaluation" began. During this 5 quarter evaluation interval that would cover 4 complete reporting periods under full shut-in, the routine physicochemical data were collected and reported with very little interpretation leading to a detailed Summary Report at the conclusion. This Summary Report was mailed to LDNR on September 3rd, 2002. The report presented all of the resulting data in both tabular and graphical forms and made direct comparisons to historical averages compiled during recovery as well as to the last pumping data points on a well by well basis. The primary focus of course was on any discernible changes in salinity at the wells around the site, however, water elevation changes within both monitored zones were showcased with time series hydrographs and with quarter by quarter contour mapping. All in all, the short period of one year of no pumping produced no dramatic salinity ramifications as some wells around the immediate former pond area noticeably improved (freshened) while others

became more saline. The cones of depression previously developed in both zones collapsed (filled in) more rapidly and noticeably in the shallow zone, however, this phenomenon was quite lengthy in duration which supported the long held suspicion that the zone is at best a leaky or semi-confined water bearing unit receiving some recharge locally perhaps even on the site. The underlying (less permeable) deep zone required a longer period to reveal a reversion to more ambient conditions. Again, this observation supports the concept of this water bearing unit being recharged primarily offsite, although leak-by at the limited deeper well locations cannot be discounted. The Year-Long Evaluation Report represents a comprehensive review of the initial changes resulting from the cessation of recovery pumping and also proposed a reinstatement of long-term site-wide ground water detection monitoring, which was not officially acted upon by the agency during CY2002.

Former recovery well salinity measurements depict a complex picture of ground water impacts beneath the former pond system. Salinity remains 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, has in the past inexplicably exceeded that of any other well. Both of these wells have shown marked improvement since recovery cessation and WH P1D has begun to approach the 10 ppt cut-off.

A stable 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. The saline ground water is defined primarily by five wells now. Recovery wells WH P1S and WH P5S formerly tugging on the plume from the west side of the pond show

notable freshening once the pumping ceased. Wells WH RW1S and WH RW2S on the south side, and WH P3S and WH P4S on the east side all have revealed variable salinity trends with recovery cessation. However, only WH P3S, in the center of the historic plume, now traces a trend of increasing salinity over this year's five-year window. 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 especially for those wells where fresher water mixes occurred when pumping was in effect. Wide salinity swings were also noted with the wells WH P2S and WH P3S as these were the two wells where the high volume submersible pumps were used near the end of the recovery program.

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 and even more so since recovery cessation. This time-series signature is especially noticeable in well WH P5S and is reflected in the post-closure data of the other two. In fact wells WH P1S and WH P5S both began exhibiting salinity below the 10 ppt cut-off within CY2002 with nearby well WH RW1S not far behind (13 to 16 ppt).

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. 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 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.

The separate and specific one-year post recovery evaluation was mailed to LDNR on September 3, 2002. This report was prepared per guidance received in the concurrence to cease the recovery pumping dated March 2001. The evaluation covered the period April 2001 through May 2002, or five full quarters. The data indicate initial improvement in many of the peripheral recovery wells and muted effects elsewhere closer to or within the existing plume(s). Included with the evaluation report was a proposal to resume long-term site wide detection ground water monitoring based upon the initial trends and indications. That proposal was not acted upon during CY 2002, so, during the interim period until written direction is provided, the monitoring conditions provided in the March 2001 recovery cessation concurrence remain in-place and in force.

Ground water salinity conditions over most of the site have improved and have also settled into a gradual freshening trend. As the five-year window progresses beyond the former recovery

operations, the graphs should reveal a very “quiet” shallow ground water monitoring regime much as the response began to occur shortly after the pond system was closed in early 1999 and then when the pumping was ceased in the spring of 2001.

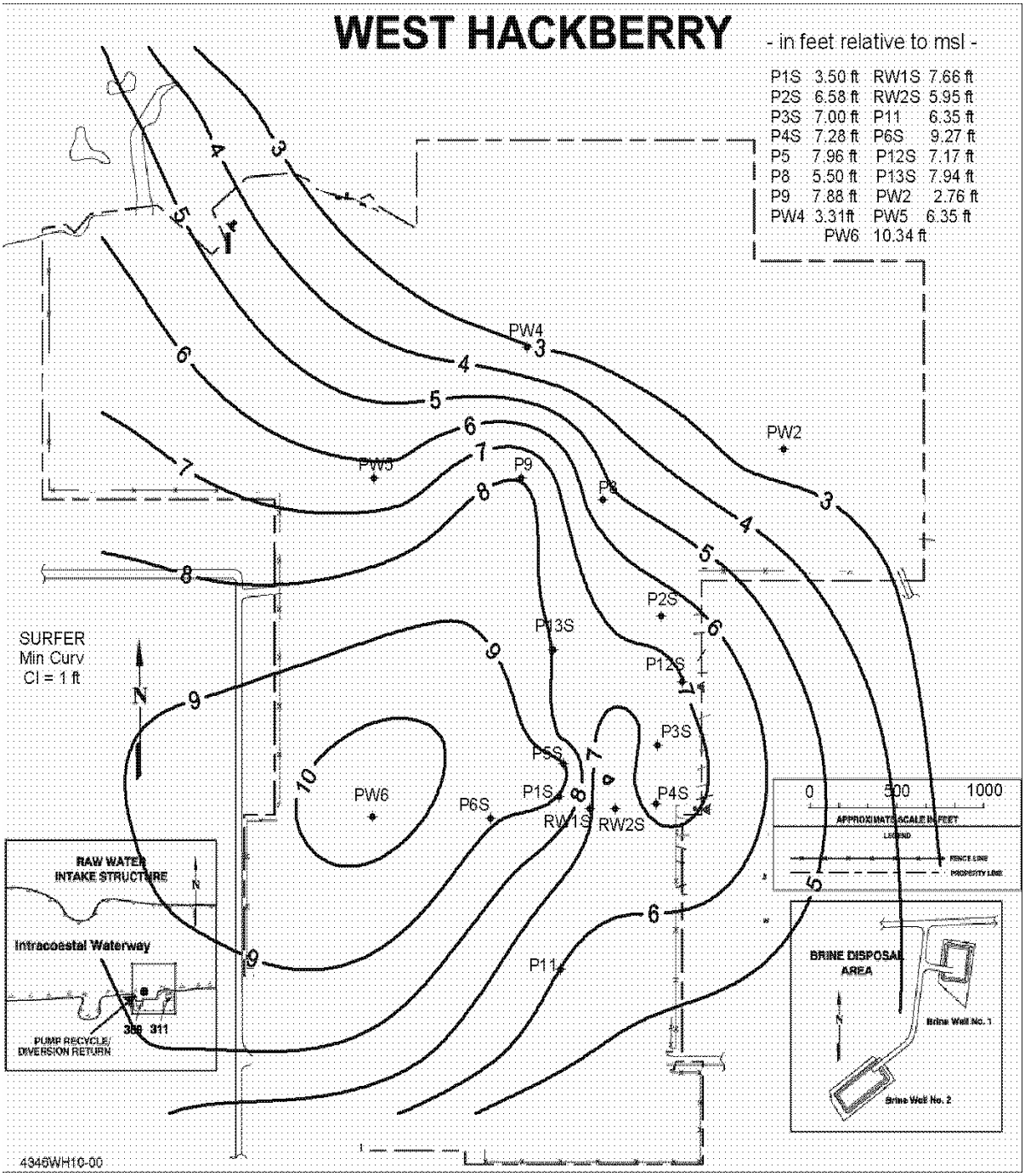


Figure 6-15. West Hackberry Shallow Ground Water Zone Contoured Elevations
Winter 2002

