U.S. DEPARTMENT OF ENERGY

STRATEGIC PETROLEUM RESERVE
PROJECT MANAGEMENT OFFICE
NEW ORLEANS, LOUISIANA

Site Environmental Report
For
Calendar Year 2014
SPRPMO Document No. 0244

Photo by Renee Hebert

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STRATEGIC PETROLEUM RESERVE

SITE ENVIRONMENTAL REPORT

FOR

CALENDAR YEAR 2014

Document No. AAA9020.569
Version 1.0

Prepared for the U. S. Department of Energy
Strategic Petroleum Reserve Project Management Office
under Contract No. DE-FE0011020

FLUOR
FEDERAL PETROLEUM OPERATIONS

DOE F 1325.8
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EFG (07-90)

United States Government **Department of Energy**

memorandum

DATE: OCT - 1 2015

REPLY TO ATTN OF: 15-ESH-013
FE-4441 (WWoods)

SUBJECT: SITE ENVIRONMENTAL REPORT FOR CALENDAR YEAR 2014 – STRATEGIC PETROLEUM RESERVE

TO: Robert F. Corbin, Deputy Assistant Secretary for Petroleum Reserves, FE-40

Attached for your information is a copy of the Site Environmental Report for Calendar Year 2014 for the U.S. Department of Energy's Strategic Petroleum Reserve. This report is prepared and published annually, after authorized release, with an electronic version of the report available at:

http://www.spr.doe.gov/esh/default.html.

To the best of my knowledge, this report accurately summarizes and discusses the results of the 2014 Environmental Monitoring Program.

Please authorize the release of this report to the attached distribution.

If you have any question or desire additional information, please contact Paul Oosterling of the Project Management Office, Office of Technical Assurance at (504) 734-4339 or by e-mail at Paul.Oosterling@spr.doe.gov.

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

Attachment:
As Stated

QUESTIONNAIRE/READER COMMENT FORM

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

Fluor Federal Petroleum Operations, LLC
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

A&E	Architect and Engineer
AFFF	Aqueous Film Forming Foam
AGSC	ASRC Gulf States Constructors, LLC
ANAB	ANSI-ASQ National Accreditation Board
ANSI	American National Standards Institute
AP	Affirmative Procurement
APHA	American Public Health Association
ASQ	American Society for Quality
ASRC	Arctic Slope Regional Corporation
ASTM	American Society for Testing and Materials
ATS	Assessment Tracking System
avg	Average
bbl	Barrel (1 bbl = 42 gallons)
BC	Bayou Choctaw
BDL	Below Detectable Limit
BH	Big Hill
BIG	Buy It Green
bls	Below Land Surface
BM	Bryan Mound
BOD5	Five Day Biochemical Oxygen Demand
^{o}C	Degrees Celsius
CAA	Clean Air Act
CAP	Corrective Action Plan
CB	Certification Body
CBT	Computer-Based Training
CEQ	Council for Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CESQG	Conditionally Exempt Small Quantity Generator
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
CV	Coefficient Of Variation
CWA	Clean Water Act
CY	Calendar Year
DMR	Discharge Monitoring Report
DO	Dissolved Oxygen
DOE	United States Department of Energy
DOT	United States Department of Transportation
E&P	Exploration and Production
EA	Environmental Assessment

ABBREVIATIONS AND ACRONYMS (continued)

EFCOG	Energy Facility Contractors Group
EFH	East Fillhole
EIQ	Emissions Inventory Questionnaire
EIS	Emissions Inventory Summary
EIS	Environmental Impact Statement
EMP	Environmental Monitoring Plan
EMS	Environmental Management System
EO	Executive Order
EOT	Extension of Time
EPA	United States Environmental Protection Agency
EPACT	Energy Policy Act
EPCRA	Emergency Planning and Community Right-to-Know Act
EPEAT	Electronic Product Environmental Assessment Tool
ERP	Emergency Response Procedure
ERT	Emergency Response Team
ESA	Endangered Species Act
ES&H	Environmental Safety & Health
E-W	East-West
FEMP	Federal Energy Management Program
FFCA	Federal Facilities Compliance Act
FFPO	Fluor Federal Petroleum Operations
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
fps	Feet Per Second
FRP	Facility Response Plan
ft	Feet
ft/yr	Feet Per Year
F&WS	United States Fish and Wildlife Service
FY	Fiscal Year
GALCOE	U.S. Army Corps of Engineers, Galveston District
GHG	Green House Gas
GLO	General Land Office
gpd	Gallons Per Day
GSA	General Services Administration
GWPMP	Ground Water Protection and Management Plan
HAP	Hazardous Air Pollutant
HW	Hazardous Waste
ICW	Intracoastal Waterway
ISM	Integrated Safety Management
ISO	International Organization for Standardization
LA	Louisiana
LAC	Louisiana Administrative Code
lbs.	Pounds
LCF	Light Commercial Facility
LCMS	Lake Charles Meter Station
LDEQ	Louisiana Department of Environmental Quality

ABBREVIATIONS AND ACRONYMS (continued)

LDHH	Louisiana Department of Health and Hospitals
LDNR	Louisiana Department of Natural Resources
LPDES	Louisiana Pollutant Discharge Elimination System
m	Meters
m3	Cubic Meters
ml	Milliliters
m/yr	Meters Per Year
max	Maximum
MCL	Maximum Contaminant Levels
MDEQ	Mississippi Department of Environmental Quality
MDR	Maximum Diversion Rate
mg/l	Milligrams Per Liter
mmb	Million Barrels
MPAR	Maintenance Performance Appraisal Report
m/sec	Meters Per Second
M&O	Management & Operating
MS	Mississippi
MSDS	Material Safety Data Sheets
MSGP	Multi-Sector General Permit
mt	Metric Tons
MW	Monitoring Well
N	North
NAAQS	National Ambient Air Quality Standards
NAEP	National Association of Environmental Professionals
NE	Northeast
NEPA	National Environmental Policy Act
NFAATT	No Further Action At This Time
NFRAP	No Further Remedial Action Planned
NHPA	National Historic Preservation Act
NIMS	National Incident Management System
NO	New Orleans
NODCOE	U.S. Army Corps of Engineers, New Orleans District
NOEC	No Observed Effect 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)
N-S	North-South
NSR	New Source Review
NW	Northwest
NWP	Nationwide Permit

ABBREVIATIONS AND ACRONYMS (continued)

OCC	Operations Control Center
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
PCB	Polychlorinated Biphenyl
PE	Performance Evaluation
pH	Negative Logarithm Of The Hydrogen Ion Concentration
PM10	Particulate Matter (less than 10 microns)
PMO	Project Management Office
PPA	Pollution Prevention Act of 1990
PPOA	Pollution Prevention Opportunity Assessment
PPP	Pollution Prevention Plan
ppt	Parts Per Thousand
PREP	Preparedness for Response Exercise Program
PSD	Prevention Of Significant Deterioration
PSI	Pounds Per Square Inch
PVC	Polyvinyl Chloride
PW	Periphery Well
PZ	Piezometer
QC	Quality Control
QPL	Qualified Products List
RAB	Registrar Accreditation Board
RCRA	Resource Conservation and Recovery Act
RRC	Railroad Commission of Texas
REC	Recognized Environmental Concern
RECAP	Risk Evaluation Corrective Action Program
ROD	Record of Decision
RWIS	Raw Water Intake Structure
S	South
SAL	Salinity
SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act
SE	Southeast
SER	Site Environmental Report
SIC	Standard Industrial Classification
SIP	State Implementation Plan
SO2	Sulfur Dioxide
SOC	Security Operations Center
SPCC	Spill Prevention Control and Countermeasures
SPR	Strategic Petroleum Reserve
SPRPMO	Strategic Petroleum Reserve Project Management Office
SQG	Small Quantity Generator

ABBREVIATIONS AND ACRONYMS (continued)

STP	Sewage Treatment Plant
s.u.	Standard Units
SW	Southwest
SWPPP	Stormwater Pollution Prevention Plan
TCEQ	Texas Commission on Environmental Quality
TCLP	Toxicity Characteristic Leaching Procedure
TDH&PT	Texas Department of Highways and Public Transportation
TDS	Total Dissolved Solids
TNRCC	Texas Natural Resource Conservation Commission
TOC	Total Organic Carbon
TPQ	Threshold Planning Quantity
TPWD	Texas Parks and Wildlife Department
tpy	Tons Per Year
TRI	Toxic Chemical Release Inventory
TSCA	Toxic Substance Control Act
TSD	Treatment Storage Disposal
TSS	Total Suspended Solids
TVP	True Vapor Pressure
TX	Texas
UIC	Underground Injection Control
URS	United Research Services
VOC	Volatile Organic Compound
VWS	Verification Well Study
WCP	Water Conservation Plan
WAD	Work Authorization Directive
W	West
WH	West Hackberry

VERSION HISTORY

Version History AAA9020.569., Site Environmental Report for Calendar Year 2014		
VERSION	DESCRIPTION	EFFECTIVE DATE
1.0	New document.	

Executive Summary

The purpose of the annual U. S. Department of Energy (DOE) Strategic Petroleum Reserve (SPR) Site Environmental Report (SER) is to characterize site environmental management performance, confirm compliance with environmental standards and requirements, and highlight significant programs and efforts performed by the previous acting management and operations (M&O) Contractor, and Fluor Federal Petroleum Operations. The SER 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 environmental regulatory compliance data. It also affirms that the SPR has been operating within acceptable regulatory limits and illustrates the success of SPR efforts toward continual environmental improvement.

During 2014, the SPR was in compliance with all applicable federal and state environmental regulations. Against the active permits in effect across all SPR sites, there were 1,198 permit related analyses conducted. There were six permit non-compliances reported during 2014. There were no reportable crude oil spills and one reportable brine spill in 2014. Reportable oil and brine spills have substantially declined over the years. There were also no Clean Air Act (CAA), Clean Water Act (CWA) or Resource Conservation and Recovery Act (RCRA) Notice of Violations (NOV) received in 2014. SPR facilities continued to operate as Conditionally Exempt Small Quantity Generators (CESQG) for the majority of CY 2014.. There was an episodic generation during the month of September that caused one of the sites to be classified as a Small Quantity Generator (SQG) for the remainder of that month. The Superfund Amendments and Reauthorization Act (SARA) Title III, Tier Two reports, which list the type and quantity of hazardous substances on SPR facilities were submitted on time and provided to the appropriate agencies.

Environmental compliance and management audits were conducted in-house, both by the DOE Strategic Petroleum Reserve Project Management Office (SPRPMO) appraisal teams and by the M&O Contractor during 2014. Ten low risk or minor deviations from internal requirements and regulations were identified during internal audits in FY2014.

The SPR Environmental Management System (EMS) is certified by a third party registrar against the International Organization for Standardization (ISO) 14001:2004 standard. A third party surveillance audit conducted in 2014 identified five minor non-conformances. The third party registrar verified that the SPR's EMS remains suitable, adequate, and effective.

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

1 Introduction

This Strategic Petroleum Reserve (SPR) annual Site Environmental Report for calendar year 2014 was prepared to inform the U.S. Department of Energy (DOE), environmental agencies, and the public about environmental management performance and data gathered at or near SPR sites. It also summarizes compliance with environmental standards and requirements and highlights significant programs and efforts. During the first three months of CY14, the SPR was managed by DM Petroleum Operations for the U. S. Department of Energy. Under contract DE-FE0011020, Fluor Federal Petroleum Operations LLC (FFPO) assumed management in April.

1.1 Background Information

The SPR was established by the Energy Policy and Conservation Act in 1975. It provides the United States with sufficient petroleum reserves to mitigate the effects of a significant oil supply interruption. The mission of the SPR is to maintain a constant state of operational readiness to drawdown the reserve and supply oil to the country in an emergency as directed by the President of the United States. The Secretary of Energy also has the authority to acquire oil to fill the reserve or exchange current holdings to alter the mix of oil, to test the SPR's capabilities through test sales or to "loan" oil to refineries when their supplies have been temporarily disrupted.

The DOE Office of Deputy Assistant Secretary for the Petroleum Reserves has overall programmatic responsibility for establishing the objectives of the SPR. The SPR Project Management Office (SPRPMO) Project Manager is responsible for implementing these goals and objectives, including articulating an environmental policy (SPRPMO P 451.1C, Appendix B) that is responsive to Departmental requirements. The DOE SPR Environmental Policy is applied to SPR operations through the M&O contractor. (both in Appendix B).

Emergency crude oil supplies are stored by the SPR in salt caverns. The caverns were created deep within the massive Louann salt deposits that underlie most of the Texas and Louisiana coastline. The caverns currently in use were created through the process of solution mining. The utilization of the caverns to store crude oil provides assurance against normal hazards associated with the aboveground storage, offers the best security, and is the most affordable means of storage.

The Gulf Coast was chosen as the site of the SPR due to its large concentration of underground salt domes, and its large number of refineries and crude oil distribution capabilities. These attributes provide the flexibility needed to respond to a wide range of supply disruptions. As of December 2012 the SPR had approximately 696 million barrels of oil.

1.2 Locations, Facilities and Operations

The SPR presently consists of four Gulf Coast underground salt dome oil storage facilities, warehouse facilities, and a project management facility. The DOE St. James Terminal was leased to Shell Pipeline in January 1997 and is no longer an active SPR storage facility; it continues as SPR property and therefore, is addressed in applicable sections of this report.

1.2.1 Bayou Choctaw

The Bayou Choctaw storage facility is located in Iberville Parish, Louisiana. The storage facility occupies 356 acres of the Bayou Choctaw salt dome, including off-site satellite brine disposal wells and associated brine piping.

The Bayou Choctaw salt dome was selected as a storage site early in the SPR program due to its existing brine caverns, which were 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. One additional cavern was acquired, modified and completed in 2012.

The area surrounding the site is a freshwater swamp, which includes substantial stands of bottomland hardwoods with interconnecting waterways. Small canals and bayous flow through the site area and join larger bodies of water off-site. The site proper is normally dry and protected from spring flooding by the site's flood control levees and pumps. The forest and swamp provides habitat for a diverse wildlife population, including many kinds of birds, mammals and reptiles including the American alligator.

Table 1-1Bayou Choctaw

SPR Bayou Choctaw Storage Facility	
Location	**Plaquemine, LA**
Caverns	**7**
Authorized Storage Capacity	**76,000,000 Barrels**
Drawdown Rate	**515,000 Barrels/Day**

1.2.2 Big Hill

The Big Hill storage facility is located in Jefferson County, Texas. The site covers approximately 270 acres of the Big Hill salt dome. Off-site facilities include an intake structure that provides raw (brackish) water for cavern development and fluid movements, a brine line for brine disposal and a crude oil pipeline for receiving and distributing oil in commence.

Big Hill 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 with a few 150-year-old live oak trees. The nearby ponds and marsh provide excellent habitat for a diverse population of wildlife including the American alligator, over-wintering waterfowl, and several species of birds and mammals.

Table 1-2 Big Hill

SPR Big Hill Storage Facility	
Location	**Winnie, TX**
Caverns	**14**
Authorized Storage Capacity	**170,000,000 Barrels**
Drawdown Rate	**1,100,000 Barrels/Day**

1.2.3 Bryan Mound

The Bryan Mound storage facility located in Brazoria County, Texas. The facility occupies 500 acres and encompasses almost the entire Bryan Mound salt dome. Off-site facilities include a brine pipeline for brine disposal and crude oil pipelines for receiving and distributing oil in commerce.

The Bryan Mound salt dome was selected as a storage site early in the SPR program due to its existing brine caverns, which were readily converted to oil storage. 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 cover and feeding grounds for wildlife. Marshes and tidal pools provide diverse habitats for a variety of birds, aquatic life and mammals.

Table 1-3 Bryan Mound

SPR Bryan Mound Storage Facility	
Location	**Freeport, TX**
Caverns	**20**
Authorized Storage Capacity	**254,000,000 Barrels**
Drawdown Rate	**1,500,000 Barrels/Day**

1.2.4 West Hackberry

The West Hackberry storage facility is located in Cameron Parish, Louisiana. The facility occupies 565 acres over the West Hackberry salt dome. Off-site facilities include an intake structure that provides raw (brackish) water for cavern development and fluid movements, brine disposal wells with associated brine piping and crude oil pipelines for receiving and distributing oil in commerce.

The West Hackberry salt dome was selected as a storage site early in the SPR program due to its existing brine caverns, which were readily converted to oil storage. 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 that support grass, trees and affect water flow through the marshes. These marshlands provide habitat for a variety of wetland and wildlife species.

Table 1-4 West Hackberry

SPR West Hackberry Storage Facility	
Location	**Hackberry, LA**
Caverns	**22**
Authorized Storage Capacity	**227,000,000 Barrels**
Drawdown Rate	**1,300,000 Barrels/Day**

1.2.5 New Orleans

The project management office for SPR operations is housed in two adjacent office buildings with a nearby warehouse in Harahan, Louisiana, part of the New Orleans metropolitan area. This facility is the main office where the SPR was managed throughout 2014. Activities conducted at the New Orleans office complex are predominantly administrative. Office and warehouse space is leased, not owned, by the Department of Energy.

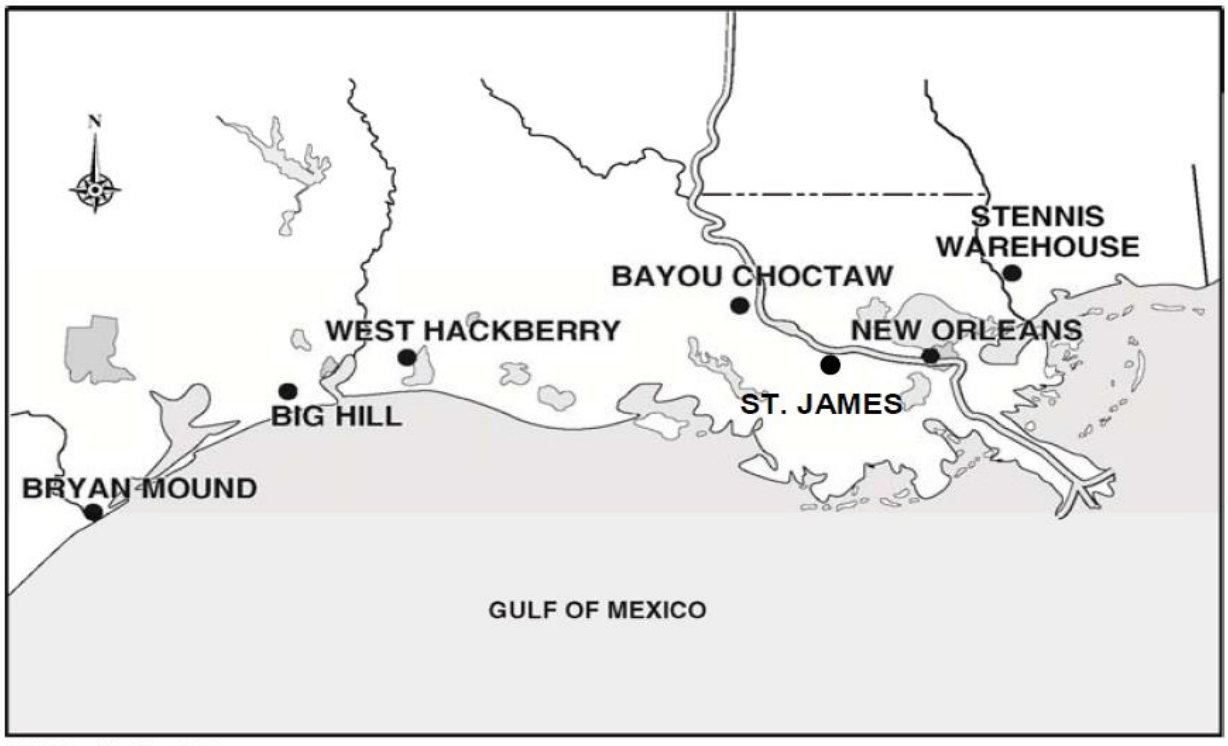
1.2.6 Stennis

The Stennis Warehouse facility is located in Hancock County, Mississippi. The warehouse and adjacent concrete aprons and parking lot occupy approximately 3.4 acres within the John C. Stennis Space Center. The warehouse was leased from the U.S. Army from 2004 to 2011 after which it was leased from NASA.. It is used to maintain and store heavy equipment and piping in support of the four storage sites. It also has office space permanently used by its tenants and, if needed, temporarily used by headquarters personnel.

1.2.7 St. James

The St. James Terminal located along the Mississippi River in St. James Parish, Louisiana was leased to Shell Pipeline in 1997. The 173-acre site consists of the main facility and two satellite docks located on the west Mississippi River batture. A small onsite area was identified as contaminated with crude oil, and remediation efforts toward clean closure were implemented that resulted with a No Further Action At This Time (NFA-ATT) determination by LDEQ in 2008.

Figure 1-1 SPR Site Locations



2 Compliance Summary

The federal, state and local regulations, Executive Orders (EOs) and DOE orders and directives that the SPR operates under are summarized in Table 2-1. A list of all applicable environmental regulations is provided in Appendix A1 and A2.

2.1 Regulatory Compliance Summary

The principal agencies responsible for enforcing environmental regulations at SPR facilities are: Environmental Protection Agency (EPA) Regions IV and VI,

- New Orleans and Galveston Districts of the U.S. Army Corps of Engineers (COE) NODCOE & GALCOE,
- U.S. Fish and Wildlife Service (F&WS),
- Louisiana Department of Environmental Quality (LDEQ),
- Louisiana Department of Natural Resources (LDNR),
- Louisiana Department of Wildlife and Fisheries (LDWF),
- Railroad Commission of Texas (RRC),
- Texas Commission on Environmental Quality (TCEQ),
- Texas General Land Office (TGLO),
- Texas Parks and Wildlife Department (TPWD) and
- Mississippi Department of Environmental Quality (MDEQ).

These agencies issue permits, review compliance reports, inspect site operations, and oversee compliance with regulations.

Table 2-1 Federal & State Environmental Regulations Applicable to the SPR

Regulatory Program Description	Compliance Status	Report Section
Clean Water Act (CWA), EPA Region VI, RRC, LDEQ and MDEQ establishes standards and issuing permits to improve water quality. LDEQ has primary enforcement responsibility for the NPDES in Louisiana. In Texas EPA and RRC issue NPDES permits.	SPR sites comply with the CWA through permitting under the NPDES program, following the Spill Prevention, Control and Countermeasures regulations and complying with the wetlands usage program.	2.3.1, 5.3, 5.4 & 5.5
Oil Pollution Act (OPA) of 1990 and TGLO improved the nation's ability to prevent and respond to oil spills and provides requirements for contingency planning both by government and industry	To meet OPA requirements the SPR conducts emergency drills at its sites each quarter in accordance with the National Preparedness for Response Program (PREP), along with full equipment deployment announced and unannounced exercises at each site annually.	2.3.2
Safe Drinking Water Act (SDWA) LDNR and RRC - Louisiana and Texas Underground Injection Control (UIC) programs regulate underground hydrocarbon storage, related brine disposal, and oil field wastes	SPR sites comply with the SDWA through permitting under the Louisiana and Texas UIC programs. The SPR operates 63 oil storage caverns, 21 saltwater disposal wells and 2 brine pipelines that extend into the Gulf of Mexico per the requirements in the permits.	2.3.3 & 5.3
Clean Air Act (CAA), the LDEQ and TCEQ regulates the release of air pollutants through permits and air quality limits.	SPR sites comply with provisions of the CAA and State Implementation Plans (SIP) through permitting and following applicable regulations. All of the SPR facilities operate in accordance with the provisions of the applicable state air permits.	2.3.4 & 5.2
Pollution Prevention Act of 1990, LDEQ, RRC and EPA Region VI focus on reducing the amount of pollution through cost-effective changes in production, operation, and raw materials use.	Each SPR site operates in accordance with a Stormwater Pollution Prevention Plan (SWPPP) prepared in accordance with EPA multi-sector general stormwater discharge authority for stormwater associated with industrial activity and similar Louisiana and Mississippi state requirements.	2.3.5 & 5.8
Resource Conservation and Recovery Act (RCRA), LDEQ, EPA and RRC govern the generation, storage, handling and disposal of hazardous wastes.	In CY14 SPR facilities continued to operate as Conditionally Exempt Small Quantity Generators (CESQG) with the exception of an episodic generation during the month of September at one of the storage facilities. Hazardous wastes are not treated, stored, or disposed at any SPR sites therefore the sites are not RCRA-permitted.	2.3.6 & 5.6
Toxic Substances Control Act (TSCA) regulates the manufacture, use and distribution of all chemicals.	Procedures are in place to preclude or prohibit purchase of equipment containing either friable asbestos or PCBs.	2.3.7 & 5.7
National Environmental Policy Act (NEPA) requires federal agencies to follow a prescribed process to anticipate the impacts on the environment of proposed major federal actions and alternatives	SPR is in full compliance with NEPA requirements. Site-wide procedure and workflow have been established for implementing the NEPA requirements.	2.3.8

Table 2-1 Federal & State Environmental Regulations Applicable to the SPR

Regulatory Program Description	Compliance Status	Report Section
Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) LDEQ and TCEQ regulate the manufacture, use, storage and disposal of pesticides and herbicides.	The SPR hires state certified pesticide applicators to apply pesticides. In addition only chemical products on the SPR Qualified Products List (QPL) are allowed on site.	2.3.9
Endangered Species Act, LDWF and TPWD prohibit activities that would jeopardize the existence of an endangered or threatened species or cause adverse modification to critical habitat.	The Fish &Wildlife Service is consulted about the appropriate actions taken with regard to threatened and endangered species.	2.3.10 & 5.10
Executive Order 13186 "Responsibilities of Federal Agencies to Protect Migratory Birds Migratory Bird Act"	In a continuing effort to minimize disruption and provide suitable habitat to 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.	2.3.11
National Historic Preservation Act (NHPA) and State Historic Preservation Office (SHPO) identify, evaluate and protect historic properties eligible for listing in the National Register of Historic Places. NHPA is administered by state historic preservation offices.	No places on or eligible to the National Register of Historic Places are located on or adjacent to SPR sites. The BM site is located on a Texas State Historical Place for its significance to the sulfur mining industry and long-term development of the nearby town of Freeport.	2.3.12
Executive Order 11988 "Floodplain Management", **Executive Order 11990** "Protection of Wetlands", NODCOE, GALCOE, LDEQ and RRC	The SPR ensures compliance with EO 11988 & 11990 by maintaining compliance with NEPA requirements, identifying potential environmental impacts, and obtaining permits through the Corps Of Engineers and state coastal management agencies.	2.3.13
Executive Order 13423 "Strengthening Federal Environmental, Energy and Transportation Management" establishes new and updated goals, practices, and reporting requirements for environmental, energy, and transportation performance and accountability **Executive Order 13514 "** Federal Leadership in Environmental, Energy and Economic Performance" establishes an integrated strategy towards sustainability in the Federal Government	The SPR Sustainability Program includes projects and activities that support the achievement of goals and targets of these two executive orders.	2.3.14 & 5.9
Superfund Amendments and Reauthorization Act (SARA), EPA, LDEQ, LDNR and TCEQ SARA Title III specifies a number of responsibilities and reporting obligations for facilities with hazardous chemicals. **Emergency Planning and Community Right to Know Act** (EPCRA) establishes requirements for federal, state and local governments, Indian tribes, and industry regarding emergency planning and "Community Right-to-Know" reporting on hazardous and toxic chemicals	The SPR prepared and distributed SARA Title III Tier Two reports, also known as Emergency Planning and Community Right-to-Know Act (EPCRA) Section 312 reports by March 1, 2015 to state and local emergency planning committees and local fire departments. The SPR prepared and submitted applicable 2014 Toxic Chemical Release Inventory (TRI) reports by July 1, 2015 to EPA.	2.3.15 & 5.7

2.2 Environmental Permit Compliance Summary

Permits in effect during 2014 include eight state and federal CWA wastewater discharge permits, seven CAA permits, 35 active original structure COE wetlands (Section 404 of CWA) permits (not counting associated modifications and amendments), and more than 100 oil field pit, underground injection well, salt mining and hydrocarbon storage permits. Detailed site specific information about the major permits is presented in tabular form in Section 5.1.

During 2014 there were two permits associated SPR Texas sites federal discharge permits that were modified and no modification or renewal of any permits associated with the SPR air quality program.

2.2.1 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 piping components such as valves, flanges, pressure relief valves, and pump seals be inspected for leaks of VOCs on a regular basis (biennially 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 rates in pounds per hour and tons per year.

The SPR ensures compliance with these permit limits by monitoring the processes that emit the pollutants. This includes monitoring use of generators, volumes of crude oil, diesel, and gasoline moved through tanks, volume of paint, and others. The results of this monitoring are reported to the agencies annually by BM and BH (if applicable) through an Emissions Inventory Questionnaire (EIQ). The BC and WH sites do not require reporting because they are below the required emission limit to report in Louisiana. All 2014 air reports were submitted to the appropriate agencies on time.

Water discharge permits require that analytical permit limits are met and reported. Other permit conditions require visual monitoring of the effluents to ensure that they have no visible sheen or foaming. All SPR sites periodically (daily, monthly and/or quarterly) monitor permit limit compliance with quarterly reporting through the NPDES, LPDES, and RRC Statewide Rule 8 Discharge Monitoring Reports (DMRs). All such reports were submitted to the appropriate agencies on time in 2014. Detailed site specific information about the major permits is presented in tabular form in Section 5.1.

2.2.2 Non-Compliances

There were six total non-compliances on the SPR out of a total of 1,198 permit-related laboratory analyses reported in 2014. With the six total permit non-compliances an overall project-wide compliance rate of 99.5 percent for 2014 was achieved. Two non-compliances occurred against the Big Hill site NPDES permit TX0092827, when two monthly samples were missed after the newly issued permit revised the sampling frequency from quarterly to monthly at stormwater outfall 008. Four non-compliances occurred against the Bryan Mound NPDES permit

TX0074012, when there was a brine discharge and no monthly samples were taken for the record. The month expired before discovery of the oversight for weekend flows resulting in four instances of missed parameter data.

2.2.3 Non-Routine Releases

State and federal agencies require notification if the amount of material spilled meets or exceeds the reportable criteria. This reportable criterion is established by each agency with jurisdictional responsibility. The majority of the non-routine releases of pollutants occur with the spills of crude oil and brine into the environment from SPR operations. In 2014 there was one reportable release of brine and no reportable releases of crude oil at the SPR.

During 2014 the SPR moved (received and transferred internally) 8.56 million m^3 (51.93 mmb) of oil and disposed of 0.62 million m^3 (3.76 mmb) of brine. The long-term trend for crude oil and brine spills and releases has declined substantially from 26 in 1990 to 1 reportable releases in 2014. Figure 2-1 provides an illustration of reportable brine and crude releases at the SPR from 1990 to 2014.

Table 2-2 Number of Reportable Oil & Brine Spills 1982-2014

Year	Type of Spill	Total Spills	Volume Spilled m^3 (barrels)	Percent Spilled of Total Throughput
1982	Brine	43	443.8 (2,792)	0.0005
	Oil	24	847.0 (5,328)	0.00704
1983	Brine	44	259.4 (1,632)	0.0002
	Oil	21	380.9 (2,396)	0.00281
1984	Brine	17	314.0 (1,975)	0.0003
	Oil	13	134.8 (848)	0.00119
1985	Brine	16	96,494.8 (607,000)	0.1308
	Oil	7	85.4 (537)	0.00122
1986	Brine	7	275.6 (1,734)	0.0017
	Oil	5	1232.5 (7,753)	0.01041
1987	Brine	22	96.5 (608)	0.0003
	Oil	5	2.5 (16)	0.00002
1988	Brine	12	93.8 (586)	0.0001
	Oil	6	8.8 (55)	0.00001
1989	Brine	17	131,231.6 (825,512)	0.1395
	Oil	11	136.4 (858)	0.00004
1990	Brine	12	11,944.3 (74,650)	0.0170
	Oil	14	74.8 (467)	0.00003

Table 2-2 Number of Reportable Oil & Brine Spills 1982-2014 (Continued)

Year	Type of Spill	Total Spills	Volume Spilled m^3 (barrels)	Percent Spilled of Total Throughput
1991	Brine	7	1,156.8 (7,230)	0.004
	Oil	6	37.9 (237)	0.0004
1992	Brine	9	48.0 (302)	0.003
	Oil	5	1.9 (12)	0.00006
1993	Brine	6	59.2 (370)	0.001
	Oil	6	36.9 (232)	0.0007
1994	Brine	2	14.4 (90)	0.0006
	Oil	7	6.2 (39)	0.0003
1995	Brine	3	131.1 (825)	0.0028
	Oil	2	56.3 (354)	0.0006
1996	Brine	5	179.7 (1,130)	0.0014
	Oil	4	4.7 (30)	0.00002
1997	Brine	0	0	0.0
	Oil	1	0.32 (2)	4.0×10^{-9}
1998	Brine	3	6.2 (39)	0.00028
	Oil	1	Sheen	N/A
1999	Brine	0	0	0.0
	Oil	1	31.8 (200)	0.00056
2000	Brine	0	0	0.0
	Oil	1	11.1 (70)	0.00011
2001	Brine	1	0.019 (0.12)	5.60×10^{-7}
	Oil	2	1.6 (10)	0.0000163
2002	Brine	2	2.1 (13)	3.9×10^{-6}
	Oil	0	0	0.0
2003	Brine	0	0	0.0
	Oil	3	1.1 (7)	0.0000104
2004	Brine	1	1.6 (10)	2.2×10^{-7}
	Oil	0	0	0.0
2005	Brine	1	27 .0 (170)	5.5×10^{-6}
	Oil	0	0	0.0
2006	Brine	0	0	0.0
	Oil	2	0.5 (3)	3.3×10^{-6}
2007	Brine	0	0	0.0
	Oil	0	0	0.0
2008	Brine	0	0	0.0
	Oil	0	0	0.0
2009	Brine	1	0.8 (5)	0.000018
	Oil	0	0	0.0
2010	Brine	0	0	0.0
	Oil	0	0	0.0
2011	Brine	1	1.9 (12)	0.000045
	Oil	0	0	0.0
2012	Brine	0	0	0.0
	Oil	0	0	0.0
2013	Brine	0	0	0
	Oil	0	0	0
2014	Brine	1	0.8 (5)	0.000133
	Oil	0	0	0

2.2.4 Environmental Reportable Project Events

Project events equal all reportable spills, and all discharge permit non-compliances. These events are used to provide a summary of SPR performance as illustrated in Figure 2-2. During 2014 there were seven environmental reportable project event at the SPRs as previously described in Sections 2.2.2 and 2.2.3