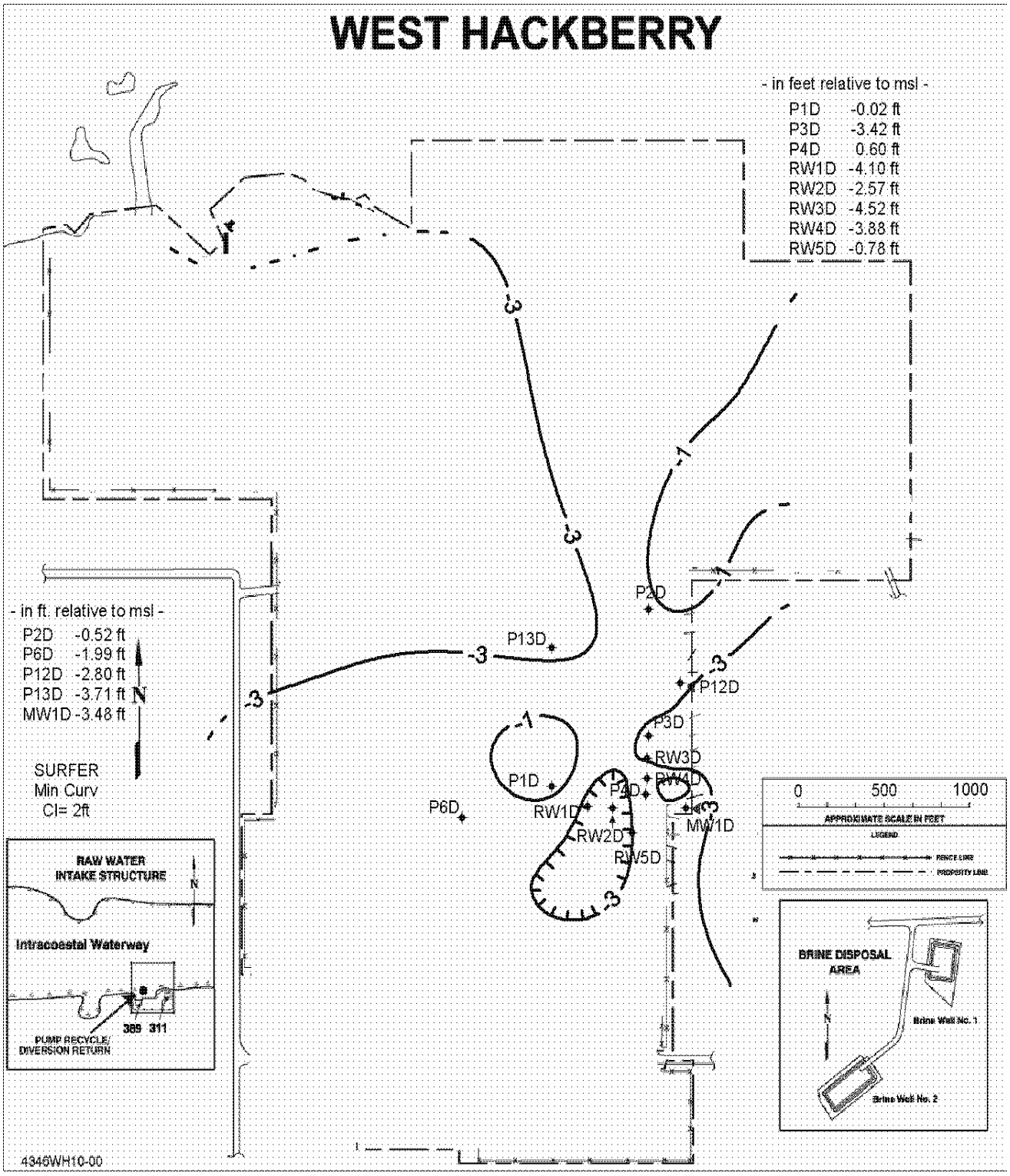


Figure 6-16. West Hackberry Deep Ground Water Zone Contoured Elevations
Winter 2002

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 (30.5 ppt annual average in 2002) which has been generally consistent since sampling began in 1992 (range 13.1 to 39 ppt, Std. D = 6.2 ppt, avg. = 27.98 ppt, n = 43); 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 2002 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.

Long-term cones of depression have been sustained in both zones as a result of successful ground water recovery through the nine years of pumping and into 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, reflecting 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 DM's Organizational 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 DM'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 this Site Environmental Report, in support of assessments of the SPR, evaluations of explained events, 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 including those in Texas, participate in the accreditation program. As part of this program the laboratories are required to analyze Performance Evaluation samples twice per calendar year, once in each the first and third quarter. Through this program, LDEQ ensures verifiable and consistent data generation by requiring the environmental analytical laboratories of permitted dischargers to 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. The laboratories have successfully completed the first and third quarter 2002 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 indicate that all 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 2002 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 laboratory 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^{o}C 5 Day, 20^{o} 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^{o}C Gravimetric, Dried at 180^{o}C
Total Suspended Solids (Residual, Non-Filterable)	160.2 2540(D)	EPA-1 APHA	Gravimetric, Dried at 103-105^{o}C Gravimetric, Dried at 103-105^{o}C
Salinity	D4542-85 (Sect. 7) 2520(B) & 2510 210B	ASTM APHA APHA (16^{th} Ed.)	Refractometric Electrical Conductivity Hydrometric

Table 7-1. SPR Wastewater Analytical Methodology (continued)

Parameter	**Method**	**Source***	**Description**
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.

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

STRATEGIC PETROLEUM RESERVE - DM ENVIRONMENTAL STANDARDS

STANDARD	AREA	DESCRIPTION
29 CFR 1910 SUBPART H	IS,CS,FP	Hazardous Materials (101 through 126)
29 CFR 1910 SUBPART I	IS	Personal Protective Equipment (132 through 139)
29 CFR 1910 SUBPART J	IS,FP	General Environmental Controls (141 through 147)
29 CFR 1910 SUBPART K	MS	Medical and First Aid (151)
29 CFR 1910 SUBPART L	IS,FP	Fire Protection (155 through 165)
29 CFR 1910 SUBPART M	IS	Compressed Gas and Compressed Air Equipment (169)
29 CFR 1910 SUBPART N	IS	Materials Handling and Storage (176-179, 181, 183-184)
29 CFR 1910 SUBPART O	IS	Machinery and Machine Guarding (211 through 213, 215, 219)
29 CFR 1910 SUBPART P	IS	Hand/Portable Powered Tools and Other Hand-Held Equipment (241 through 244)
29 CFR 1910 SUBPART Q	IS	Welding, Cutting, and Brazing (251 through 255)
29 CFR 1910 SUBPART R	IS	Special Industries (268) Telecommunications
29 CFR 1910 SUBPART R	IS	Special Industries (269) Power generation, Transmission
29 CFR 1910 SUBPART S	IS	Electrical (301 through 306, 331–335, 399)
29 CFR 1910 SUBPART T	IS	Commercial Diving Operations (401 through 402, 410, 420-427, 430, 440-441)
29 CFR 1910 SUBPART Z	IH	Toxic and Hazardous Substances (1000 through 1450 except 1029, 1043, 1045, 1047, 1050-1051)
29 CFR 1926 APPENDIX A	IS	Designations for General Industry Standards Incorporated Into Body of Construction Standards

STRATEGIC PETROLEUM RESERVE - DM ENVIRONMENTAL STANDARDS

STANDARD	AREA	DESCRIPTION
29 CFR 1926 SUBPART A	MO	General (1 through 5)
29 CFR 1926 SUBPART B	IS	General Interpretations (10 through 16)
29 CFR 1926 SUBPART C	IS,FP	General Safety and Health Provisions (20 through 35)
29 CFR 1926 SUBPART D	IS	Occupational Health and Environmental Controls (50 through 66)
29 CFR 1926 SUBPART E	IS,FP	Personal Protection and Life Saving Equipment (95 through 107)
29 CFR 1926 SUBPART F	IS,FP	Fire Protection and Prevention (150 through 155)
29 CFR 1926 SUBPART G	IS	Signs, Signals, and Barricades (200 through 203)
29 CFR 1926 SUBPART H	IS	Materials Handling, Storage, Use, and Disposal (250 through 252)
29 CFR 1926 SUBPART I	IS	Tools - Hand and Power (300 through 307)
29 CFR 1926 SUBPART J	IS	Welding and Cutting (350 through 354)
29 CFR 1926 SUBPART K	IS	Electrical (400 through 408, 416-417, 431-432, 441, 449)
29 CFR 1926 SUBPART L	IS	Scaffolds (450 through 454)
29 CFR 1926 SUBPART M	IS	Fall Protection (500 through 503)
29 CFR 1926 SUBPART N	IS	Cranes, Derricks, Hoists, Elevators, and Conveyors (550 through 555)
29 CFR 1926 SUBPART O	IS	Motor Vehicles, Mechanized Equipment, and Marine Operations (600 through 606)
29 CFR 1926 SUBPART P	IS	Excavations (650 through 652)

STRATEGIC PETROLEUM RESERVE - DM ENVIRONMENTAL STANDARDS

STANDARD	AREA	DESCRIPTION
29 CFR 1926 SUBPART Q	IS	Concrete and Masonry Construction (700 through 706)
29 CFR 1926 SUBPART R	IS	Steel Erection (750 through 752)
29 CFR 1926 SUBPART S	IS	Underground Construction, Caissons, Cofferdams, and Compressed Air (800 through 804)
29 CFR 1926 SUBPART T	IS	Demolition (850 through 860)
29 CFR 1926 SUBPART U	IS	Blasting and the Use of Explosives (900 through 914)
29 CFR 1926 SUBPART V	IS	Power Transmission and Distribution (950 through 960)
29 CFR 1926 SUBPART W	IS	Rollover Protective Structures; Overhead Protection (1000 through 1003)
29 CFR 1926 SUBPART X	IS	Stairways and Ladders (1050 through 1060)
29 CFR 1926 SUBPART Y	IS	Diving (1071 through 1092)
29 CFR 1926 SUBPART Z	IH	Toxic and Hazardous Substances (1100 through 1152 except 1129, 1145, 1147)
33 CFR 64	CW	Markings of Structures, Sunken Vessels and Other Obstructions
33 CFR 67	CW	Aids to Navigation on Artificial Islands and Fixed Structures
33 CFR 68	CW	Private Aid to Navigation
33 CFR 126	CW	Handling Class I (Explosive) Materials or Other Dangerous Cargo
33 CFR 153	CW	Control of Pollution by Oil and Hazardous Substances, Discharged Removed
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

STRATEGIC PETROLEUM RESERVE - DM ENVIRONMENTAL STANDARDS

STANDARD	AREA	DESCRIPTION
33 CFR 328	CW	Definition of Waters of the United States
33 CFR 329	CW	Definition of Navigable Waters of the United States
33 CFR 330	CW	Nationwide Permits
36 CFR 800	MR	Advisory Council on Historical Preservation
40 CFR 52	CA	Approval & Promulgation of Implementation Plans
40 CFR 53	CA	Ambient Air Monitoring
40 CFR 60	CA	Standards of Performance for New Stationary Sources
40 CFR 60, Appendix A	CA	Determination of Emissions from Volatile Compounds Leaks
40 CFR 61	CA	National Emission Standards for Hazardous Air Pollutants
40 CFR 63	CA	National Emission Standards for Hazardous Air Pollutant for Source Categories
40 CFR 66	CA	Assessment and Collection of Noncompliance Penalties
40 CFR 70	CA	State Operating Permit Programs
40 CFR 80	CA	Regulations of Fuels and Fuel Additives
40 CFR 81	CA	Designation of Areas for Air Quality Planning Purposes
40 CFR 82	CA	Protection of Stratospheric Ozone
40 CFR 109	CW	Criteria for State, Local, and Regional Oil Removal Contingency Plans
40 CFR 110	CW	Discharge of Oil
40 CFR 112	CW	Oil Pollution Prevention
40 CFR 116	CW	Designation of Hazardous Substances
40 CFR 117	CW	Determination of Reportable Quantities for Hazardous Substances
40 CFR 121	CW	State Certification of Activities Requiring a Federal License or Permit
40 CFR 122	CW	EPA Administrated Permit Programs: NPDES
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

STRATEGIC PETROLEUM RESERVE - DM ENVIRONMENTAL STANDARDS

STANDARD	AREA	DESCRIPTION
40 CFR 144	CW	Underground Injection Control Program
40 CFR 146	CW	Underground Injection Control Programs: Criteria and Standards
40 CFR 147	CW	State UIC Programs
40 CFR 149	CW	Sole Source Aquifers
40 CFR 152	CS	Pesticide Registration and Classification Procedures
40 CFR 156	CS	Labeling Requirements for Pesticides and Devices
40 CFR 170	CS	Worker Protection Standards (Pesticides)
40 CFR 171	CS	Certification of Pesticide Applicators
40 CFR 220	CW	General
40 CFR 228	CW	Ocean Dumping
40 CFR 243	HW	Guidelines for Storage and Collection of Residential, Commercial, and Institutional Solid Wastes
40 CFR 247	HW	Comprehensive Procurement Guideline for Products Containing Recovered Materials
40 CFR 260	HW	Hazardous Waste Management System: General
40 CFR 261	HW	Identification and Listing of Hazardous Waste
40 CFR 262	HW	Standards Applicable to Generators of Hazardous Wastes
40 CFR 263	HW	Standards applicable to transporters of hazardous wastes
40 CFR 264	HW	Standards for Owners and Operators of Hazardous Waste, Treatment, Storage, and Disposal Facilities
40 CFR 266	HW	Standards for Management of Specific Hazardous Wastes
40 CFR 268	HW	Land Disposal Restrictions
40 CFR 272	HW	Approved State Hazardous Waste Management Programs
40 CFR 273	HW	Standard for Universal Waste Management
40 CFR 279	HW	Standards for Management of Used Oil
40 CFR 280	HW	Technical Standards and Corrective Action Requirements for Owners and Operators of UST
40 CFR 282	HW	Approved Underground Storage Tank Programs
40 CFR 300	CS	National Oil and Hazardous Substances Pollution Contingency Plans
40 CFR 302	CS	Designation of Reportable Quantities and Notification
40 CFR 355	CS	Emergency Planning and Notification
40 CFR 370	CS	Hazardous Chemical Reporting: Community Right-to-Know
40 CFR 372	CS	Toxic Chemical Release Reporting: Community Right-to-Know
40 CFR 373	CS	Reporting Hazardous Substance Activity When Selling or Transferring Federal Real Property
40 CFR 401	CW	General Provisions