Figure 2-1 Reportable Oil & Brine Spills 1990-2014

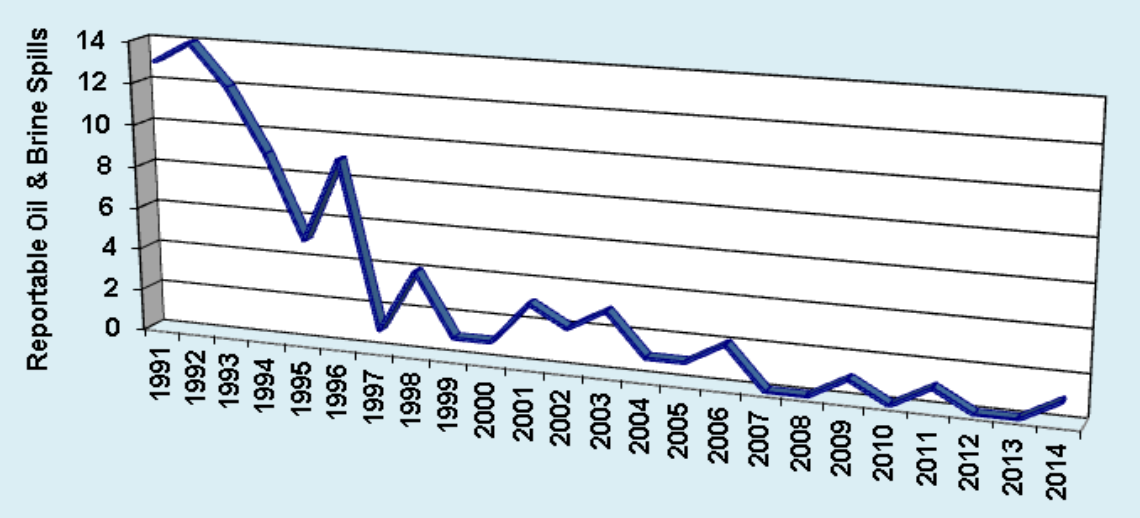
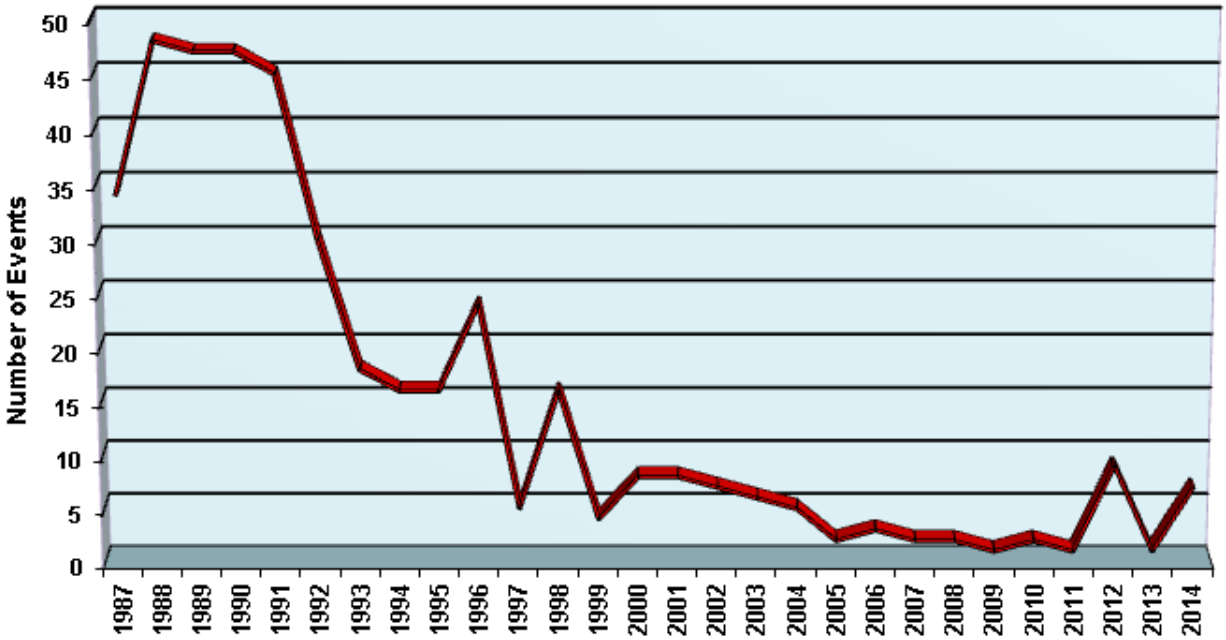


Figure 2-2 Environmental Reportable Project Events 1986-2014



2.3 Compliance Status

A major component of the SPR's compliance program is associated with meeting regulations under the CWA. At the beginning of the year, the SPR sites had a total of 95 wastewater and stormwater discharge monitoring stations that remained unchanged during this period, and 35 active (core-structure) individual wetland permits authorizing various structures at each of the sites. The SPR is also required to meet many requirements under the CAA and the SWDA and conduct waste management activities in accordance with RCRA and state guidelines. The following sections highlight primary compliance activities at the SPR sites by environmental statute.

2.3.1 Clean Water Act

SPR sites comply with the CWA through permitting under the National Pollutant Discharge Elimination System (NPDES) program. Additionally, the sites follow the Spill Prevention, Control and Countermeasures (SPCC) regulations, comply with the requirements of the Oil Pollution Act (OPA) of 1990 and comply with the wetlands usage program.

In 2014 the modifications to the Texas sites federal discharge permits that set the minimum nozzle exit velocity at 30 feet per second (fps) remained in effect until November 1, 2014. Modifications to each permit based on CORMIX modeling reviews by Region 6 and the SPR resulted in changes to operations that maintain adequate levels of dispersion of the offshore brine discharge limiting potential impacts to organisms in receiving waters. The two federal NPDES permits that were the subject of required renewal applications sent to the EPA in 2013, 180 days to expiration per regulation, became effective November 1, 2014, after review and comments were exchange mid-year and final permits issued September 10, 2014. Louisiana has primary enforcement responsibility for the NPDES discharge program, issuing permits under the CWA. 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.

Each SPR storage site and the Stennis warehouse comply with the federal 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 SPCC plans are current in accordance with Title 40 CFR 112 and corresponding state regulations. Interim revisions were made to the BC and WH SPCC Plans in May, 2013; to update potential oil spill release volumes from a cavern wellhead severance.

The SPR sites obtain permits from the COE and Coastal Zone Management representatives of the responsible state agencies whenever fill, discharge, or dredging occurs in a wetland. During 2014 there were no wetlands permits issued to the SPR by either District (Galveston or New Orleans) having jurisdiction over SPR sites. There were, however, several maintenance notifications for traveling screen removals for repair and associated replacements at two of the sites.

2.3.2 Oil Pollution Act (OPA) of 1990

SPR emergency programs, planning, and management are guided by OPA 1990 regulatory standards for onshore storage facilities, pipelines, and marine terminal facilities. Facility Response Plans (FRP) on the SPR have been combined with the site emergency response

procedures in accordance with the EPA "One Plan" scheme and meet or exceed the requirement of OPA 1990 and related state acts such as the Oil Spill Prevention and Response Act (OSPRA) in Texas. The plans are approved by the appropriate federal and state regulatory agencies. The Texas sites maintain their individual OSPRA certifications in accordance with state requirements.

The SPR conducts emergency drills or hands-on training of its sites each quarter in accordance with the National Preparedness for Response Program (PREP), along with full equipment deployment announced and unannounced exercises at each site annually. A professional staff of emergency management personnel from the M&O Contractor in New Orleans (NO) coordinates these drills and exercises and includes the participation of public and regulatory/governmental agencies as available.

The SPR utilizes the National Incident Management System (NIMS), 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.

2.3.3 Safe Drinking Water Act

The SPR oil storage caverns and brine disposal wells are regulated by the SDWA. The EPA granted 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 is disposed via brine pipelines that extend into the Gulf of Mexico. Some ancillary commercial disposal wells are used occasionally. The 2014 Annual Report Form OR-1 for underground injection was completed and submitted on schedule to the LDNR using the newly implemented and required electronic reporting process.

Historic groundwater evaluations have indicated the presence of some shallow groundwater impacts from salt water at the BM and WH sites. At BM, data suggest that use of unlined brine storage pits by the previous industrial tenants may have been a major contributor to the salt impacted groundwater located east of the site's closed large brine storage pond. As part of the site's overall groundwater surveillance, the post-closure monitoring near the BM brine storage pond is provided through this report to the RRC as requested.

The WH site completed closure of its brine ponds in 1999 under a Corrective Action Plan (CAP) negotiated with LDNR. All remedial recovery pumping was successfully completed in 2001. Post closure monitoring for three closed anhydrite ponds of certain wells for 30 years is currently met by monitoring quarterly and reporting annually in this SER, which is shared with LDNR. A 2002 proposal for resumption of a site-wide groundwater monitoring program addressing both the brine pond and anhydrite pond closures was approved by LDNR in 2004, and has been followed since.

Groundwater monitoring of the uppermost interconnected aquifer at all SPR sites is mandated through DOE orders for surveillance assessment and are coordinated on the SPR through the

Environmental Monitoring Plan (EMP). Details of the groundwater monitoring of the site wide well nets are presented in Section 5.

Local public water systems supply drinking water to all storage sites, NO headquarters, and the NO and Stennis warehouses. Potable water systems at BM and BH are classified by state and federal regulations as "non-transient, non-community" public water systems, and these sites are required to have potable water monitoring programs. Unlike BH and BM, WH and BC facilities are not required to have potable water monitoring programs and are recognized as water purchasers only.

In 2014, drinking water samples were taken monthly at BH and BM. Residual chloramine was monitored weekly at BH and BM

Potable water at BM, BH, and BC has been tested under state programs for lead and copper, most recently in 2008 at the BM and BC sites, and in 2009 at the BH site with the Texas sites remaining in compliance and for BC the testing was eliminated commencing in 2011 with connection to the parish supplied water. In 2014 testing for disinfection by-products was conducted through TCEQ at BM and BH. Test results for the two groups of disinfection by-products – trihalomethanes and haloacetic acids – show that concentrations continue to be below the maximum contaminant levels (MCL) at the two sites.

BH and BM calculate maximum residual disinfectant levels (chloramine) based on a running annual arithmetic average. Calculated results at both sites have not exceeded the regulatory MCL for disinfectants.

2.3.4 Clean Air Act

The SPR sites comply with the applicable provisions of the CAA and State Implementation Plans (SIP) through permitting and following applicable regulations. The state agencies have primacy (LDEQ and TCEQ). All of the SPR sites are located in attainment areas for all National Ambient Air Quality Standards (NAAQS) pollutants with the exception of ozone. The BH and WH sites are located in attainment areas for ozone; therefore, it is regulated by the Prevention of Significant Deterioration (PSD) permitting program. The BC and BM sites 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 of air emissions during normal operations under PSD, NSR, Title III hazardous air pollutant (HAP), or Title V operating permit regulations. All of the facilities operate in accordance with the provisions of the applicable state air permits.

2.3.5 Pollution Prevention Act of 1990

Each SPR site operates in accordance with a Stormwater Pollution Prevention Plan (SWPPP) prepared in accordance with EPA multi-sector general stormwater discharge authority for stormwater associated with industrial activity and similar Louisiana and Mississippi state requirements. This multimedia document consolidates these regulatory agency requirements with EO 13423, which require a Pollution Prevention Program (PPP) and the related Waste Minimization and Solid Waste Management Plans.

2.3.6 Resource Conservation and Recovery Act

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 and MDEQ in Mississippi. SPR Texas sites fall under the jurisdiction of the RRC, which has not yet received delegation; therefore, the SPR complies with both EPA and RRC regulations in Texas.

Large quantities of hazardous waste are not routinely generated at the SPR and the sites continued to operate as Conditionally Exempt Small Quantity Generators (CESQG) in 2014 with one exception. In February of 2014 an episodic generation of hazardous waste occurred at one of the SPR sites, which lead to a change in generator status from CESQG to Small Quantity Generator (SQG) for the remainder of the month. Hazardous wastes are not treated, stored, or disposed at SPR sites and therefore, the sites 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 Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).

SPR non-hazardous wastes associated with underground hydrocarbon storage activities are regulated under the corresponding state programs for managing drilling fluids, produced waters, and other wastes related to the exploration, development, production or storage of crude oil or natural gas. These wastes are referred to as Exploration and Production (E&P) wastes. Hazardous E&P wastes are exempted from RCRA, but Congress did not include the underground storage of hydrocarbons in the scope of the E&P criteria. Under LA and TX regulations, underground storage of hydrocarbons is included in the E&P scope. In order to remain in compliance with federal law, the SPR does not dispose of hazardous waste under the "E&P" exemption rules. The SPR characterizes all E&P waste streams to determine if they exhibit hazardous characteristics, and any that do are managed and disposed as hazardous waste. The SPR disposes of non-hazardous wastes generated by the E&P process at state approved E&P disposal facilities.

The SPR achieved the 100% Affirmative Procurement (AP) purchases target for fiscal year 2014. All purchases qualified as recycled products or justified virgin products. There were no purchases of virgin products in 2014. The DOE and M&O contractor’s corporate environmental policies stress the SPR’s commitment to waste management and environmental protection (Appendix B).

2.3.7 Toxic Substances Control Act

Friable asbestos is not present at SPR sites. Small amounts of non-friable asbestos usually in the form of seals or gaskets are disposed locally as they are taken out of service, in accordance with applicable solid waste regulations. Non-asbestos replacement components are used. No liquid-filled electrical equipment or hydraulic equipment currently used on the SPR has been identified as polychlorinated biphenyl (PCB) equipment or PCB contaminated under TSCA. Procedures are in place to preclude or prohibit purchase of equipment containing either friable asbestos or PCBs.

2.3.8 National Environmental Policy Act

Approximately 539 documents that included design reviews, engineering change proposals, deviations, waivers and purchase requisitions were evaluated for NEPA review in 2014. Out of these documents, 42 required NEPA categorical exclusion documentation. None of the projects associated with these documents had the potential to adversely affect any environmentally or culturally sensitive resources, such as structures of historic, archeological, or architectural significance or any threatened or endangered species or their habitat. Also, no wetlands were adversely impacted as a result of these actions. All of these NEPA reviews resulted in categorical exclusions that required no further action.

The purpose of the NEPA Program is to review all SPR projects in the early planning stages to ensure that environmental impacts and requirements are adequately evaluated. All activities on the SPR must have, or have had, a NEPA review. For most projects, the NEPA document is a "Record of NEPA Review" (RONR), which suggests that a project is a categorical exclusion (CX) or that the project is covered under an existing NEPA document. For those few projects not covered by a RONR, a higher level of NEPA review is required, and is part of the planning process. A RONR is required if the project's value is greater than $150,000 (for information systems, construction contracts, and service contracts) or for any project or task that might cause significant environmental impact. The following are reviewed for NEPA compliance:

- Conceptual Design Reports
- Definitive Engineering Scopes
- Statements of Work
- Work Orders or Service Orders
- Engineering Change Proposals
- Deviations and Waivers
- Design Reviews
- Purchase Requests
- Scopes of Work

A signed NEPA document is required 1) prior to detailed design beyond conceptual design, 2) before a scope of work is issued for construction or 3) before manpower commitment. The NEPA process is also a key method of identifying environmental aspects for incorporation into the EMS.

2.3.9 Federal Insecticide, Fungicide and Rodenticide Act

Much of the SPR property is developed with buildings, piping, cable trays, and other structures where the use of pesticide and herbicide products are necessary to control unwanted vegetation and other pests. During 2014 the SPR used pesticide products to control pests in buildings and around work areas and herbicide products to control vegetation throughout site grounds, and security zone areas, and to mitigate the reduction of the number of personnel dedicated to mowing. Although the use of herbicides and pesticides are necessary, there is a concerted effort made, through screening of chemicals prior to purchase, to restrict the use of those products to the least harmful to the environment and the site employees.

2.3.10 Endangered Species Act

In a continuing effort to minimize disruption and provide suitable habitat to 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 US Fish & Wildlife Service (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/or relocation of threatened, endangered and nuisance wildlife.

Consideration of potential impacts to endangered species at the SPR was included as part of the original conditional coverage through the re-issued Multi Sector General Permit (MSGP). During the process 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 finalizing 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 stormwater "sheet flow" run-off. No potential impacts were discerned at that time. The MSGP coverage has since been migrated to either the individual or general permits issued to each site.

2.3.11 Executive Order 13186 Responsibilities of Federal Agencies to Protect Migratory Birds & Migratory Bird Act

The active storage facilities comprising the SPR are located in a variety of environments and on migratory pathways along the Gulf Coast of Texas and Louisiana. As such, a variety of waterfowl and song birds frequent our sites during the migratory season.. Environmental awareness of migratory bird issues commences at the site level. Each site ES&H Manager implements site-wide surveillance in the conduct of normal operations. Selected fields are not mowed from early fall through early spring at BM, BH, and WH to provide food and shelter for migrating birds. . When discovered, nesting areas at all sites are flagged in the field for the duration of the nesting season (e.g. least terns); and equipment has been designated for limited/restricted use on occasion when they harbor bird nests (e.g. by mockingbird, mourning dove, and shrikes). Selected areas on the sites are not mowed and/or are posted from early spring through mid summer to allow bird feeding, nesting and brooding.

2.3.12 National Historic Preservation Act

No site projects required certified reviews by the Louisiana State Historical Preservation Office (SHPO) in 2014. No locations on or adjacent to SPR sites are on or eligible to the National Register of Historic Places. The BM SPR site is located on a Texas State Historical Place for its significance to the sulfur mining industry and long-term development of the nearby town of Freeport.

2.3.13 Executive Order 11988 Floodplain Management & Executive Order 11990 Protection of Wetlands

Since the inception of the SPR, compliance with EO 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. The measures that illustrate the SPR compliance with EO 11988 are also used to comply with EO 11990 and ensure that any

practicable steps to minimize harm to wetlands are identified and taken.

2.3.14 Executive Order 13423 Strengthening Federal Environmental, Energy and Transportation Management & Executive Order 13514 Federal Leadership in Environmental, Energy and Economic Performance

In January 2007, President Bush signed EO 13423, "Strengthening Federal Environmental, Energy, and Transportation Management". This EO consolidated and strengthened five previous executive orders and two memorandums of understanding, and established new and updated goals, practices, and reporting requirements for environmental, energy, and transportation performance and accountability. The EO requires federal agencies to lead by example in advancing the nation's energy security and environmental performance. During 2014, the SPR made a concerted effort to successfully comply with the goals of the EO and associated requirements based on the implementation strategies developed in 2007.

EO 13514, "Federal Leadership in Environmental, Energy, and Economic Performance", was signed and implemented in October 2009 by President Obama to establish an integrated strategy towards sustainability in the Federal Government and to make reduction of green house gas emissions (GHG) a priority for federal agencies. The strategy to achieve this EO is similar to and integrates with that of previous EO 13423.

DOE Order DOE O 436.1 (Departmental Sustainability) and SPR PMO Order 436.1 (Site Sustainability) both delineate requirements and responsibilities to DOE and contractor personnel for implementing the goals of the two executive orders. These goals comprise the SPR Sustainability Program and are as follows:

- Increase energy efficiency and reduce Scope 1 and 2 green house gas (GHG) generation
- Reduce Scope 3 GHG generation
- Conduct an annual comprehensive GHG inventory
- Increase use of renewable energy and implement renewable energy generation projects on DOE property
- Install meters
- Reduce fleet consumption of petroleum products
- Promote high performance sustainable building design and construction
- Install cool roofs
- Promote regional and local planning
- Increase potable and industrial/landscape/agricultural (ILA) water use efficiency and management
- Achieve EPA's stormwater management objectives
- Promote pollution prevention and waste elimination
- Increase diversion of non-hazardous solid waste and construction/demolition materials and debris
- Increase diversion of compostable and organic material from waste streams
- Reduce paper use and acquisition
- Reduce and minimize the quantity of toxic and hazardous chemicals and materials acquired, used, and disposed
- Increase use of acceptable alternative chemicals and processes, including those that will reduce the use of chemicals that could threaten GHG reduction targets

- Implement pest management and other landscaping management practices
- Increase sustainable acquisition
- Meter data centers
- Promote electronic stewardship and energy efficient data centers
- Continue implementation and achieving these goals through an environmental management system

Each year the SPR Sustainability Planning Committee oversee the identification, selection, scheduling, budgeting, and implementation of projects and activities that support the sustainability program. A brief synopsis of the goals, activities, and projects that support the goals and FY 2014 performance are found in section 5.

2.3.15 Superfund Amendments and Reauthorization Act & Emergency Planning and Community Right-to-Know Act

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 1, 2015 to state and local emergency planning committees and local fire departments. Table 2-3 contains a summary of the inventory information that was submitted for 2014.

SPR sites are required to report under EPCRA Section 313, by submitting Toxic Chemical 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. This form must be submitted by July 1 for the reporting thresholds exceeded during the preceding calendar year. The submittal of a TRI Form R was required for the BH and WH sites in 2014 because the SPR introduced crude oil into commerce from the Test Sale in April and May, 2014.

Table 2-3 2014 SARA Title III Tier Two Summary for the SPR

SPR Site	Chemical Name (Category)	*Max Daily Amt (lbs.)	Location on Site
BC	AFFF 3%	10,000 – 99,999	OPS., Foam Storage Building
	Buckeye Low Temp. AR-AFFF	10,000 – 99,999	Fire Truck, Helipad
	Chemguard 3%/6% AR-AFFF C-363	1,000 – 9,999	OPS., Foam Deluge Building
	Crude Oil Petroleum	> 1 Billion	Flammable Storage Building, Site Tanks, Piping, Underground Caverns
	Diesel Fuel	10,000 – 99,999	Emergency Generator Fuel Tank, Property Tank 2
	Diesel Fuel #2	10,000 – 99,999	Property Tank #2
	Gasoline, Including Casing Head	1,000 – 9,999	Property Tank 1
	Hydrochloric Acid	0 – 99	Environmental laboratory
	Hydrogen Sulfice	0 – 99	Environmental Laboratory
	Nitric Acid	0 – 99	Environmental Laboratory
	Nitrogen Balance Gas	0 – 99	Control Building
	Xylene	0 – 99	Environmental Laboratory
BH	Chemguard 3%/6% AR-AFFF C-363	10,000 – 99,999	Operations Buildings 805 and 834
	Chemguard 3% MS AFFF C301	10,000 – 99,999	Operations Buildings 16 and 805
	Crude Oil Petroleum	> 1 Billion	Flammable Storage Building, Site Tanks, Piping, Underground Caverns

SPR Site	Chemical Name (Category)	*Max Daily Amt (lbs.)	Location on Site
	Diesel Fuel	10,000 – 99,999	Operations, BHT-4, BHT-50, BHT-51, and BHT 53
	Hydrochloric Acid	0 – 99	Environmental Laboratory
	Hydrogen Sulfide	0 – 99	Administration BLDG 244, Permit Office
	Nitric Acid	0 – 99	Environmental Laboratory
	Non-Flammable Gas Mixture	0 – 99	I & C Office
	Potassium Chloride Solution	0 – 99	Environmental Laboratory
	Sulfuric Acid	0 – 99	Environmental . Laboratory
	Xylene	0 – 99	Crude Oil Storage Bldg.
BM	1-125PPM Vol. Hydrogen Sulfide Balance Nitrogen – Cal. Gas	0 – 99	Property Building 202
	3% AFFF	100,00 – 999,000	Operations Foam Storage Buildings 207, 213, 242 and 206. Foam Tank BMT 16 and BMT 25
	Amercoat 78 HB Cure	0 – 99	Maintenance Building 243
	Chemguard 3% MS AFFF C301	10,000 – 99,999	Operations Buildings 242 and 208
	Crude Oil Petroleum	➢ 1 Billion	Flammable Storage Building, Site Tanks, Piping, Underground Caverns
	Diesel	10,000 – 99,999	Fuel Tank, Workover, Operations BMT 20 and 18
	FC-600 Light Water ATC AR-AFFF 3% or 6%	10,000 – 99,999	Foam Storage Buildings 207 and 213
	Gasoline	10,000 – 99,999	Operations Building 242
	Hydrogen Sulfide	0 – 99	Degas Plant
	Nitrogen Balance Gas	0 – 99	Laydown Yard and Warehouse Yard
	Non-Flammable Gas Mixture	0 – 99	244 Permit Office
Offsite Pipelines	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)
WH			
	Amercoat 68 HS Powder	1,000 – 9,999	Flammable Storage Building
	Amerlock 2/400 Custom Color Resin	100 – 999	Flammable Storage Building
	Buckeye 3% Mil Spec AFFF	10,000 – 99,999	Operations Buildings 303 and 305
	Buckeye Platinum 3%-6% Low Temp AR-AFFF	1,000 – 9,999	Operations Building 305
	Chemguard BC Dry Chemical	1,000 – 9,999	Operations Building 305
	Crude Oil Petroleum	> 1 Billion	LCMS Piping, Site Tanks, Piping, Underground Caverns, Warehouse E
	Diesel Fuel	10,000 – 99,999	MTC, Fuel Pump Tank, Contractor Laydown Yard, Workover Rig

SPR Site	Chemical Name (Category)	*Max Daily Amt (lbs.)	Location on Site
	Diesel Fuel #2	1,000 – 9,999	Workover Rig
	Diglycolamine	10,000 – 99,999	Degas Laydown
	FC-203CF Lightwater Brand AFFF	10,000 – 99,999	Operations Foam Storage Building
	Gasoline, Including Casing Head	1,000 – 9,999	Fuel Pump Tank, Laydown Yard,
	Hydrochloric Acid	0 – 99	Environmental Laboratory
	Mineral Oil, Petroleum Distillates	100 – 999	Workover Rig Yard
	Mobil DTE Oil BB	1,000 – 9,999	Degas General
	Mobil DTE Oil Heavy	1,000 – 9,999	Degas General
	Sulfuric Acid	0 – 99	Environmental Lab

* Reporting range specified by LA, MS, or TX SARA Title III Tier Two Reporting Requirement based on location of site.

2.3.16 Federal Facilities Compliance Act

During 2013 none of the SPR sites generated any waste considered to be hazardous and radioactive (mixed waste). Therefore, this act did not apply to the SPR.

2.3.17 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.

2.3.18 Preventing and Reporting Spills

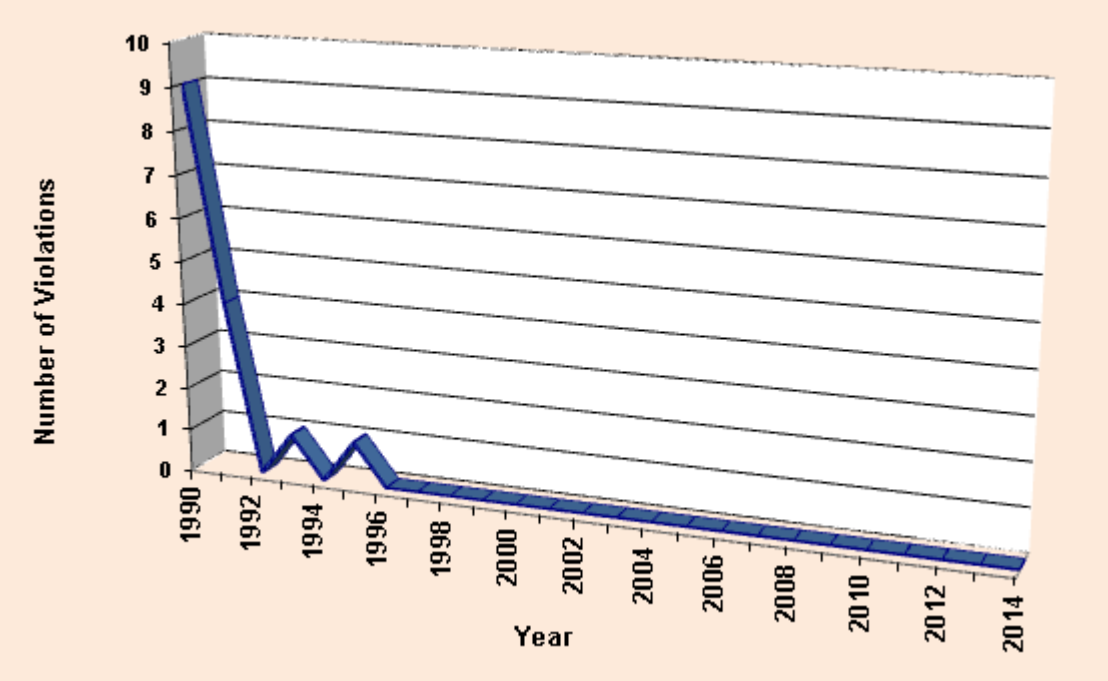
The SPR crude oil storage sites are located near marsh or other wetland areas so protection of the environment through oil spill prevention and control is a primary commitment. Verbal notification and associated written reports to the appropriate regulatory agencies (e.g. National Response Center) occur as required, if the spill meets the reportable criteria. Each SPR 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.

Site Emergency Response Procedures address spill reporting requirements of 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. The tool to document these spills is the Operations Control Center (OCC) Non-Routine and Occurrence Report form that is completed at the site level and then forwarded to the New Orleans OCC. Final written reports from the sites are submitted after cleanup, unless otherwise directed by the DOE or appropriate regulatory agency.

2.3.19 Notices of Violation, Notices of Deficiency, Notices of Intent to Sue, and other types of enforcement actions issued to the site

During 2014 the SPR did not have any compliance or cleanup agreements, environmental violations cited by regulators, notices of violation, notices of deficiency, notices of intent to sue or other types of enforcement actions issued at any of the sites. The SPR has continued to maintain a status of low risk to the environment. NOVs related to CAA, CWA and RCRA activities have declined significantly from 4 in 1991 to zero since 1996 to date, as depicted in Figure 2-3.

Figure 2-3 Number of Violations 1991-2014



2.4 Major Environmental Issues and Actions

2.4.1 Gassy Oil

When SPR crude oil is brought to surface facilities, methane and ethane gas (non-regulated) that has migrated from the salt in the salt dome is released, stripping regulated pollutants (VOC) into the atmosphere. Also, geothermal processes raise the crude oil temperature, elevating the true vapor pressure (TVP) potentially above the atmospheric pressure of 14.7 pounds per square inch (PSI). This elevated vapor pressure may exceed regulatory limits for storage in floating roof tanks, potentially affecting some of the SPR sites and receiving commercial terminals (customers). Beginning in 1995 the SPR conducted operations to separate and remove gas from stored oil, in addition to heat exchangers used to cool oil prior to transport offsite. Recent operation of the degas plant at BH began in early 2004 and completed operations in October 2006. The degas plant was disassembled and moved to BM in 2007. Operations started in September 2007, and were completed in February 2011. The scope was developed for the degas project in 2012. The initial phase of the proposed project to disassemble the unit at BM, transport, and reassemble over at the WH SPR site began in 2013. Operation of the degas plant at WH started in August, 2014 and is ongoing.

2.4.2 Bayou Choctaw Cavern 102

In order to make certain that the SPR is able to successfully perform its mission of stockpiling crude oil in the event of a petroleum supply disruption; processes are monitored to ensure the integrity of the storage systems.

Sonar testing at the BC storage site identified Cavern 20 (BC-20) as being deficient. It was decided to empty BC-20 of crude and purchase BC Cavern 102 (BC-102), an existing cavern owned by an adjacent private entity, as a replacement for BC-20. In 2010 DOE canceled the expansion at the Richton site and elected to pursue the purchase of BC-102 from Petrologistics, LLC. In November 2011, DOE acquired BC-102 through land condemnation.

In May 2010, the M&O Contractor commissioned services to conduct a Phase I Environmental Site Assessment of the BC-102 Cavern Site. The assessment was completed in June 2010 and indicated that there were no recognized environmental concerns (RECs) associated with the BC-102 cavern area. The wetland permit application was completed in March 2011 and the permit was received on October 4, 2011. Compensatory mitigation of 4.6 acres was procured from a mitigation bank.

During 2012 the SPR purchased the existing 102 cavern and well, drilled a new well into the existing cavern and connected BC-102 with the existing infrastructure at the BC site. Mechanical Integrity Test (MIT) of the cavern was successfully completed and approval to operate was granted by LDNR. The site completed a 100% construction Readiness Review Board checklist on 11/15/12. The crude oil transfer process began in January 2013 and continued throughout the calendar year where it concluded in December with an inventory of 6.7 million barrels.

2.4.3 Cavern Integrity

Texas Administrative Code (TAC), Title 16, Part 1, Chapter 3, Rule 3.95 (o) (3) requires storage wellhead components and casing to be inspected at least once every 10 years for corrosion,

cracks, deformations or other conditions that may compromise integrity and that may not be detected by the five-year mechanical integrity test. In response, the SPR initiated a multi-sensor caliper program in 2008 to evaluate the condition of the last cemented casing string. In some cases where caliper results showed an irregularity, a downhole camera was run to better define the anomaly. If the anomaly is determined to be structural, plans are made to remediate the issue. The remediation varies depending on the type of anomaly involved. These remediations have been worked in conjunction with state regulatory agencies and in full compliance with the regulatory requirements. Once a cavern is depressured for workover, the wellhead components are taken off and inspected. This work continues in conjunction with the cavern workover and remediation programs. These programs were expanded to include the Louisiana SPR sites in addition to the required Texas sites. During 2014, remediation workovers were performed at Big Hill on well 103B, and at Bryan Mound on wells 4B, 101C, 103C, and 112C.

2.5 DOE Onsite Appraisal

SPRPMO Management Appraisal teams conduct visits to all SPR sites annually to audit environmental compliance and EMS practices. Issues and programs reviewed in FY14 included chemical and waste management, air and water quality, and spill prevention control and countermeasures. There was only one minor environmental finding associated with these assessments.

2.6 Organizational Assessments

The New Orleans M&O Environmental group conducts annual audits at all SPR sites covering compliance with all environmental programs and the EMS. Assessors were independent of the operating sites and were not accountable to those directly responsible for the issues audited. Specific topics are chosen based on current management concerns and the results of previous audits. The M&O identified nine minor deviations from internal requirements and regulations during FY14. Corrective action plans were developed and implemented for all. All audit findings are tracked to completion in the SPR's Assessment Tracking System (ATS).

2.7 Regulatory and ISO 14001 Registrar Inspections/Visits

There were ten inspections or visits by or on behalf of regulatory agencies and the ISO 14001 certification body to SPR facilities in 2014. These visits are summarized in Table 2-4. The visits are usually conducted on a routine basis by the regulatory agencies to ensure compliance or to address concerns regarding activities at the SPR facilities. The ISO 14001 registrar's visit was a surveillance audit to validate the SPR's environmental management system is in compliance with the ISO14001 standard. Although there were five minor nonconformances identified, corrective actions were immediately put into place and all findings were successfully closed. The M&O maintains ISO14001 registration.