STRATEGIC PETROLEUM RESERVE - DM ENVIRONMENTAL STANDARDS

STANDARD	AREA	DESCRIPTION
40 CFR 403	CW	General Pretreatment Regulations for Existing and New Sources of Pollution
40 CFR 700	CS	General
40 CFR 761	CS	PCB Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions
40 CFR 763	IH,CS	Asbestos
40 CFR 1500	MR	NEPAPurpose, Policy and Mandate
40 CFR 1501	MR	NEPA and Agency Planning
40 CFR 1502	MR	NEPA Environmental Impact Statement
40 CFR 1503	MR	NEPA Commenting
40 CFR 1504	MR	NEPA Predecision Referrals to the Council of Proposed Federal Actions Determined to be Environmentally Unsatisfactory
40 CFR 1505	MR	NEPA and Agency Decision Making
40 CFR 1506	MR	Other Requirements of NEPA
40 CFR 1507	MR	NEPA Agency Compliance
40 CFR 1508	MR	NEPA Terminology and Index
40 CFR 1515	MR	Freedom of Information Act Procedures
40 CFR 1516	MR	Privacy Act Implementation
49 CFR 130	CS	Oil Spill Prevention and Response Plans
49 CFR 171	TS	General Information, Regulations, and Definitions
49 CFR 172	TS	Hazardous Materials Tables and Hazardous Materials Communications Regulations
49 CFR 173	TS	Shippers - General Requirements for Shipments and Packaging
49 CFR 177	TS	Carriage by Public Highway
49 CFR 194	TS	DOT Response Plans for Onshore Pipelines
49 CFR 195	TS	Transportation of Hazardous Liquids by Pipeline
49 CFR 199	TS	Drug Testing
50 CFR 10	MR	General Provisions
50 CFR 17	MR	Endangered and Threatened Wildlife and Plants
EO 11988	CW	Floodplain Management
EO 11990	CW	Protection of Wetlands
EO 11991	MR	Protection and Enhancement of Environmental Quality
EO 12088	MR	Federal Compliance with Pollution Control Requirements
EO 12898	MR	Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations

STRATEGIC PETROLEUM RESERVE - DM ENVIRONMENTAL STANDARDS

STANDARD	AREA	DESCRIPTION
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
EO 13186	MR	Responsibilities of Federal Agencies to Protect Migratory Birds
33:LAC I.3	MR	Departmental Administrative Procedures
33:LAC I.13	MR	Risk Evaluation/Corrective Action Program
33:LAC I.14	MR	Groundwater Fees
33:LAC I.15	MR	Permit Review
33:LAC I.39	MR	Notification Regulations and Procedures for Unauthorized Discharge
33:LAC I.45	MR	Policy and Intent
33:LAC I.47	MR	Program Requirements
33:LAC I.49	MR	Organization and Personnel Requirements
33:LAC I.51	MR	On-site Inspection/Evaluation
33:LAC I.53	MR	Quality System Requirements
33:LAC I.55	MR	Sample Protocol/Sample Integrity
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

STRATEGIC PETROLEUM RESERVE - DM ENVIRONMENTAL STANDARDS

STANDARD	AREA	DESCRIPTION
33:LAC III.30	CA	Standards of Performance for New Stationary Sources
33:LAC III.51	CA	Comprehensive Toxic Air Pollutant Emission Control Program
33:LAC III.53	CA	Minor Sources of Toxic Air Pollutants
33:LAC III.56	CA	Prevention of Air Pollution Emergency Episodes
33:LAC III.59	CA	Chemical Accident Prevention and Minimization of Consequences
33:LAC III.60	CA	Division's Source Test Manual
33:LAC V.1	HW	General Provisions and Definitions
33:LAC V.9	HW	Manifest System for TSD Facilities
33:LAC V.11	HW	Generators
33:LAC V.13	HW	Transporters
33:LAC V.15	HW	Treatment, Storage and Disposal Facilities
33:LAC V.18	HW	Containment Buildings
33:LAC V.19	HW	Tanks
33:LAC V.21	HW	Containers
33:LAC V.22	HW	Prohibitions on Land Disposal
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

STRATEGIC PETROLEUM RESERVE - DM ENVIRONMENTAL STANDARDS

STANDARD	AREA	DESCRIPTION
33:LAC IX.3	CW	Permits
33:LAC IX.5	CW	Enforcement
33:LAC IX.7	CW	Effluent Standards
33:LAC IX.9	CW	Spill Prevention and Control
33:LAC IX.11	CW	Surface Water Quality Standards
33:LAC IX.13	CW	Louisiana Water Pollution Control Fee System Regulation
33:LAC IX.15	CW	Water Quality Certification Procedures
33:LAC IX.17	CW	Rules Governing Disposal of Waste Oil, Oil Field Brine, and All Other Materials Resulting From the Drilling for, Production of, or Transportation of Oil, Gas or Sulphur (as amended January 27, 1953)
33:LAC IX.19	CW	State of Louisiana Control Commission
33:LAC IX.23	CW	The LPDES Program Definitions and General Program Requirements
33:LAC XI.1	HW	Program Applicability and Definitions
33:LAC XI.3	HW	Registration Requirements, Standards and Fee Schedule
33:LAC XI.5	HW	Spill and Overfill Control
33:LAC XI.7	HW	Methods Release Detection and Release Reporting, Investigation, Confirmation and Response
33:LAC XI.9	HW	Out of Service UST Systems and Closure
33:LAC XI.15	HW	Enforcement
43:LAC I.1	CW	General Rules and Regulations
43:LAC I.5	CW	State Lands
43:LAC I.7	CW	Coastal Management
43:LAC XI.3	TS	Underwater Obstructions
43:LAC XI.5	TS	Pipeline Safety
43:LAC XVII.1	CW	Class I, III, IV, and V Injection Wells (Statewide Order 29-N-1)
43:LAC XVII.3	CW	Hydrocarbon Storage Wells in Salt Dome Cavities (Statewide Order 29-M)
43:LAC XIX.1	CW	General Provisions (Statewide Order 29-B)
43:LAC XIX.2	CW	Fees
48:LAC V.73	CW	Water and Wastewater Operator Certification
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