Table 2-4 Summary of Regulatory & Third-Party Inspections/Visits in 2014

Site	Organization	Remarks
BC	US Coast Guard	Emergency Response Exercise
	ISO 14001 CB	Surveillance audit conducted – Certification remains in effect.
BH	TGLO	Annual Oil Spill Prevention and Response audit conducted, and site passed.
	TCEQ	Potable Water System Audit. Site passed and no findings
BM	TGLO RRC US Coast Guard	Annual Oil Spill Prevention and Response Audit
	ISO 14001 CB	Surveillance audit conducted – Certification remains in effect.
NO	ISO 14001 CB	Surveillance audit conducted – Certification remains in effect.
ST	NASA	Environmental and Safety Inspections. No Findings.
WH	ISO 14001 CB	Recertification audit conducted. Granted certification.
	LDEQ US Coast Guard	Emergency Response Exercise

2.8 EISA S432 Energy/Water Survey at Bryan Mound

Section 432 of the Energy Independence and Security Act (EISA) of 2007 requires that each Federal installation complete comprehensive energy and water audits of 25% of its covered facilities each year. According to EISA, "covered facilities" include buildings, installations, structures, or other property owned operated, constructed, or manufactured and leased to the Federal Government for which the cost of utilities is paid by the Federal Government, and that constitute at least 75% of facility energy use at each agency.

For FY 2014, the second year of the current four-year cycle, the M&O contractor chose to evaluate the Bryan Mound storage site. As defined by the "Energy Savings Assessment Training Manual" (a publication of DOE's Office of Energy Efficiency and Renewable Energy), the M&O contractor conducted a Type I audit – a walk-through survey – to identify readily observable problem areas and possible opportunities for conserving energy and water. Two M&O contractor ES&H personnel managed the survey and were assisted by four site personnel. Numerous other site personnel were interviewed. The review included site buildings and processes that use energy and water, relative to mission operation.

The survey evaluated 14 buildings and the crude oil, brine, and raw (fire) water processes. A total of 90,314 SF of buildings and processes were examined. This included 96% (63,049 SF) of

buildings/processes identified in the DOE Facility Information Management System (FIMS) as being energy-consuming structures. Examining raw water, brine, and crude oil pump pads assured that at least 75% of all areas where energy is used were examined, because process energy consumption dwarfs building-energy consumption.

Based on visual observations made during the survey, a list of 35 potential energy- and water-conservation measures (ECMs and WCMs) was developed, by building and process. Rough cost approximations associated with these conservation measures were also estimated. The following energy and water conservation opportunities were found repeatedly:

- Install occupancy-sensing light switches
- Weather-seal doors
- Install more efficient lighting in buildings and outside for security
- Install light switches where circuit breakers are the sole means of energizing lighting
- Install more efficient plumbing fixtures
- Install insulation above ceiling tiles and seal penetrations in walls
- Upgrade HVAC thermostats allowing set-backs
- Turn off lights and appliances when unneeded

Overall condition of the Bryan Mound site was good. No large wasteful energy and potable water issues were observed, and all personnel interviewed were satisfied with their work area illumination. Newer, more energy-efficient induction technology lamps have been installed in the bay and tool room of Maintenance/Lab Building (Building 210). The survey identified newer and more efficient air-conditioning units installed at the operator's office at the Fire Pump House (Building 242) and one of the Switchgear buildings (Building 274). Bathroom sink fixtures in the Maintenance/Lab Building (Building 210) and the Administration Building (Building 244) are of the push-down type that conserve water (and have been for many years), and aerators were found on most faucets. Substantial potable water conservation measures may be limited to industrial uses at the pump pads and fire system.

3 Environmental Management System

To illustrate its commitment to excellence with regard to environmental management, the M&O operates within an Environmental Management System (EMS) that is third party certified against the International Organization for Standardization (ISO) 14001 standard.

All site personnel receive computer-based ISO 14001 EMS training annually. The training provides an overview of the ISO 14001 standard and the importance of conformity with the SPR's environmental policy and procedures. Several environmental staff members have completed ISO 14001 Lead Auditor certification training allowing them to assist in performing SPR site assessments and due-diligence inspections of disposal and recycling facilities.

3.1 EMS Certification

On May 19, 2000, the EMS was first evaluated by an independent CB accredited by the American National Standards Institute/American Society for Quality (ANSI-ASQ) National Accreditation Board (ANAB) and certified in conformance with the ISO 14001 standard. The EMS was recertified in 2003, 2006, 2009, 2012, and 2015. Between certification and recertification activities surveillance audits are conducted by the CB to evaluate the SPR EMS.

3.2 Integration of EMS with Integrated Safety Management System

DOE delegates responsibility and authority for the environmental component of the Integrated Safety Management System (ISM) to the M&O. The purpose of ISM is to ensure that environmental, safety, and health requirements are an integrated but discernible part of the performance of all work, from the initial planning stage through to feedback and improvement. The SPR EMS Manual formalizes the environmental portion of ISM and defines the scope of the EMS in regard to the elements of the ISO 14001:2004(E) Standard and the requirements of EO 13423, EO 13514, and DOE Order 436.1. Although compliance with ISM does not ensure compliance with the ISO 14001:2004(E) Standard, the M&O has tailored the EMS to comply with both standards.

3.3 EMS Implementation

Conformance of the EMS to the ISO 14001 standard is illustrated through the SPR Environmental Management System Manual. The manual provides descriptions and references to SPR policies, plans, procedures, environmental aspects and impacts and objectives and targets that form the foundation of the EMS. Conformance with and implementation of each of the 17 ISO elements are discussed, as are the environmental management programs conducted in 2012 to achieve environmental objectives. This document is reviewed and revised at least annually.

A brief synopsis of how the SPR EMS conforms to the ISO 14001 standard is provided in Table 3-1.

Table 3-1 Elements of the SPR EMS

Element	Implementation Summary
Environmental Policy	The SPR operates only in an environmentally responsible manner. Top management commits to and directs that all functional levels will: • comply with applicable legal and other requirements to which the SPR subscribes which relate to the environmental aspects of SPR activities, • prevent pollution through design, processes, practices, techniques, materials, products and services so that detrimental environmental impact is reduced or eliminated, and • continually improve environmental performance and sustainability through the EMS. The SPR Environmental Policy is signed and issued by the DOE Project Manager to communicate senior management's (DOE and the M&O) environmental and regulatory priorities and expectations. It is implemented by top management and is applicable to all SPR personnel and those who work on behalf of the SPR. Its scope includes the facilities and pipelines comprising the SPR. Protection of the environment, workers and the public are responsibilities of paramount importance. Environmental protection is integrated into all phases of activity.
Environmental Aspects	The M&O has a procedure to identify the environmental aspects (significant and otherwise) of its activities, products and services within the defined scope of the EMS. This includes the aspects that can be controlled and those that can be influenced taking into consideration planned or new developments, new or modified activities, products and services. Significant environmental aspects are taken into account in establishing, implementing and maintaining the EMS. The following environmental aspects are considered significant: Air emissions Environmental monitoring Fire Green procurement Project Design Waste Spills/Releases Natural resource preservation Cavern integrity Discharges Energy use Aspects of future activities are sought during the environmental review of purchase requests and designs. The design review process provides a mechanism by which new designs are reviewed by the appropriate personnel, including the environmental organization, for adverse environmental effects, compliance, and continuous improvement. The design review process fits together with the National Environmental Policy Act (NEPA) process at the conceptual stage, where new and previously recognized aspects are readily identified. The environmental review addresses compliance, pollution prevention opportunities, and general design or process improvements. Both of these processes provide the overall mechanism by which all projects and other issues are reviewed for their impact on the environment.
Legal and Other Requirements	The applicable legal and other requirements that affect the SPR are described in permits issued by Federal and State agencies and the ES&H Standards List, which is provided in Appendix A1. The standards list is updated quarterly to reflect any necessary changes. Information on pertinent new or changed requirements is disseminated to the M&O subject matter experts (SMEs), affected departments, and appropriate management for review and feedback. If determined to be applicable, the SMEs provide guidance or information to affected departments and appropriate management for implementation.

Table 3-1 Elements of the SPR EMS (Continued)

Element	Implementation Summary
Objectives, Targets, and Programs	Performance measures were tracked by the SPR EMS in FY 2014. A target is established for each objective. Some objectives have two targets, a "minimum" level that all DOE contractors should meet and a more challenging "stretch" level. EMS targets are either identified directly in contract Work Authorization Directives (WADs) as contract objectives or support the WADs, or indirectly through activities required by the DOE Strategic Sustainability Performance Plan (SSPP) to achieve Executive Orders 13423 and 13514. Refer to Tables 5-16 and 5-17 for all SPR institutional and sustainability objectives and targets and activities that support them.
Resources, Roles, Responsibility and Authority	The M&O organizational infrastructure, roles, responsibilities, and authority are defined, documented, and communicated at all levels throughout the organization. The Human Capital department maintains job descriptions for all functions and maintains organizational charts with all positions. Ultimately, the M&O is held responsible by DOE for environmental stewardship at SPR facilities. DOE and M&O subcontracted personnel who work at SPR facilities and those who work on their behalf also comply with the M&O's written environmental protection criteria. The EMS Management Representative is appointed by top management. Each SPR facility has a designated site EMS focal point responsible for communicating and working EMS issues at that facility. Other EMS focal points have been designated by the SPRPMO including security contractors.
Competence, Training and Awareness	The M&O determines training needs for each M&O employee, offers training as appropriate to SPR contractors, and requires training for subcontractors as needed based on activity. The M&O uses several types of training modules and methodologies to educate workers, to achieve or improve worker competency and, subsequently, to improve their awareness and control of the environmental aspects and impacts of their activities and understanding of their roles and responsibilities to support the EMS. Training courses and personnel requirements are available from the Performance Improvement/Training Coordinator at each storage site. In M&O contracts, environmental competency requirements for subcontractors are included in contract boilerplate.
Communication	The M&O communicates issues internally throughout the organization and to DOE and other SPR contractors in numerous ways, such as through telephone, e-mail, letters, meetings, and tailgate discussions. Several procedures are used for communicating internally between organizations and various levels within the SPR and externally between interested parties. Information regarding environmental aspects and the EMS is also communicated verbally in meetings at all levels of management., such as staff and scheduling meetings, readiness, technical, and project reviews, emergency response critiques, and EMS management reviews. Response to external inquiries, including responses to inquiries related to significant environmental aspects, is provided to outside interested parties. The SPR maintains an Environmental Advisory Committee (EAC) as a communications conduit with the general public, environmental, cavern and pipeline engineering, and emergency management communities. Storage sites actively support and participate in emergency response and security activities with their communities such as through Community Awareness Emergency Response (CAER), local emergency planning committees (LEPC), and mutual aid programs. Annually, the M&O prepares this SPR Site Environmental Report that describes SPR environmental activities during the previous year. The report is distributed throughout the SPR as well as to the public (through libraries, media, elected officials, and interested parties).

Table 3-1 Elements of the SPR EMS (Continued)

Element	Implementation Summary
Documentation	Environmental intentions are described at the highest level through DOE's SPR Environmental Policy. The scope of the EMS, its elements, and supporting documents are described in detail in the SPR EMS Manual. Records required by the ISO 14001 standard are maintained in accordance with the M&O's record management system.
Control of Documents	Configuration management dictates that operating procedures and records be controlled. Publications are developed and managed in an electronic document management system. External documents such as various types of externally generated operations/maintenance logistics manuals are also controlled. Instructional and reference documents (both internal and external) that are part of the EMS are located or registered in an electronic web site. Some documents are purposely maintained in hard copy, such as "grab and go" documents that are used in emergencies. Hard copy locations and responsible holders are identified. All controlled documents are approved, revised as necessary, and maintained current.
Operational Control	The M&O has identified and continues to identify those operations and activities that are associated with significant aspects and impacts. Operational controls have been established for activities associated with significant aspects and impacts. These include broad as well as more aspect-specific documents (i.e. procedures and instructions) that address operational activities, planning, scheduling, maintenance, repair, and replacement of SPR equipment. Environmental boilerplate is attached as needed to vendor service and construction contracts to communicate specific requirements and procedures for controlling environmental aspects. Environmental permits provide specific environmental performance criteria that must be met to minimize adverse environmental impacts.
Emergency Preparedness and Response	The M&O is responsible for emergency response on the SPR. The emergency management program is a comprehensive emergency management system program with site-specific emergency response procedures. The emergency management program provides the framework for development, coordination, control, and direction of all emergency planning, preparedness, readiness assurance, response, and recovery actions.
Monitoring and Measurement	DOE requires all DOE contractors have comprehensive and integrated assurance systems for all aspects of operations essential to mission success. These assurance systems identify and address program and performance deficiencies, opportunities for improvement, and provide a means and requirements to report deficiencies to responsible managers and authorities, establish and effectively implement corrective and preventive actions, and share lessons learned across all aspects of operations. The monitoring and measurement requirements for regulatory compliance are described in this annual SPR Site Environmental Report. Internal procedures provide guidance in monitoring and measuring significant aspects and impacts and regulatory and programmatic monitoring of air, surface water, and groundwater at SPR sites. Objectives and targets based on the significant aspects and Executive Orders 13423 and 13514 are reviewed, tracked, and reported to upper management monthly. Process instruments and measurement and other testing equipment are calibrated to support operational control.

Table 3-1 Elements of the SPR EMS (Continued)

Element	Implementation Summary
Evaluation of Compliance	Compliance with legal and other requirements is evaluated annually through a review of the environmental requirements in the ES&H Standards List and through organizational assessments (OAs) at each site. Compliance criteria examined during OAs are based on the environmental requirements identified on the ES&H Standards List. They pertain to water, air, waste, pollution prevention/waste minimization, and management oversight. Data taken to support permit requirements (i.e. water data that are reported on discharge monitoring reports) are evaluated to ascertain compliance with respective permits. Through the contractor assurance system (CAS) DOE requires the M&O to have established, auditable programs and systems. CAS addresses many types of assessments (i.e. from self-, third party, and independent assessments to management walk-throughs), event reporting, worker feedback mechanisms, and issues management (i.e. analysis of causes, identifying and tracking corrective actions, monitoring and closure, and verification of effectiveness). Contractors must annually submit to DOE for approval detailed CAS program descriptions for, among others, environmental, safety and health, safeguards and security, and emergency management – programs that are integrated into the EMS.
Non-conformity, Corrective Action and Preventive Action	The M&O subscribes to DOE's Occurrence Reporting and Processing System to identify, investigate, and correct non-conformances that occur during facility operations and activities. This includes spills and non-compliances with requirements. Operating experience of DOE and DOE contractor organizations is systematically reviewed for lessons learned, and the results are disseminated. This process reinforces the core functions and guiding principles of the DOE Integrated Safety Management System (ISMS) to enhance mission safety and reliability, and it provides mutual integration with the lessons learned requirements of other DOE directives. The SPR participates in the DOE-wide program for management of operating experience (OE) to prevent adverse operating incidents and to expand the sharing of good work practices among DOE sites. Assessment findings are managed and tracked in the Assessment Tracking System (ATS), a computer-based database. ATS is available to personnel throughout the SPR, and each finding/nonconformity entry in the database describes the issue and identifies responsibility for resolution. A corrective action plan is required for each SPR finding/nonconformity and includes, as applicable: 1) remedial action taken, 2) cause of the finding/nonconformity, 3) long-term corrective action planned, and 4) estimated date for completion of the plan. Results of corrected findings/nonconformities are examined during the subsequent assessments to determine the effectiveness of corrective action taken.
Control of Records	The SPR's records management system is based on federal requirements established by the National Archives and Records Administration (NARA). NARA has developed a list of federal records and a general schedule for their disposition. The M&O further defines this schedule in a records and disposition schedule which provides guidance and instruction for the records management program, establishes policy and objectives for records management practices, assigns records management responsibilities at all levels of operations, and identifies and classifies records.

Table 3-1 Elements of the SPR EMS (Continued)

Element	Implementation Summary
Internal Audit	The EMS is audited routinely by the M&O as part of their OAs at each facility. Both the compliance program and environmental management are reviewed extensively during these assessments. The entire scope of the EMS is audited at least annually. Audit plans that include criteria, scope, and audit methods are developed and approved prior to the assessments. Nonconformities are identified and tracked to completion in the ATS. M&O EMS auditors have received ISO internal auditor training prior to conducting such an audit.
Management Review	The Management Review Team is composed of the M&O project manager and Assistant Project Managers. The EMS Management Representative reports on EMS performance to the team to evaluate improvement. Site Directors, site EMS focal points, and the M&O Environmental Director are also invited to participate, DOE and security contractor representation is also included. Management reviews are twice during the year, and all elements of the standard are reviewed at least once annually. Suitability, adequacy, and effectiveness of the EMS are evaluated and voted on by team members at each meeting. Management review is also provided through weekly senior staff meetings, bimonthly project review meetings, quarterly energy efficiency/pollution prevention (E2P2) meetings, semiannual contract performance evaluations, and the M&O Contractor occurrence reporting program.

4 Environmental Radiological Program Information

Radioactive sources at the SPR consist of electrically-generated X-ray that is used in laboratory and security 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 nuclear regulatory agencies (NRC and NNSA) and required notices to employees are posted on each X-ray scanning device and at entry points to rooms containing this equipment.

4.1 Sealed Sources

At the SPR sealed sources of radiation are used for monitoring activities related to the physical properties of crude oil and brine caverns, and pipeline integrity. There were no issues involving sealed sources in 2014.

5 Environmental Program Information

The SPRPMO Environmental, Safety, and Health Division (ESHD) is responsible for development and oversight of the 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. The SPR has had an Environmental Protection Program since its inception in 1978. The SPRPMO has assigned contractual responsibilities for implementation of the program to the M&O contractor. The M&O contractor operates on behalf of DOE with regard to waste classification, representations, shipments, and disposal for all SPR activities. The SPR was the recipient of the DOE Silver Green Buy Award for reaching the Leadership Goal for eight products in five different categories, achieving excellence in Sustainable Acquisition. A summary of the programs and procedures that presently make up the SPR environmental protection program is provided in Table 5-1.

Associated plans that support the SPR environmental program include the Site Emergency Plan (SEP), the M&O contractor's Continuity of Operation Program (COOP) Implementation Plan, site specific Emergency Response Procedures with spill reporting procedures; site-specific SPCC plans; the EMP which incorporates the Ground Water Protection Management Program (GWPMP) plan; and the Pollution Prevention (P2) Plan which includes the SWPPP for each site. The EMP, GWPMP, and the P2 Plan are reviewed and updated annually; the SPCC plans are reviewed and revised as needed or every five years per regulation.

Associated procedures that support the SPR environmental program are located in the M&O contractor's 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

Table 5-1 SPR Environmental Protection Program Components

Programs & Procedures	Description
National Environmental Policy Act (NEPA) Program	Provides a comprehensive environmental review of all projects including purchase requisitions, engineering scopes of work, engineering change proposals, design reviews, and design changes for all SPR activities
Wetland & Floodplain Management Program	Addresses projects that have an impact on Section 404 of the CWA, Section 10 of the Rivers and Harbors Act, and state coastal zone management programs
Inspections, Appraisals, Assessments & Surveillance	Provides regular monitoring to ensure compliance with regulatory and policy requirements
Non-Routine Reporting System	Notification of oil, brine, or hazardous substance spills, and noncompliant effluent discharges, to identify the impact of such spills and discharges on property and the environment, and to comply with regulatory requirements
Routine Reporting Program	Fulfills self-reporting obligations under water, air and waste permits and regulations

Programs & Procedures	Description
Permit Monitoring Program	Ensures compliance with all permit requirements and limitations, onsite operations and maintenance activities
Environmental Monitoring & Surveillance Program	In place to detect any possible influence routine SPR operation may have on surface waters and groundwater on or near SPR sites and to provide baseline data in the event of an environmental upset
Discharge Procedures	Used by SPR sites when releasing liquid from any authorized containment or control system
Environmental Training Program	Ensures that applicable personnel are aware of the SPR EMS, environmental laws and regulations and are proficient in oil and hazardous material spill prevention and safe handling of hazardous waste
Pollution Prevention (P2) Program	Focuses on source reduction, recycling, reuse, affirmative and bio-based procurement, proper disposal of all wastes generated on SPR sites, and other sustainability goals
Underground Injection Control Program (mandated by the Safe Drinking Water Act)	To ensure sound operation of Class II underground wells/caverns for brine disposal or hydrocarbon storage
Regulatory Review Program	Identifies new environmental requirements pertinent to the SPR
Employee Environmental Awards Program	Recognizes activities, initiatives and innovative approaches to environmental management and pollution prevention

Proper operation of the SPR with respect to the environment involves several types of reports and reporting procedures. The M&O contractor provides several reports to, or on behalf of DOE. Table 5-2 contains a comprehensive list of environmental regulations and reporting requirements applicable to the SPR.

Table 5-2 Federal, State & Local Routine Regulatory 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	Texas Commission on Environmental Quality (TCEQ)	Air Emissions Permit	Annual Emissions Inventory Questionnaires
			Air Emissions Permit Special Requirement	Monthly Tank Emissions
Clean Water Act	Wastewater discharges	U.S. EPA, Region VI	NPDES Permit	Quarterly monitoring reports
		LA Dept. of Env. Quality (LDEQ)	Water Discharge Permit	
		Railroad Commission of Texas (RRC)	Water Discharge Permit	
	Spill Prevention, Control and Countermeasures (SPCC)	U.S. EPA, LDEQ	SPCC Plan	Submit existing plan when spills on navigable waters exceed 1000 gals or occur ≥2x in 1 year
	Discharge notification	LDEQ, TCEQ, RRC, U.S. DOT, EPA	Verbal and written notification	Non-permitted discharges over Reportable Quantity
	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.
SPR Environmental Management System (EMS) Manual (ASI5400.55). Section 5.0, Checking and Corrective Action, subsection 5.1 Monitoring and Measurement	Environmental Planning and Monitoring		Environmental Monitoring Plan	Annual revision
			Ground Water Protection Management Program Plan	Annual review (now contained in EMP)
			Site Environmental Report	Annual report
			Performance Indicators	Monthly electronic updates in Score Card data management system and quarterly report
	Waste Management / Pollution Prevention	DOE	Annual Report on Waste Generation and Pollution Prevention Progress	Annual summary of all wastes
SPRPMO Order 451.1D	NEPA Compliance	DOE	NEPA Planning Summary	Annual Report
			EIS Supplement Analysis	As needed
EO 13423 and EO 13514	Affirmative Procurement	DOE	Affirmative Procurement Report	Annual report (combined with EPEAT and Biobased reports)

Regulation, Statute or Directive	Regulated Area	Enforcement Agency	Types of Required Permits, Applications, or Documentation	Routine Reporting Requirements
	Electronic Product Environmental Assessment Tool (EPEAT)	DOE	EPEAT Report	Annual report (combined with Affirmative Procurement and Biobased reports)
	Compliance with Sustainability Goals	DOE	Implementation Report	Quarterly status reports
	Environmental Management Systems (EMS)	DOE	EMS Progress Report	Annual Report
	Annual SPR Site Sustainability Plan (SSP)	DOE	Annual report on progress in meeting goals of EO 13423 and 13514	Annual report
Farm Security and Rural Investment Act of 2002	Procurement	USDA	Biobased Procurement Report	Annual report (combined with Affirmative Procurement and EPEAT reports)
Federal Migratory Bird Act	Disturbance of bird nests	US F&WS	Special Purpose Permit	As requested by USFWS
Miscellaneous State Environmental Regulations	Water withdrawal from coastal areas	TCEQ	Water Appropriation Permit	Annual Usage Report
	Pipeline usage	RRC	Pipeline and Gathering System Certification (T-4C)	Annual Certification
	Operation of relined brine ponds 7&37 BH	RRC	Operate and Maintain Permit, Weekly Leak Detection	Retain on site
	Surveillance of closed brine and anhydrite ponds	LDNR, RRC	Closure agreements, annual ground water monitoring results	Report in SER
National Environmental Policy Act	Review of proposed projects for environmental considerations	CEQ	Environmental Impact statements, Environmental Assessments	Only when not tiered under other EIS or EA.
			Categorical Exclusions	For projects that require consent.
	Inclusion of cooperating agencies in NEPA process	CEQ	Agency participation in NEPA activities to ensure adequate information in the decision-making process	Memorandum, as needed
Oil Spill Prevention & Response Act of 1991	Oil spill response in Texas coastal zone	TGLO	Discharge Prevention and Response Plan	Report spills of oil as required
			Discharge Prevention and Response Facility Cert.	Annual review by agency.
Pollution Prevention Act of 1990	Strategy to incorporate pollution prevention into ES&H goals	EPA, DOE	Pollution Prevention Plan, Waste Min Plan, Waste Mgmt Plan, Stormwater Pollution Prevention Plan	Annual update to Pollution Prevention Plan
Resource Conservation and	Hazardous waste generation and	LDEQ	Annual Generators Report	Annual report to agency

Regulation, Statute or Directive	Regulated Area	Enforcement Agency	Types of Required Permits, Applications, or Documentation	Routine Reporting Requirements
Recovery Act	disposal		LA Notification of HW Activity	New waste stream, change in generator status
			LA Uniform HW Manifest	Complete and submit form with disposal
		RRC	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, RRC	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	Complete for documentation
			Weekly waste inspection form	Complete for documentation
	Affirmative Procurement	EPA	Affirmative Procurement Report	Annual Report (combined with EPEAT and Biobased reports)
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
		RRC	Brine Injection Permit (H-10)	Annual Disposal/ Injection Wells Reports

Regulation, Statute or Directive	Regulated Area	Enforcement Agency	Types of Required Permits, Applications, or Documentation	Routine Reporting Requirements
		TCEQ	Weekly disinfectant residual concentration (BM and BH) Monthly total coliform test (BM and BH) Annual disinfectant and disinfectant by-products test (BM) Lead and copper test	Quarterly to agency Retain results on site Submit to TCEQ Frequency based on past test result
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 Texas Department of State Health Services Tier II Chemical Reporting Program Mississippi Emergency Management Agency	Title III, Tier II	Annual Inventory Report Annual Inventory Report Title III, Tier II
	Reporting of discharges of all listed hazardous materials	EPA	Toxic Release Inventory, Form R	Complete and submit form when threshold exceeded

5.1 Environmental Program Permits

The active environmental permits required by regulatory agencies to construct, operate, and maintain the SPR are discussed by site. The SPRPMO negotiated a 20-year 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 concurrent with their lease.

There are no permits for the Stennis Warehouse facility. A Certificate of No Exposure, declaring that all activities are conducted in a manner that will not expose potential pollutants to stormwater, was approved by the MDEQ in lieu of operating under a multi-sector general permit. The five-year cycle Certificate of No Exposure to stormwater was successfully renewed, as required, in June 2014, prior to a July expiration date. Air emissions from Stennis Warehouse operations are *de minimus*, requiring no permitting or reporting activity.

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

LDEQ has primacy for the NPDES program in Louisiana that includes responsibility for all compliance and enforcement actions relating to the discharge of water in Louisiana. The LDEQ-issued general stormwater permit coverage remained in-force throughout 2014 for WH and for BC a combination of LCGP and MSGP coverage remains in force.

In Texas the RRC does not have primacy for the NPDES program; BH and BM operate under parallel EPA and RRC discharge permits. In addition to supplying renewal applications in 2013 for the NPDES permits expiring in 2014, the two Texas SPR sites also operated under authority granted with Statewide Rule 8 water discharge permits issued by the RRC. Both the EPA permits and the RRC permits were renewed in 2014 in order to maintain alignment , and all became effective on November 1, 2014.

The air permits for the SPR facilities are administered by the LDEQ in Louisiana and the TCEQ in Texas. There were no SPR air permits modified, renewed, or new air permits obtained from LDEQ or TCEQ in 2014. All SPR air permits are current.

5.1.1 Bayou Choctaw Permits

Bayou Choctaw permits are listed in Table 5-3. 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. BC operates under the water and air programs delegated to Louisiana by EPA.

The site's security perimeter "clear sight zone" authorized and implemented by the NODCOE in the summer of 2006 was maintained by site personnel throughout 2014. This permit was modified to allow for the annexation of and construction work to the cavern 102 well pad. Additional appurtenances included a temporary personnel escape bridge and temporary ditch and ring levee during well construction.

Table 5-3 Bayou Choctaw Environmental Permits

PERMIT NUMBER	ISSUING AGENCY	PERMIT TYPE	EFFECTIVE DATE	EXPIRATION DATE	COMMENTS
LAG480540	LDEQ	LPDES	8/15/11	11/31/15	(1),(2)
1280-00015- 02	LDEQ	Air	12/2/99	Open	(3)
None	LDNR	Injection	01/11/83	Open	(4)
LMNOD-SP (Bull Bay) 3	COE	Constr. & Maintain	01/30/79	- *	(5)
LMNOD-SP (Iberville Parish Wetlands) 7	COE	Constr. & Maintain	09/26/77	-	(6)
LMNOD-SP (Iberville Parish Wetlands) 10	COE	Constr. &Maintain	06/12/78	-	(7)
LMNOD-SP (Iberville Parish Wetlands) 17	COE	Constr. & Maintain	11/06/78	-	(8)
LMNOD-SP (Iberville Parish Wetlands) 31	COE	Constr. & Maintain	05/27/80	-	(9)
LMNOD-SP (Iberville Parish Wetlands) 102	COE	Constr. & Maintain	09/26/77	-	(10)

PERMIT NUMBER	ISSUING AGENCY	PERMIT TYPE	EFFECTIVE DATE	EXPIRATION DATE	COMMENTS
WN-20-020-0168	COE	Constr. & Maintain	04/02/02	-	(11)
WT-20-020-2654	COE	Constr. & Maintain	08/20/02	-	(12)
WT-20-020-3621	COE	Constr. & Maintain	09/17/02	-	(13)
LMNOD-SP (Bayou Plaquemine)	COE	Constr. & Maintain	09/26/77	-	(14)
CT-20-030-1379-0	COE	Constr. & Maintain	03/12/03	-	(15)
CT-20-030-1501-0	COE	Constr. & Maintain	03/28/03	-	(16)
CT-20-030-3087-0	COE	Constr. & Maintain	07/25/03	-	(17)
MVN-2004-4453-CT	COE	Constr. & Maintain	10/14/04	-	(18)
MVN-2003-2234-CT	COE	Constr. & Maintain	02/2/06 Mod 10/4/11	-	(19)

* COE permits remain active for the life of the structure.

(1) LDEQ cancelled the LPDES converted permit LA0053040 and LA MSGP permit LAR05M577 replacing both with a single Light Commercial Facility (LCF) general permit LAG480540.
(2) The state's LPDES LCF general permit (LAG48000) was renewed 1DEC11 and discharge authority was given to BC on 15AUG11 after review of a full NOI from March. The former BC LCGP permit number remained intact.
(3) Site air operating permit modified 12/99
(4) Letter of financial responsibility to plug and abandon injection wells.
(5) Maintain Bull Bay 24" brine disposal pipeline recorded with applicable Registrar of Deeds.
(6) Construct and maintain well pads (brine disposal wells).
(7) Enlarge existing well pads and construct access roads (brine disposal wells 1, 2, & 3.)
(8) 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.
(9) 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" petroleum products pipeline under and across Bayou Plaquemine
(16) Install and maintain a replacement N-S bridge for an existing, permitted N-S bridge on the Main Site. Activity authorized under NWP-3; provides a construction period until 3/12/2005.
(17) Install and maintain a replacement brine disposal access road bridge for an existing permitted structure on the brine disposal access road. Activity authorized under NWP-3, provides a construction period until 3/28/2005.
(18) Install and maintain a bulkhead and fill for bank stabilization in the North-South Canal on the Main Site. Activity authorized under NWP-13 providing a construction period until 7/25/2005.
(19) Install and maintain refurbished Bailey Bridge crossing over Wilbert's Canal via NWP14, providing construction period for 2 years.
(20) Implement and maintain an expanded clear sight security perimeter zone. Requires compensatory mitigation and long-term oversight of the mitigation bank sites. Modified to include the acquisition of BC 102 and development of clear zone and cavern pad. Included compensatory mitigation via wetland mitigation bank credit purchases.

5.1.2 Big Hill Permits

Big Hill permits are listed in Table 5-4. In 2014, the site appropriated 0.375 million m^3 (303.96 acre-feet) of water from the Intracoastal Waterway (ICW) exclusive of water for fire protection. This represents 1.01 percent of the current revised total allowable withdrawal for a year. The certified annual report of water usage was forwarded to the TCEQ as required in 2014.

The M&O contractor is registered with TCEQ as a Public Water System Operations Company (registration # WC0000073) since BH provides sanitary control of their purchased water distribution system on-site. This three-year registration was successfully renewed in May 2011. In addition, the M&O contractor is also registered as a Waste Water Operations Company (registration #OC0000067) which was successfully renewed in 2012 for a three-year period.

Required annual reporting for 2014 involved the performance of a brine line integrity test sent to Region 6 EPA, raw water usage to TCEQ; and crude oil pipeline system operations renewal (T4C) to the RRC.

Table 5-4 Big Hill Environmental Permits

PERMIT NUMBER	ISSUING AGENCY	PERMIT TYPE	EFFECTIVE DATE	EXPIRATION DATE	COMMENTS
TX0092827	EPA	NPDES	11/01/14	10/31/19	(1)
NOT	EPA	NPDES	1/17/09	none	(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	01/11/08	01/10/2018	Site Air Permit
PBR 100485	TCEQ	Air	01/24/12	Open	Cavern Leaching
PBR 107009	TCEQ	Air	02/20/13	Open	Frac Tanks for Workovers
02939	RRC	Operate	11/28/83	Open	(6)
UHS-006	RRC	Water Discharge.	11/01/14	10/31/19	(7)
4045A	TNRCC	Water Use	11/14/83	Open	(8)

(1) Renewal submitted June 2013. Accepted as administratively complete January 2014; comments to draft permit made June 2014; final permit issued September 2014, effective 11/1/2014.
(2) NPDES coverage for Stormwater Associated with Industrial Activity was written into the individual permit TX0092827, as a result the former Multi Sector General Permit (MSGP) coverage was terminated with a Notice of Termination instrument.
(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. Dredging clause is allowed to lapse due to no RWIS dredging needed before expiration indicated above. Shall be renewed with next maintenance dredging activity/project.
(5) Completion of pipeline construction extended. (48" Brine Pipeline)
(6) Permits to create, operate, and maintain an underground hydrocarbon storage facility consisting of 14 caverns.
(7) Corresponds to TX0092827 (EPA-NPDES). Amendment request filed October 2014, early renewal in order to coincide with EPA renewal effective 1NOV14. Permit language corresponds to EPA permit and with same effective date.
(8) Permit amended in 1990 to allow for annual diversion of no more than 117,291 ac 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 acre/ft per year. Maximum Diversion Rate (MDR) 175 cubic feet per second (CFS).