STRATEGIC PETROLEUM RESERVE - DM ENVIRONMENTAL STANDARDS

STANDARD	AREA	DESCRIPTION
70:LAC XIII.5	CW	Plugging and Sealing Abandoned Water Wells and Holes
70:LAC XIII.7	CW	Reporting Abandoned Wells and Holes
LAC:XV chpt 1	RP	Radiation Protection - General Provisions
LAC:XV chpt 2	RP	Registration of Radiation Machines and Facilities
LAC:XV chpt 3	RP	Licensing of Radioactive Material
LAC:XV chpt 4	RP	Standards for Protection Against Radiation
LAC:XV chpt 5	RP	Radiation Safety Requirements for Industrial Radiographic Operations
16:TAC I.3	CW	Oil and Gas Division
25:TAC I.301	CW	Wastewater Surveillance and Technology
25:TAC I.325	HW	Solid Waste Management
25:TAC I.337	CW	Water Hygiene
30:TAC I.90	MR	Regulatory Flexibility
30:TAC I.101	CA	General Provisions
30:TAC I.106	CA	Exemption from Permitting
30:TAC I.111	CA	Control of Air Pollution from Visible Emissions and Particulate Matter
30:TAC I.112	CA	Control of Air Pollution from Sulfur Compounds
30:TAC I.113	CA	Control of Air Pollution from Toxic Materials
30:TAC I.114	CA	Control of Air Pollution from Motor Vehicles
30:TAC I.115	CA	Control of Air Pollution from Volatile Organic Compounds
30:TAC I.116	CA	Control of Air Pollution by Permits for New Construction or Modification
30:TAC I.117	CA	Control of Air Pollution from Nitrogen Compounds
30:TAC I.118	CA	Control of Air Pollution by Episode
30:TAC I.119	CA	Control of Air Pollution from Carbon Monoxide
30:TAC I.122	CA	Federal Operating Permits
30:TAC I.279	CW	Water Quality Certification
30:TAC I.281	CW	Applications Processing
30:TAC I.285	CW	On-site Sewage Facilities
30:TAC I.290	CW	Water Hygiene
30:TAC I.295	CW	Water Rights, Procedural
30:TAC I.297	CW	Water Rights, Substantive
30:TAC I.307	CW	Surface Water Quality Standards

STRATEGIC PETROLEUM RESERVE - DM ENVIRONMENTAL STANDARDS

STANDARD	AREA	DESCRIPTION
30:TAC I.312	HW	Sludge Use, Disposal, and Transportation
30:TAC I.324	CW	Used Oil
30:TAC I.325	CW	Certificates of Competency
30:TAC I.327	CW	Spill Prevention and Control
30:TAC I.328	PP	Waste Minimization and Recycle
30:TAC I.330	PP	Municipal Solid Waste
30:TAC I.334	HW	Underground and Aboveground Storage Tanks
30:TAC I.335	HW	Industrial Solid Waste and Municipal Hazardous Waste
30:TAC I.343	CW	Oil and Hazardous Substances General Provisions
31:TAC I.15	CW	Planning Division
31:TAC I.19	CW	Oil Spill Prevention and Response
31:TAC I.20	CW	Natural Resource Damage Assessment
31:TAC I.21	CW	Oil Spill Prevention and Response Hearings Procedures
31:TAC II.57	MR	Fisheries
31:TAC II.65	MR	Wildlife
31:TAC II.69	MR	Resource Protection
31:TAC XVI.503	CW	Coastal Management Program
37:TAC XIII.501	FP	Texas Commission on Fire Protection, Flammable Liquids
No number	CA	Technical Guidance Package for Chemical Sources, Storage Tanks, TNRCC, Feb 1995
No number	CA	Technical Guidance Package for Chemical Sources, Equipment Leak Fugitives, TNRCC, Mar 1995
R.S. 30:2361-2379 SARA Title III	CS	Hazardous Materials Information Development, Preparedness and Response Act
TCRA, 505-507 SARA Title III	CS	Texas Tier Two Reporting Forms and Instructions
TRCR part 11	RP	Texas Regulations for Control of Radiation - General provisions
TRCR part 12	RP	Texas Regulations for Control of Radiation - Fees
TRCR part 13	RP	Texas Regulations for Control of Radiation - Hearing and Enforcement Procedures
TRCR part 21	RP	Standards for Protection Against Radiation - Permissible Doses, Precautionary Procedures, Waste Disposal
TRCR part 22	RP	Notices, Instructions and Reports to Workers; Inspections
TRCR part 31	RP	Radiation Safety Requirements and Licensing and Registration Procedures for Industrial Radiography

STRATEGIC PETROLEUM RESERVE - DM ENVIRONMENTAL STANDARDS

STANDARD	AREA	DESCRIPTION
TRCR part 41	RP	Licensing of Radioactive Material -Exemptions, Licenses, General Licenses, Specific Licenses, Reciprocity, Transport
ANSI Standards	IS	OSHA Referenced Standards
ANSI/ISO 14001-1996	MR	Environmental Management Systems Specification With Guidance For Use
ASME Standards	IS	OSHA Referenced Standards
EPA 453/R-93-026	CA	Protocol for Equipment Leak Emission Estimates, Jun 1993
EPA 530/R-93-001	CW	RCRA Groundwater Monitoring; Draft Technical Guidance
EPA 600/2-85/105	CW	Practical Guide for Groundwater Sampling
EPA 600/4-78-012	CW	Methods for Measuring the Acute Toxicity of Effluents to Aquatic Organisms
EPA 600/4-79-019	CW	Handbook for Analytical Quality Control in Water and Wastewater Laboratories
EPA 600/4-79-020	CW	Methods for Chemical Analysis of Water and Wastes
EPA 600/4-82-029	CW	Handbook for Sampling and Sample Preservation of Water and Wastewater
EPA/600/4-83-039	CW	Addendum to Handbook for Sampling and Sample Preservation, EPA 600/4-82-029
EPA/600/8-78-017	CW	Microbiological Methods for Monitoring the Environment, Water and Wastes
EPA/600/R-92/088	PP	Facility Pollution Prevention Guide
EPA 833-R-92-002	PP	Storm Water Management for Industrial Activities
EPA, ISBN:0-86587-279-1	CW	EPA Groundwater Handbook
EPA, ISBN:0-86587-752-1	PP	EPA Waste Minimization Opportunity Assessment Manual
EPA Region IV	MR	Engineering Support Branch Standard Operating Procedures and Quality Assurance Manual, 4/1/86
FAA AC 150/5345-27	IS	Specification for 8' and 12' Unlighted and Externally Lighted Wind Cone Assembly
FAA AC 150/5390-2	IS	Heliport Design, January 4, 1988
FAA AC 70/7460-1G	IS	Obstruction Marking and Lighting, October 1985
NFPA	FP	Fire Protection Handbook
NFPA 1	FP	Fire Prevention Code
NFPA 10	FP	Portable Fire Extinguishers
NFPA 11	FP	Low Expansion Foam
NFPA 12	FP	Carbon Dioxide Extinguishing Systems
NFPA 12A	FP	Halon 1301 Fire Extinguishing Systems
NFPA 13	FP	Installation of Sprinkler Systems
NFPA 14	FP	Installation of Standpipe and Hose Systems
NFPA 15	FP	Water Spray Fixed Systems

STRATEGIC PETROLEUM RESERVE - DM ENVIRONMENTAL STANDARDS

STANDARD	AREA	DESCRIPTION
NFPA 16	FP	Deluge Foam-Water Sprinkler Systems and Foam-Water Spray Systems
NFPA 20	FP	Installation of Centrifugal Fire Pumps
NFPA 24	FP	Installation of Private Fire Service Mains and Their Appurtenances
NFPA 25	FP	Water-Based Fire Protection Systems
NFPA 30	FP	Flammable and Combustible Liquids Code
NFPA 37	FP	Stationary Combustion Engines and Gas Turbines
NFPA 43D	FP	Storage of Pesticides
NFPA 45	FP	Fire Protection for Laboratories Using Chemicals
NFPA 49	FP	Hazardous Chemical Data
NFPA 51B	FP	Cutting and Welding Processes
NFPA 54	FP	National Fuel Gas Code
NFPA 55	FP	Compressed and Liquefied Gases in Portable Cylinders
NFPA 70	FP, IS	National Electric Code
NFPA 70B	FP	Electrical Equipment Maintenance
NFPA 70E	FP	Electrical Safety Requirements for Employee Workplaces
NFPA 72	FP	National Fire Alarm Code
NFPA 75	FP	Protection of Electronic Computer/Data Processing Equipment
NFPA 77	FP	Static Electricity
NFPA 80	FP	Fire Doors and Fire Windows
NFPA 80A	FP	Exterior Fire Exposures
NFPA 90A	FP	Installation of Air Conditioning and Ventilating Systems
NFPA 92A	FP	Smoke Control Systems
NFPA 96	FP	Ventilation Control and Fire Protection of Commercial Cooking Operations
NFPA 101	FP, IS	Safety to Life from Fire in Buildings and Structures
NFPA 101A	FP	Alternative Approaches to Life Safety
NFPA 110	FP	Emergency and Standby Power Systems
NFPA 122	FP	Fire Prevention and Control in Underground Metal and Nonmetal Mines
NFPA 170	FP	Fire Safety Symbols
NFPA 204	FP	Roof Coverings and Roof Deck Constructions
NFPA 220	FP	Types of Building Construction
NFPA 221	FP	Fire Walls and Fire Barrier Walls

STRATEGIC PETROLEUM RESERVE - DM ENVIRONMENTAL STANDARDS

STANDARD	AREA	DESCRIPTION
NFPA 231	FP	General Storage
NFPA 231C	FP	Rack Storage of Materials
NFPA 232	FP	Protection of Records
NFPA 241	FP	Construction, Alteration, and Demolition Operations
NFPA 253	FP	Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source
NFPA 255	FP	Test of Surface Burning Characteristics of Building Materials
NFPA 291	FP	Fire Flow Testing and Marking of Hydrants
NFPA 295	FP	Wildfire Control
NFPA 297	FP	Principles and Practices for Communication Systems
NFPA 302	FP	Pleasure and Commercial Motor Craft
NFPA 306	FP	Control of Gas Hazards on Vessels
NFPA 307	FP	Marine Terminals, Piers, and Wharves
NFPA 321	FP	Basic Classification of Flammable and Combustible Liquids
NFPA 325	FP	Fire Hazard Properties of Flammable Liquids, Gases, and Volatile Solids
NFPA 326	FP	Safe Entry of Underground Storage Tanks
NFPA 327	FP	Cleaning of Safeguarding Small Tanks and Containers Without Entry
NFPA 328	FP	Control of Flammable and Combustible Liquids and Gases in Manholes, Sewers, and Similar Underground Structures
NFPA 329	FP	Handling Underground Releases of Flammable and Combustible Liquids
NFPA 385	FP	Tank Vehicles for Flammable and Combustible Liquids
NFPA 402M	FP	Aircraft Rescue and Fire Fighting Operations
NFPA 418	FP	Heliports
NFPA 430	FP	Liquid and Solid Oxidizers
NFPA 471	FP	Responding to Hazardous Materials Incidents
NFPA 472	FP	Professional Competence of Responders to Hazardous Materials Incidents
NFPA 491M	FP	Hazardous Chemical Reactions
NFPA 497A	FP	Classification of Class I Hazardous Locations for Electrical Installations in Chemical Process Areas
NFPA 505	FP	Powered Industrial Trucks Including Type Designations, Areas of Use, Maintenance and Operations
NFPA 512	FP	Truck Fire Protection
NFPA 550	FP	Fire Safety Concepts Tree
NFPA 600	FP	Industrial Fire Brigades

STRATEGIC PETROLEUM RESERVE - DM ENVIRONMENTAL STANDARDS

STANDARD	AREA	DESCRIPTION
NFPA 601	FP	Guard Service in Fire Prevention
NFPA 703	FP	Fire Retardant Impregnated Wood and Dire Retardant Coatings for Building Materials
NFPA 704	FP	Identification of the Fire Hazards of Materials
NFPA 780	FP	Installation of Lightning Protection Systems
NFPA 820	FP	Fire Protection in Wastewater Treatment and Collection Facilities
NFPA 901	FP	Standard Classifications for Incident Reporting and Fire Protection Data
NFPA 902M	FP	Fire Reporting Field Incident Manual
NFPA 903	FP	Fire Reporting Property Survey Guide
NFPA 904	FP	Incident Follow-Up Report Guide
NFPA 906	FP	Fire Incident Field Notes
NFPA 921	FP	Fire and Explosion Investigations, Guide for
NFPA 1000	FP	Fire Service Professional Qualifications Accreditation and Certifications System
NFPA 1021	FP	Fire Officer Professional Qualifications
NFPA 1031	FP	Professional Qualification of Fire Inspector
NFPA 1033	FP	Fire Investigator Professional Qualifications
NFPA 1401	FP	Fire Protection Training Reports and Records
NFPA 1404	FP	Fire Department Self-Contained Breathing Apparatus Program
NFPA 1406	FP	Outside Live Fire Training Evolutions
NFPA 1410	FP	Training for Initial Fire Attack
NFPA 1420	FP	Pre-Incident Planning for Warehouse Occupancies
NFPA 1500	FP	Fire Department Occupational Safety and Health Program
NFPA 1561	FP	Fire Department Incident Management System
NFPA 1582	FP	Medical Requirements for Fire Fighters
NFPA 1901	FP	Pumper Fire Apparatus
NFPA 1902	FP	Initial Attack Fire Apparatus
NFPA 1903	FP	Mobile Water Supply Fire Apparatus
NFPA 1911	FP	Service Tests of Pumps on Fire Department Apparatus
NFPA 1921	FP	Fire Department Portable Pumping Units
NFPA 1922	FP	Fire Service Self-Contained Pumping Units
NFPA 1932	FP	Use, Maintenance and Service Testing of Fire Department Ground Ladders
NFPA 1961	FP	Fire Hose