5.1.3 Bryan Mound Permits

Bryan Mound permits are listed in Table 5-5.

The BM site has a permit from TCEQ 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 2014, the site used a total of 0.003 million m^3 (3.68 acre-feet) of water

from the Brazos River Diversion Channel, representing 0.007 percent of the annual water usage authorized. The certified annual report of water usage was forwarded as required in 2014.

Required annual reporting for 2014 involved the successful brine line integrity test to Region 6 EPA, raw water usage to TCEQ; and crude oil pipeline system operations renewal (T4C) to the RRC.

The M&O contractor is registered with TCEQ as a Public Water System Operations Company (registration # WC0000073) since BM provides sanitary control of their purchased water distribution system on-site. In addition, the M&O contractor is also registered as a Waste Water Operations Company (registration #OC0000067) which was successfully renewed for a three-year period in 2012.

Table 5-5 Bryan Mound Environmental Permits

PERMIT NUMBER	ISSUING AGENCY	PERMIT TYPE	EFFECTIVE DATE	EXPIRATION DATE	COMMENTS
TX0074012	EPA	NPDES	11/01/14	10/31/19	(1)
NOT	EPA	NPDES	1/17/09	None	(2)
SWGCO-RP-12347 (03), repl. by SWG-2006-2568	COE	Constr & Maintain	02/22/78	Dredging clause open to 12/2017	(3)
3681A	TNRCC	Water Use	07/20/81	Open	(4)
UHS-004	RRC	Water Disch	11/01/14	10/31/19	(5)
82-8475	TDH&PT	Constr.	01/01/83	Open	(6)
SWGCO-RP-11666	COE	Constr. & Maintain	10/15/77	- *	(7)
SWGCO-RP-12112	COE	Constr. & Maintain	07/25/77	-	(8)
SWGCO-RP-12062 (03)	COE	Constr. & Maintain	10/10/78	-	(9)
SWGCO-RP-14114 (01)	COE	Constr. & Maintain	05/18/85	-	(10)
SWGCO-RP-16177	COE	Constr. & Maintain	09/07/82	-	(11)
SWGCO-RP-13435 (01)	COE	Constr. & Maintain	05/21/79	-	(12)
04994	RRC	Operate	08/01/00	Open	(13)
6176B	TCEQ	Air	05/31/13	05/31/23	Site Air Permit
PBR 100484	TCEQ	Air	01/24/12	Open	Cavern Leaching
PBR regulations	TCEQ	Air	05/13/13	Open	Frac Tanks for Workovers

* COE permits remain active for the life of the structure.

(1) Renewal submitted June 2013. Accepted as administratively complete January 2014; comments to draft permit made J8ne 2014; final permit issued September 2014, effective 11/1/2014.
(2) NPDES coverage for Stormwater Associated with Industrial Activity was written into the individual permit TX0074012, as a result the former Multi Sector General Permit (MSGP) coverage was terminated with a Notice of Termination instrument.
(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. A renewed Extension of Time (EOT) re-authorized maintenance dredging for a ten year period effective July10, 2007.
(4) Permit expires at project end, covers 52,000 ac/ft/yr and MDR of 130 CFS per 2001 amendment.
(5) Corresponds with TX0074012 (EPA-NPDES). Renewal submitted 12/15/2008; RRC acted on permit in mid March2009, effective 4/1/09.
(6) Corresponds with SWGCO-RP-16177.
(7) For 30" crude oil pipeline to 3 miles SW from Freeport
(8) For 30" crude oil pipeline to 2 miles S from Freeport
(9) For 36" brine disposal pipeline & diffuser. Revision/amendment (01) deleted special condition (a) requiring maximized deep

well injection; (02) approved construction of 24" replacement pipeline and diffuser in January 12, 1993. (03) Added the offshore additions the new integrity test method.

(10) General permit for pipeline crossings by directional drilling in navigable waters
(11) Place an 8" water line (PVC, potable)
(12) For construction of cavern pads 101, 102, 103, 111, and 113 in wetlands. Mod.01 added access road and fill placement for DCS-2.
(13) Pipeline distribution system registration to operate crude oil lines. Renewed annually with T-4C.

5.1.4 West Hackberry Permits

West Hackberry permits are listed in Table 5-6.

WH authority to discharge wastewater from two named outfalls with an individual LPDES permit remained in full force during 2014, with the remainder of the retained stormwater held and released from secondary containments and the site's stormwater associated with industrial activity covered under a state MSGP renewed in 2011, and as addressed in the site's current SWPPP maintained throughout the year. The Degas Unit was moved from the BM site to the WH site and became fully operational in August 2014, with two outfalls of a similar nature consisting of retained stormwater being added to the existing coverage and SWPPP.

No construction activities, requiring permits review, authorization or permitting agency activity occurred in jurisdictional wetlands during 2013. A single maintenance notification for repair of a traveling screen associated with the site's RWIS was made as required per the standing wetlands permit for the structure situated on the south shore of the ICW north of the WH site.

Table 5-6 West Hackberry Environmental Permits

PERMIT NUMBER	ISSUING AGENCY	PERMIT TYPE	EFFECTIVE DATE	EXPIRATION DATE	COMMENTS
LA0053031	LDEQ	LPDES	11/1/10	10/31/15	(1)
LAR05M559	LDEQ	LPDES	05/27/11	5/4/16	(2)
LMNOD-SP (LTCS) 26	COE	Constr.& Maintain	02/08/79	-	(3)
LMNOD-SP (Black Lk) 31	COE	Constr.& Maintain	10/26/82	-	(4)
LMNOD-SP (Black Lk) 43	COE	Constr.& Maintain	07/26/84	-	(5)
LMNOD-SP (Gulf of Mexico) 2574	COE	Constr.& Maintain	08/11/80	-	(6)
LMNOD-SE (LTCS) 40	COE	Constr.& Maintain	05/25/88	-	(7)
LMNOD-SP (Cameron Parish Wetlands) 162	COE	Constr. & Maintain	03/09/78	-	(8)
None (Letter)	LDNR	Injection	01/11/83	Open	(9)
971198-9	LDNR	Injection	09/27/83	Open	(10)
0560-00019-04	LDEQ	Air	2/20/12	Open	Site air permit (includes degas plant)
SWGCO-RP-12342	COE	Constr. & Maintain	03/28/78	-	(11)
LMNOD-SP (Cameron Parish Wetlands) 152	COE	Constr. & Maintain	03/16/78	-	(12)
LMNOD-SP (Cameron Parish Wetlands) 276	COE	Constr. & Maintain	02/11/80	-	(13)

PERMIT NUMBER	ISSUING AGENCY	PERMIT TYPE	EFFECTIVE DATE	EXPIRATION DATE	COMMENTS
WN20-000-3972-0	COE	Constr. & Maintain	8/31/00	-	(14)
WO-20-020-1136	COE	Constr. & Maintain	01/25/02 02/19/02	-	(15)
WO-20-020-3607	COE	Constr. & Maintain	10/23/02	-	(16)
WW-20-030-3748	COE	Constr. & Maintain	10/22/03	-	(17)
MVN-1997-00068 WW	COE	Constr. & Maintain	4/29/2009	4/29/2014	(18)

(1) LDEQ obtained primacy and issued an LPDES permit with former NPDES number, effective 11/1/2004. Renewal application processed in April 2009, found administratively complete, and finalized in 2010 for a five-year term.
(2) LPDES Multi-Sector General Permit (MSGP) coverage for Stormwater 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. State renewed authority for the MSGP became effective 5/1/2006; a re-instatement letter effective 5/27/2006 replaced the expired coverage with the new MSGP authority (and conditions) maintaining existing permit number for a five-year state renewal cycle.
(3) Construct and maintain RWIS and 42" raw water pipeline. Modified in 1998 to add the recirculation system discharge point; and in 2006, programmatic general Category II permit MVN-2006-1387-WY was issued for RWIS maintenance modifications and for the 48" replacement pipeline; carries consistency determination C20060053 from LDNR.
(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); offshore brine line and diffuser remains inactive.
(7) Permit to construct and maintain 36" crude oil pipeline from site to Texoma/Lake Charles Meter Station (LCMS).
(8) Permit to maintain 42" crude oil pipeline.
(9) Letter of financial responsibility to close all injection wells on this site. Still active
(10) Approval to construct and operate wells 117A and B.
(11) For 42" crude oil pipeline crossings of waters & waterways in Texas
(12) For brine disposal wells, well pads, and brine disposal pipelines, (12", 20", & 24")
(13) For well pads, levees, and access roads (Wells 110, 111, 112, 113, 114, & 115)
(14) Category I programmatic general permit. Repair exposed 42" crude oil pipeline.
(15) Restore riprap along the north perimeter dike adjacent to Cavern 6 and Black Lake. Permit authorized a construction period until 1/25/2007.
(16) Deposit fill in the fire ditch. Permit authorized a construction period until 10/23/2007.
(17) Modifications to the existing Boat Ramp; and, re-establishment of the erosion control breakwater in Black Lake along the north side of the site. Authorizes construction period until October 31, 2008 and includes an associated Water Quality Certification and Federal Consistency Determination for the activity.
(18) Time extension granted for maintenance dredging at the RWIS for five-year period commencing with the date of the letter response; carries consistency determination C20090198 from LDNR.

5.2 Air Quality

Air pollutants of concern emitted by the SPR sites are either hazardous or have an impact on the ambient air quality. Benzene, toluene, ethyl benzene, and xylene are HAPs that are emitted in relatively small quantities and do not trigger HAP reporting. The non-hazardous pollutants that have an impact on air quality are non-methane/non-ethane VOCs, 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.

Monitoring for air pollutants consists of monitoring processes and calculating the volume through the use of acceptable industry practices. These results are compared to the permitted limits to ensure that they are in compliance. 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 ponds/brine tanks;
- number of piping components that emit over the acceptable regulatory limits by monitoring all components with an OVA.

Monitoring for air pollutants is conducted at both Texas and Louisiana sites. The results are reported to the Texas state agency through EIQs. The Louisiana 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 BC and WH are not reported, they are used to determine ongoing compliance with the permit and assure adequate performance of emission control equipment.

In addition, air pollution control equipment monitoring is performed at SPR sites. Air regulations require that 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. The BH and BM sites each have an external floating roof tank that requires inspection of the primary (every five years) and secondary (semi-annual) seals. The two internal floating roof tanks at BM have a mechanical shoe seal that requires seal inspections every year.

5.2.1 Bayou Choctaw

Located in a marginal nonattainment area for ozone, BC is permitted to emit 7.4 metric tons per year (tpy) (8.14 tpy) of VOC. Since this site emits less than nine metric tpy (10 tpy), it is not required to submit an emissions inventory summary (EIS) to report its annual emissions. Although BC is exempt from reporting emissions, monitoring was conducted in 2014 on all permitted sources. These sources include the volume of crude oil in slop tanks and frac tanks, volume of brine flowing through the brine pond, fugitive emissions from monitoring piping components for acceptability, and monitoring the run-time of the emergency generators. BC operated in accordance with all air quality regulatory requirements in 2014. Table 5-7 provides a summary of the permitted limits and actual emissions for BC.

Table 5-7 Parameters for Bayou Choctaw Emission Points

Emission Point Description	Parameter	Permit Limits Metric tpy (tpy)	Actual Emissions Metric tpy (tpy)
Crude & Slop Oil Tanks	VOC	2.43 (2.67)	0.24 (0.26)
Gasoline Fuel Tank	VOC	0.52 (0.57)	0.17 (0.18)
Frac Tanks	VOC	1.42 (1.56)	0.02 (0.02)
Brine Pond	VOC	1.14 (1.26)	0.01 (0.01)
Fugitive Emissions	VOC	1.66 (1.83)	0.05 (0.06)
Air Eliminator	VOC	0.04 (0.04)	0 (0)
Emergency Generators/Pumps	VOC PM_{10} SO_2 NOx CO	0.19 (0.21) 0.18 (0.20) 0.72 (0.79) 5.54 (6.09) 1.26 (1.39)	0.03 (0.03) 0.03 (0.03) 0 (0) 0.43 (0.47) 0.09 (0.10)

5.2.2 Big Hill

Located in an ozone attainment area, BH is permitted to emit 25.81 metric tpy (28.39 tpy) of VOC. BH is required to use an EIQ to report its annual emissions if requested by TCEQ. Monitoring was conducted in 2014 on all permitted sources, such as the volume of crude oil in slop tanks, frac tanks, and surge tanks; volume of brine into the brine pond; and monitoring the run-time of the emergency generators. BH operated in accordance with all air quality regulatory requirements in 2014. Table 5-8 provides a summary of the permitted limits and actual emissions for BH.

Table 5-8 Parameters for Big Hill Emission Points

Emission Point Description	Parameter	Permit Limits Metric tpy (tpy)	Actual Emissions Metric tpy (tpy)
Crude & Slop Oil Tanks	VOC	1.45 (1.60)	0.75 (0.82)
Gasoline & Diesel Fuel Tanks	VOC	0.35 (0.39)	0.19 (0.21)
Frac Tanks	VOC	10.04	1.22 (1.34)
Brine Pond	VOC	11.97 (13.15)	0.07 (0.08)
Fugitive Emissions	VOC	2.59 (2.86)	0.10 (0.11)
Air Eliminator	VOC	0.07 (0.08)	0 (0)
Solvent Recycler	VOC Acetone	0.01 (0.01) 0.01 (0.01)	0 (0) 0 (0)
Emergency Generators/Pumps	VOC PM_{10} SO_2 NOx CO	0.10 (0.11) 0.09 (0.10) 0.64 (0.70) 2.30 (2.54) 0.53 (0.58)	0.01 (0.01) 0.01 (0.01) 0.01 (0.01) 0.20 (0.22) 0.05(0.05)

5.2.3 Bryan Mound

Located in a marginal non-attainment area for ozone, BM is permitted to emit 12.38 metric tpy (13.62 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. Monitoring was conducted in 2014 on all permitted sources. These sources include the volume of crude oil in slop tanks, frac tanks, one external floating roof tank and one internal floating roof tank; volume of brine into the brine tank; and monitoring the run-time of the emergency generators. BM operated in accordance with all air quality regulatory requirements in 2014. Table 5-9 provides a summary of the permitted limits and actual emissions for BM.

Table 5-9 Parameters for Bryan Mound Emission Points

Emission Point Description	Parameter	Permit Limits Metric tpy (tpy)	Actual Emissions Metric tpy (tpy)
Crude & Slop Oil Tanks	VOC	8.52 (9.37)	3.11 (3.42)
Gasoline & Diesel Fuel Tanks	VOC	0.38 (0.42)	0.32 (0.36)
Frac Tanks	VOC	25.0	0 (0)
Brine Tank	VOC	4.92 (5.42)	0.30 (0.33)
Fugitive Emissions	VOC	0.89 (0.98)	0.08 (0.09)
Paints & Solvents	VOC	0.62 (0.68)	0.07 (0.08)
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)	0.25 (0.28) 0.27 (0.29) 0.03 (0.03) 8.69 (9.56) 1.99 (2.19)

5.2.4 West Hackberry

Located in an ozone attainment area, WH is permitted to emit 49.03 metric tpy (53.93 tpy) of VOC. Since the site emits less than 90.8 metric tpy (100 tpy), it is not required to submit an EIQ to report its annual emissions. Although WH is exempt from reporting emissions, monitoring was conducted in 2014 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 fugitive emission acceptability, degas plant emissions and monitoring the run-time of the emergency generators. WH operated in accordance with all air quality regulatory requirements in 2014. Table 5-10 provides a summary of the permitted limits and actual emissions for WH.

Table 5-10 Parameters for West Hackberry Emission Points

Emission Point Description	Parameter	Permit Limits Metric tpy (tpy)	Actual Emissions Metric tpy (tpy)
Slop Oil Tanks & Sump	VOC	1.92 (2.11)	0.19 (0.21)
Gasoline Fuel Tank	VOC	0.73 (0.81)	0.41(0.45)
Frac Tanks	VOC	23.85 (26.29)	4.52 (4.97)
Brine Tanks	VOC	20.20 (22.22)	0.65 (0.71)
Fugitive Emissions	VOC	0.12 (0.13)	0.10 (0.11)
Air Eliminator	VOC	0.06 (0.07)	0 (0)

Emergency Generator/Pump	VOC PM_{10} SO_2 NO_x CO	0.25 (0.28) 0.25 (0.27) 1.11 (1.22) 8.31 (9.14) 1.90 (2.09)	0.01 (0.01) 0.01 (0.01) 0 (0) 0.45 (0.50) 0.10 (0.11)
Degas Plant	VOC PM_{10} SO_2 NO_x CO	1.39 (1.53) 1.26 (1.39) 0.35 (0.39) 13.89 (15.31) 17.52 (19.31)	0.06 (0.07) 0.10 (0.11) 0.02 (0.02) 1.37 (1.51) 1.65 (1.81)

5.3 Site Hydrology, Ground Water Monitoring & Public Drinking Water Protection

Ground water monitoring is performed at all 4 SPR sites to comply with the SPR Environmental Management system (EMS) Manual (ASI5400.55), and also in the case of the WH site, a state agency agreement. Salinity is measured and the potential presence of hydrocarbons is screened at all sites using TOC as an indicator. In addition, pH and temperature are taken along with the physical attribute depth to water for each well at each sampling episode. The overall monitoring scheme performed at West Hackberry is governed by an agreement between DOE and the LDNR to report annual ground water monitoring data through this document. At the Weeks Island, Louisiana site, long-term ground water monitoring has been accepted as complete as part of the state approved decommissioning plan. BM ground water quality is conveyed for a pond closure annually to the RRC via copy of this report. Wells surrounding the operating brine storage and disposal pond system at BH monitor groundwater as part of permit required leak detection. The St. James terminal has undergone and completed a remediation to satisfy state criteria for some limited historic crude oil leakage there and because follow-on studies indicated no further action required; no permanent ground water monitoring well system is indicated for the leased facility**.**

Available ground water salinity data collected for the past five years are presented graphically (Appendix C), 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 Y-axis has been standardized with appropriate exceptions noted at either the 0–10 ppt or 0–100 ppt as the baseline dependent upon the historical range, providing easier comparisons among the monitoring stations.