STRATEGIC PETROLEUM RESERVE - DM ENVIRONMENTAL STANDARDS

STANDARD	AREA	DESCRIPTION
NFPA 1962	FP	Care, Use, and Service Testing of Fire Hose Including Connections and Nozzles
NFPA 1963	FP	Fire Hose Connections
NFPA 1964	FP	Spray Nozzles (Shutoff and Tip)
NFPA 1971	FP	Protective Clothing for Structural Fire Fighting
NFPA 1972	FP	Helmets for Structural Fire Fighting
NFPA 1973	FP	Gloves for Structural Fire Fighting
NFPA 1974	FP	Protective Footwear for Structural Fire Fighting
NFPA 1976	FP	Protective Clothing for Proximity Fire Fighting
NFPA 1981	FP	Open-Circuit Self-Contained Breathing Apparatus for Fire Fighters
NFPA 1983	FP	Fire Service Life Safety Rope and Systems Components
NFPA 1991	FP	Vapor-Protective Suits for Hazardous Chemical Emergencies
NFPA 1992	FP	Liquid Splash-Protective Suits for Hazardous Chemical Emergencies
NFPA 1993	FP	Support Function Protective Garments for Hazardous Chemical Operations
NFPA 1999	FP	Protective Clothing for Medical Emergency Operations
DOE/EH-0350	CA	Management of Polychlorinated Biphenyls (PCBs)
DOE/EH-0358	MR	Performance Objectives and Criteria for Conducting DOE Environmental Audits
DOE G 450.4-1B	MR	Integrated Safety Management System Guide, March 2001
DOE G 414.1-1A	MR	Management Assessment And Independent Assessment Guide, May 2001
DOE/EM-0276	PP	Annual report on Waste Generation and Waste Minimization Progress
DOE/EP-0108	FP	Standard for Fire Protection of DOE Electronic Computer/Data Processing Systems
DOE/FM-0145	PP	Waste Minimization/Pollution Prevention Crosscut Plan 1994
DOE Guideline	PP	DOE Waste Minimization reporting Requirements, Nov. 1994
DOE Handbook	PP	Guidance for the Preparation of the Waste Minimization and Pollution Prevention Awareness Plan, Dec 1993
DOE Handbook	PP	Pollution Prevention Handbook
DOE Handbook	PP	Waste Minimization Reporting System (Wmin) User's Guide
DOE HDBK, 1090-9	IS	Hoisting And Rigging Handbook
DOE Memorandum	PP	EPA's Interim Final Guidance to Hazardous Waste Generators on the Elements of a Waste Minimization Program
DOE Orders	MO,MR	For all applicable DOE Orders See Contract No. DE-AC96-93PO18000 Applicable Standards List
SPRMO 220.2	MO	Observations report
DOE S-0118	PP	Pollution Prevention Program Plan

STRATEGIC PETROLEUM RESERVE - DM ENVIRONMENTAL STANDARDS

STANDARD	AREA	DESCRIPTION
DOE-STD-1088-95	FP	Fire Protection for Relocatable Structures
DOE Standard Spec. 17900	PP	Paint Repair of Exterior Metal Surfaces
SPRPMO O 3790.1	MR	Employee Occupational Medical and Counseling Programs
No number	MO,MR	Environmental, Safety, and Health Management Plan (FY 1998 - FY 2002)
SEN-15-90	MR	National Environmental Policy Act
SEN-22-90	HW	DOE Policy on Signatures of RCRA Permit Applications
SEN-37-92	PP	Waste Minimization Crosscut Plan Implementation
AL 5500.11	MO,MR	Drill and Exercise Program Plan
ASE 5400.48	MR	Annual Site Environmental Report
ASI 3400.1	MO, MR	Conduct of Training for the SPR M&O Contractor
ASI 4000.10	FP	Integrated Logistics Support Procedures
ASI 4330.16	FP,IS	Work Order System Procedures
ASI 4400.4	PP	Supply Services Manual
ASI 5400.15	MR	Environmental Instructions Manual
ASI 5480.19	MO,MR	Conduct of Operations at the SPR
ASI 5480.22	IS	Accident Prevention Manual
ASI 5600.1	FP	Security Operations Manual
ASI 5700.11	IS	Root Cause Analysis Instruction
ASI 5700.15	MR	Quality Assurance Manual
ASI 6410.2	FP	Construction Management Procedures Manual
ASI 6430.15	MO,MR	Design Review Procedure
ASL 1000.15	MR	Self-Assessment Program Implementation Plan
ASL 4700.1	MO,MR	Configuration Management Plan and Procedures
ASL 5480.18	FP	Fire Protection Manual
ASL 5480.44	IS	Electrical Safety Program Plan
ASL 6400.30	CW	Cavern Inventory & Integrity Control Plan
ASL 5500.1	MO,MR	Emergency Management Plan
ASL 5500.10	MO,MR	Emergency Readiness Assurance Plan
ASL 5500.25	MO,MR	Emergency Response Team Organization and Training Plan
ASL 6400.18	MO,MR	Drawdown Management Plan
ASL 6400.31	MO,MR	Drawdown Readiness Program Plan

STRATEGIC PETROLEUM RESERVE - DM ENVIRONMENTAL STANDARDS

STANDARD	AREA	DESCRIPTION
ASP 4000.11	FP	Integrated Logistics Support Master Plan
ASP 5000.8	MO,MR	Master Action Tracking Management and Control System
ASP 5400.2	MR	Environmental
ASR 4330.5	FP	Interim Repair/Mitigation Authorization
ASR 5480.49	MO,MR	Environmental, Safety and Health (ES&H) Orientation Video Program
ASR 5700.3	MO,MR	Independent Quality Assurance Assessments
ASR 5700.4	FP	Deviation and Waiver Requests
ASR 7000.1	MO,MR	Readiness Review Board
ASR 7000.2	MO,MR	SPR Crosstalk Information Exchange Program
BCL 5400.16	CW	Bayou Choctaw Spill Prevention, Control, and Countermeasures Plan
BCI 5500.3	EM, FP	Bayou Choctaw Emergency Response Procedures
BHL 5400.21	CW	Big Hill Spill Prevention, Control, and Countermeasures Plan
BHI 5500.4	EM, FP	Big Hill Emergency Response Procedures
BMI 6420.27	FP	Bryan Mound Foam Deluge System Interim Operations Manual
BML 5400.17	CW	Bryan Mound Spill Prevention, Control, and Countermeasures Plan
BMI 5500.5	EM, FP	Bryan Mound Emergency Response Procedures
D506-01162-02	FP	Bryan Mound: Preventive Maintenance Procedures Manual
D506-01163-03	FP	West Hackberry: Preventive Maintenance Procedures Manual
D506-01164-04	FP	Bayou Choctaw: Preventive Maintenance Procedures Manual
D506-01167-07	FP	St. James: Preventive Maintenance Procedures Manual
D506-01168-08	FP	Big Hill: Preventive Maintenance Procedures Manual
D506-02569-09	TSM, CS	Hazardous Materials Packaging & Transportation Plan
D506-03287-09	HW,PP,CW	Pollution Prevention Plan
MSL 7000.133	CW, HW	Laboratory Programs & Procedures
NOL 5400.44	CW	New Orleans Warehouse Spill Prevention, Control, and Countermeasures Plan
NOL 5500.6	EM, FP	New Orleans Emergency Response Procedures
NOI 1000.72	MR	Organizational and Management Assessments
No number	CW,PP,CA, HW,CS	Environmental Exhibit 6.6
No number	CW	SPR Groundwater Protection Management Program
No number	PP,HW	SPR Qualified Products List

STRATEGIC PETROLEUM RESERVE - DM ENVIRONMENTAL STANDARDS

STANDARD	AREA	DESCRIPTION
No number	MO, MR	SPRPMO Environmental, Safety and Health Manual
No number	MO, MR	SPRPMO Level III Design Criteria
WHL 5400.20	CW	West Hackberry Spill Prevention, Control, and Countermeasures Plan
WHI 5500.9	EM,FP	West Hackberry Emergency Response Procedures
120 IAC	IS	Boiler And Pressure Vessels - Degas Project Only
055-001-01049-4	CW	Quality Criteria for Water
ACGIH TLV	IH	Threshold Limit Values For Chemical Substances - Current Year & Applicable Substances
ACP USCG	CW	Area Contingency Plan for New Orleans
ACP USCG	CW	Area Contingency Plan for Lake Charles
ACP USCG	CW	Area Contingency Plan for Port Arthur
ACP USCG	CW	Area Contingency Plan for Galveston
ACP-EPA	CW	Area Contingency Plan for EPA Region 6
AIHMM	PP	Hazardous Materials Management Education Program Observations and Recommendations: Environmental Mgmt, Hazardous Waste Minimization, and Pollution Prevention for the SPR Operations
American Public Health Assoc.	CW	Standard Methods for the Examination of Water and Wastewater
AP-42	CA	Compilation of Air Pollutant Emission Factors, Mobile Sources
API	MR	Amer. Petroleum Institute - Recommended Practices and Guides
API - Standard	CA	API Standard 653 for Tank Inspection, Repair, Alteration, and Reconstruction
CERI-89-224	CW	Seminar on Site Characterization for Subsurface Remediations
FM	FP	Factory Mutual - Approval Guide and Loss Prevention Data Sheets
ICIMF	IS	Oil Cos. International. Marine Forum - International Oil Tanker and Terminal Safety Guide
IEEE Standards	IS	OSHA Referenced Standards
LP 92-03	PP	Pollution Prevention Assessment Manual for Texas Businesses
MIL-HDBK-1008	FP	Fire Protection for Facilities - Engineering, Design and Construction
MP 94W0000131	CA	SPR Gas and Geothermal Heat Effects on Crude Oil Vapor Pressure, Dec. 1994
NACE	FP, IS	National Association of Corrosion Engineers
NEC	FP, IS	National Electric Safety Code
No number	CW	Construction of Geotechnical Boreholes and Groundwater Monitoring Systems Handbook (LDOTD and LDEQ)
No number	CW	Earth Manual, 2nd Ed.
No number	CW	Engineering Geology Field Manual

STRATEGIC PETROLEUM RESERVE - DM ENVIRONMENTAL STANDARDS

STANDARD	AREA	DESCRIPTION
No number	CW, CA	Environmental Monitoring Plan
No number	CW	Groundwater Manual
No number	CW	Groundwater Program
No number	CA	Louisiana Air Permit Procedures Manual, Jun 1995
No number	CW	Louisiana's Suggested Chemical Weed Control Guide for 1994 (LA Cooperative Extension Services)
No number	CA	Nonattainment New Source Review Guidance Manual, Oct 1993
No number	CW	The Sterling Brine Handbook (Int'l Salt Co.)
No number	CW	Water Measurement Manual
OSWER-9950.1 (1986)	CW	RCRA Groundwater Technical Enforcement Guidance Document (TEGD)
RBCA (OS21)	CW	Proposed Approach for Implementing a Louisiana Dept. of Env. Quality Risk-Based Corrective Action Program
RG-133	PP	Pollution Prevention Assessment Manual
UFC/UBC	FP	International Conference of Building Officials - Uniform Building Code and Uniform Fire Code
UL	FP	Underwriter's Laboratory - Building Materials, Fire Resistance, Fire Prot. Equip., & Haz. Location Equip. Directories
Water Supply Paper 1473	CW	Study and Interpretation of the Chemical Characteristics of Natural Water (HEM)
Y-87-1	CW	Corps. of Engineers Wetlands Delineation Manual

KEY TO ACRONYMS:

AIHMM American Institute of Hazardous Materials Mgmt.
API American Petroleum Institute
CA Protection of Air Quality
CFR Code of Federal Regulations
CS Control of Toxic Substances
CW Protection of Water Quality
EO Executive Order
ESH Environmental, Safety, and Health Directorate
FM Factory Mutual
FP Fire Protection
HW Solid and Hazardous Waste Generation and Control
IH Industrial Hygiene
IS Industrial Safety
LAC Louisiana Administrative Code
M Manual (DOE)
MO Management and Oversight
MR Management, Oversight, and Reporting
MS Medical Services
NEC National Electric Code
NFPA National Fire Protection Association
O Order (DOE)
P Policy (DOE)
PP Pollution Prevention and Waste Minimization
RCRA Resource Conservation and Recovery Act

STRATEGIC PETROLEUM RESERVE - DM ENVIRONMENTAL STANDARDS

RP Radiation Protection
SEN Secretary of Energy Notice
TAC Texas Administrative Code
TRCR Texas Regulations for the Control of Radiation
TS Transportation Safety
UBC Uniform Building Code
UFC Uniform Fire Code
UL Underwriter's Laboratory

Appendix A-1
SPRPMO ES&H Directives

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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 O 450.1 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

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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, G0, "ENVIRONMENTAL POLICY" APPROVED BY: R. MCGOUGH, PROJECT MANAGER	POLICY NO: ASP5400.2 VERSION: H0 PAGE 1

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

Title: Environmental Policy

Effective Date: 11/11/02

Applicability: All DynMcDermott Petroleum Operations Company (DM) Organizations

Significant Changes Since the Last Revision. Added wording that more clearly states: top management's commitment to compliance and continual improvement (see B below), the framework for establishing and reviewing objectives and targets (C), and requirements for revision of the policy (E). Revision bars in the right margin mark the changed paragraphs.

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

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 Strategic Petroleum Reserve (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, as well as the commitment to compliance and continual improvement, essential to DM's operation of the SPR.

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 EMS. 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, through excellence in environmental management, to:

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

DM incorporates these commitments, from top management down, in all phases of its activities, including concept, design, development, construction, operations, and decommissioning. DM fully complies with federal, state, and local environmental laws, regulations, statutes, and permits, and with other requirements including the Department of Energy (DOE), industry, and internal environmental standards, as applicable. Pollution

TITLE: Environmental Policy	POLICY NO: ASP5400.2 VERSION: H0 PAGE 2

prevention, 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 are safety and loss prevention. DM strives to continually improve processes and systems through decision-making, implementation, and training.

C. **Impacts, Aspects, Objectives, and Targets.** Significant environmental impacts are controlled through recognizing the environmental aspects related to these impacts 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 other objectives and targets that are based on environmental requirements; environmental aspects; appropriate available technology; financial, operational, and business considerations; and the views of interested parties. Objectives and targets are set annually and evaluated at least annually to measure environmental performance and facilitate continual improvement.

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 EMS 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 annually by the Management Review Team and approved by the project manager. It is revised, as necessary, in response to changing conditions, EMS audit results, and the commitment to continual improvement.

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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.