Three of the storage sites have a long history of industrialized development primarily involving the mining of salt and associated minerals that were used for various purposes and as feedstock. A 10 ppt cut-off for salinity is used in this report for making comparisons for assessing affected and unaffected waters. This is not a regulatory limit but rather a value, given the setting, which represents usable versus unusable water. At BM, however, because of its particular site specific and historic mining conditions, a 20 ppt cut-off is employed for evaluating the generalized ambient shallow ground water conditions there.

5.3.1 Bayou Choctaw

The Plaquemine Aquifer, the main source of fresh water for the site through an Iberville Parish public connection and several surrounding municipalities, 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 sediment in the aquifer consists predominantly of Atchafalaya clay. The interface of freshwater

and saline water occurs at a depth of 122 to 150 m (400-500 ft) below the surface on the dome. Ground water levels in the Plaquemine Aquifer are said to respond locally with the Mississippi River, flowing away from it during the high river stage and towards the river when in the low stage. Other, more predominant, local influences to the general site-wide flow patterns are manifested by structural features.

Historically, there have been four monitoring wells (BC MW1, BC MW2, BC MW3, and BC MW4) surrounding the brine storage pond at BC (Figure C-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. Seven additional similarly screened wells were installed at various locations around the main site, and one off site near a selected brine disposal well pad. BC PW3 was plugged and abandoned in the original Verification Well Study (VWS).

These periphery wells (PWs) 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 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 of the ground water movement within the shallow monitored zone. For BC 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 (Figure C-2).

Ground water salinity observed at all of the four pond wells (BC MW1 through BC MW4, Figure C-3) has historically been above an ambient cut-off concentration of 10 ppt, somewhat high for a fresh water environment. This condition of elevated salinity is attributed to a previous owner’s salt water brine operational activities and possibly some more recent brine handling activities. Four of these wells (BC MW1, BC MW2, BC MW3, and BC MW4) exhibit 2014 traces this year that are all below the 10 ppt cut-off. Of these four wells, BC MW2, BC MW3 and BC MW4, have shown brief excursions above 10 ppt in the 2011 to 2012 timeframe. 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. Well BCMW3 continues to freshen indicative of the passing of a small saltwater plume from an historic brine piping release. BC MW1 shows a declining five-year trace, having all of its measured values well below 10 ppt. This year after a long multi-year decline to below the 10 ppt cut-off, well BC MW2 began showing large salinity fluctuations (spikes and declines) returning, at times, to its historic highs, Well BC MW2 after showing historic high measurements in two of the four quarters of 2011, has dropped below 10 ppt for 2012, 2013 and 2014, indicating that this position, just downgradient of the operating pond is free and clear of any salt effects.

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 a historic somewhat elevated overall salinity concentration, but the recent long-term time-series trending reflects a downward trace similar to BC MW3. This trace began to change late in 2010 and continued into 2011 with wild swings in an overall upward trending appearance. This year's salinity measurements in these wells has moderated and returned to low levels.in each. Such swings have been observed in the past. Much of the variability exhibited with the earlier data may have resulted from over purging and inconsistently applied sampling techniques. However, use of low-flow sampling has aided the ground water testing by assuring more representative sampling

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 and to the north. A north-south trending ground water divide is evident in the water level contouring, being controlled by a sink that has formed along the western edge of the site and in response to low water levels measured in the most easterly wells BC MW3 and BC MW4.

Long-term salinity trends have been tracked which, when examined within the context of the radial ground water movement, assist in identifying possible areas of or sources of salt water contamination. The 2014 keynote observation is the continued muting (or absence) of the large salinity swings historically prominent and as a result the 5-year traces are observed to flatten in appearance across the site. Even so, with such slow ground water movement being applied to a series of salinity values mostly below 10 ppt, small fluctuations can often cause the five-year trends to change direction (flip-flop) with a single year's data addition. With the large swings absent in most of the wells this year, we also see a pattern of more flattened traces in the salinity data.

Well BC MW1, up gradient of the brine pond, after exhibiting a flattened 5-year trace through 2012, and with some swings in 2013, ending with a freshening trace persisting into the first quarter of 2014, now reveals a general upward trend although all of its measurements remain below 10 ppt. Well BC MW2, the intercept well immediately down gradient of the brine pond reveals a muted increasing five-year trace resulting from a return to lower salinities versus the wild swings experienced in 2011. The well is showing long-term lower salinity values evident throughout the calendar year all below 10 ppt since the 2011 swings. This well shall continue to be observed closely because of its downgradient position of the pond, but the lower numbers commencing in 2012 and persisting with BDL values for three years, keep the well off the identified site "watch list."

Periphery well BC PW2 monitors an area of historical residual surface soil salt impact that affects shallow ground water and this year's five-year trace continues to indicate a steady improving or freshening trend from 40 ppt to below 30 ppt. This area is 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 now exhibiting an essentially stable and decreasing trend. The slightly decreasing five-year trend varying around the 10 ppt cut-off is now revealing a continuing downward trend despite the large swings of 2011. Former impacts from a historical 1991 brine piping leak appear to have completely passed this well now in an easterly downgradient direction as all of the measurements

in 2014 are again found below the 10 ppt cut-off.

Five of the seven PW well series wells indicate decreasing or flat five-year salinity trends. Well BC PW7 reveals a continued upward trace driven primarily by the 2010 lows in the data, even with the mild improvements noted since 2013.

All of these monitored locations appear to fluctuate regularly over the entire period of record, but generally with decreasing trend lines and especially with decreasing variability for each well despite the occasional trend reversals noted in the shorter-term five-year windows presented. 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 potential 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.

5.3.2 Big Hill

The three major subsurface hydrogeological formations in the BH 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 BH salt dome. Fresh water in the upper Chicot Aquifer over the dome is limited from near the surface to a depth of -30 m (-98 ft) below mean sea level, with the natural waters becoming more mineralized and brackish with depth The town of Winnie, situated off the dome and to the west, uses fresh water from the upper Chicot Aquifer. Beaumont and nearby Port Arthur both draw fresh water from the lower Chicot Aquifer. Historic [file] permits for cathodic protection borings provide a "depth of useable quality water to protect" ranging from 400 to 450 feet which means that any borings/wells penetrating beyond this depth must be properly cased to limit or preclude hydraulic cross-connections.

Sampling of six monitoring wells (wells BH MW1 to BH MW6) around the brine disposal pond system (Figure C-4) began in 1987 and was converted to the low-flow method in May 1995. Ground water contours from these and all of the Big Hill site monitor wells developed on spring quarter data are shown on Figure C-5.

The interconnected brine pond system is comprised of three contiguous PVC-lined above grade ponds (anhydrite settlement, oil recovery and brine ponds). All three have an under drain system contained within a surrounding slurry wall system keyed to an underlying clay bed. Commencing in August 2006, a renovation project to replace the liner material in the oil recovery and brine ponds in the series, was implemented. The project was completed there and the three-pond system was re-commissioned in August 2007. In 2012 an application was filed with the RRC to reline the anhydrite pond. The design approach proposed involved converting the accumulated anhydrite into a leachate collection system supporting a new PVC liner and operating pond placed over them but within the existing dikes. The application was administratively denied in 2013 and an additional sampling study of the anhydrite was completed as part of a re-evaluation project plan proposed and accepted by the RRC. In 2014, additional time was granted to develop a complete closure plan based on a Conceptual Closure Design submitted early in the year. The design has evolved to a "clean closure" proposal following a

full scale in-pond rinsing test developed to address entrained but washable chlorides from the insoluble anhydrite materials. In April 2015 the RRC approved the clean closure plan and the SPR initiated actions for the procurement of services to complete the necessary construction and conduct the pilot test by spring 2016.

Salinity data collected from the six permit required wells surrounding the ponds have for the past five years indicated complete consistency and absence of effects below detection limits until 2001 for well BH MW2 and BH MW5 after Ike came ashore in 2008, (Figure C-6). All values below the detection limit are specified as one-half the detection limit for statistical calculations. No ground water effects associated with the pond operation are evident since monitoring was begun in 1987. The salinity increase in BH MW2, up-gradient (northwest of) the ponds, is attributed to a previous release from buried brine header piping The freshening trend continued until Hurricane Ike forced a huge storm surge of saltwater from the Gulf that inundated the site. Several of the wells BH MW2, BH MW5, and BH PW4, were impacted by the saltwater pushed onto the site overtopping several well casings temporarily and allowing saltwater to infiltrate through permeable surface soils, nearby piping backfill and also the breather holes in their caps. These three wells have shown remarkable recoveries during the time since Ike with well BH PW4 returning to BDL. The two pond-service wells are showing continued downward trending with all measurements for both below 10 ppt, as the salt is slowly purged reflecting the limited impact to clear the salt water effects from the sandpack materials surrounding the screens with the routine low-flow sampling methodology. BH MW2 shows all 2014 data at less than 1 ppt or BDL and BH MW5 shows four years of data below 2 ppt with a 2014 trace revealing spikes and swings associated with the loss of the field instrument with the lower (1 ppt) detection limit. Until the instrument was determined unrepairable and slated for replacement, the measurements reflect use of a standard handheld refractometer with a 2 ppt lower detection limit. The refractometer was used throughout 2014 until a replacement salinometer could be procured.

Figure C-5 presents the contours of the water level data obtained on a date in the spring quarter for all the site wells, as representative of 2014. The gradients and flow direction remain very similar to the previous contouring staggered throughout the calendar year in order to account for any seasonality. 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 elevations and appears to be moving radially off the underlying salt dome structure. This contouring appearance cannot be completely corroborated due to lack of control points off the site in a north and westerly directions. As with our other sites, however, it is suspected that regional flow regimes are locally modified by the underlying domal piercements.

Well BH PW5 located at the most up-gradient point of the site shows a clean and flat trace and well BH PW4 near the southwest corner, below the closed mud pits, has also cleaned and flat lined this year. This year's 5-year trace on site wells includes 2010 for the oldest SER review.

The well BH PW2 was plugged and abandoned as part of the original VWS Study in the 1995/1996 timeframe and therefore is not depicted as an active well on the site well locator map.

5.3.3 Bryan Mound

Site monitoring wells screened in two water bearing zones, 6 and 15 m (20 and 50 ft) bls,

indicate that no usable quantities of shallow fresh water exist in the uppermost inter-connected aquifer overlying the BM salt dome structure. This generalization was confirmed by the additional salinity data from VWS in 1995-96. However, the Chicot and Evangeline Aquifers are fresh to slightly saline in the Bryan Mound area, and fresh water for Brazoria County is obtained from the upper portions of the Chicot up gradient of the BM salt dome. Historic [file] permits for cathodic protection borings provide a "depth of usuable quality water to protect" ranging from 225 to 350 feet which means that any borings/wells penetrating beyond this depth must be properly cased to limit or preclude hydraulic cross-connections.

Fifteen monitoring wells were drilled at BM in four phases between 1981 and 1990 (Figure C-7). Wells BM BP1S, BM BP2S, and BM PZ2S have been removed from monitoring service due to casing damage. Five additional shallow well locations and one additional deep well were installed in 1996 as part of the VWS, and all of these were incorporated into the site's monitor well net.

All five-year traces this year reflect only the low-flow sampling method which produces less data variability and which helps assure more consistent and representative sampling of the shallow aquifers across the SPR. The resulting trending graphs now more accurately reflect the Bryan Mound site's ground water conditions. Two of the 12 total shallow zone wells around the site reveal a decreasing trend for the current 5 year windows with four of the remaining ten wells having a nominal flat trace. Three of the six total deep wells reveal a saltier trend this year. The remaining three deep zone wells have freshening trends in two and one that could not be sampled in 2014 due to the depth of water was below the reach of the peristaltic sampling pump. Well BM MW1D although located down gradient of a pre-DOE source had a series of decidedly downward 5-year traces responding to the freshening data points from 2006 onward. The trend reversal noted in 2011, was short-lived only through 2012 as freshening conditions from 2007, and on into 2010, despite large swings in the dataset, have prevailed and the five-year trending remains downward for this year through a series of extremely pronounced fluctuations. The first three 2014 quarterly values fluctuated around a level of 160 ppt then a very low value of 57 ppt producing a downward freshening trace closed out the year.

Salinity trends are evident in both salt-affected and unaffected areas in the 18 total wells being tracked (12 shallow zone and 6 deep zone). Elevated ground water salinity measurements in both the deep and shallow zones near the former brine pond and pump pad area have, however, remained relatively constant over time. This year the counting statistics for the 5-year trends are: 4 of the 12 shallow zone wells are trending upward; 3 of the 6 deep zones are trending upward, and 6 of the 18 wells watched show trending reversals versus last year. These statements do not include those wells found with flat 5-year traces.

After an overall step change in salinity evident in both the paired wells back in 1995, BM MW1S and BM MW1D, a decidedly consistent and similar freshening (downward) trend has been observed in both wells until the 2005 five-year trace where the deep zone well BM MW1D began trending upwards briefly, while the shallow zone well screened above it, BM MW1S, continued its consistent freshening. Both wells are currently showing large swings in their 5-year windows but the freshening trend remains for the shallow zone well and again also for the deeper set well of the pair. This may be the result of a slug of salty water slowly passing the

position in both the wells. Water level measurements indicate that the two zones are hydraulically separate with 5.6 feet of downward head difference (shallow zone to deep zone) in this portion of the site.

Salinity measurements (>20 ppt) observed in the shallow zone near the SOC (BM MW5) and the historic anhydrite disposal area was trending downward despite salinity swings noted in the center of the current five-year trace. This year, however, the 5-year trace reverses to a slight upward trend The swings and trending are not indicative of any noteworthy releases (slugs) passing and the slight upward trend is produced by a single low value now occurring early in the 5-year range. A variety of salinity swings are found in this year's traces of the well pair BM MW2S and BM MW2D. The flattening of the trace occurring in the shallow well (MW2S) since 2013 is flat and stable around 10 ppt. The trace in the deep well complement here continues to trend downward and has stabilized around a 60 ppt level and the notable swings in the 5-year dataset produce yet another trend reversal at this location. This well pair reveals a hydraulic separation of 6 feet in downward direction (shallow well to deep well) in the summer quarter timeframe contoured.

Salinity observed in the unaffected (<20 ppt) deep and shallow well pair at the northwest corner of the site (BM MW4S and BM MW4D) have reversed their downward trends now due to saltier values observed since the 2011 lows and the upward trend persists this year. All of the measurements in both the shallow and deep well are below 10 ppt. The underlying deep zone well now is also trending slightly upward but more slowly and at a lower overall salinity, indicative of differing waters, despite water level measurements showing only 1.2 feet of downward head difference which is less than that found with the other deep and shallow well pairs on the site.

BM MW3 continues to show a flat to slightly increasing salinity trend over this five-year period due to stabilized salinity values all below the 10 ppt cut-off since 2009.

Site ground water movement in the shallow, 6 m (20 ft) bls, zone is found to be flowing radially (in all directions) off the dome with perceptible ground water divides defining a three-lobed appearance this year (see Figure C-8). The flow directions in the deeper zone results from a NW-SE trending recharge zone causing flow to move in a northeasterly manner over basically half the site and in a southwesterly manner for the remaining half (see Figure C-9) again responding to the topographic expression of the underlying piercement. The water level data for the spring quarter of 2014 were contoured after reducing the depths to water measurements to elevations using the 2005 re-leveled measuring points. Again this year, the data do not produce any dramatic changes in flow direction interpretation but reveal gradients that appear to continue to steepened on portions of the site near the edges of the dome as recharge (rising water levels) in both the monitored zones and higher water levels in the adjacent lakes is noticeable this year with a return to more normal rainfall.

Both of the monitor zones exhibit 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, lowering the intrinsic permeability and the low observed hydraulic gradients found across the site due to lack of nearby groundwater offtake. The low average velocity characteristic has the effect of extending

groundwater travel times towards the flanks of the dome, while also promoting natural attenuation via diffusion and dilution with the slowly moving subsurface waters.

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 closed DOE brine pond eastward to the brine pump pads and to the vicinity of an older small brine pond demolished by DOE in 1989, and then southward towards the center of the site and below the maintenance building already discussed. Operations pre-dating DOE ownership included brine retention in two separate unlined elongated abandoned ponds reclaimed (filled) by DOE in this same area. The second and considerably smaller area lies southeast of the security operations center (SOC) adjacent to a closed anhydrite and drilling muds confinement area.

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 the large SPR brine storage pond. The large brine pond with a Hypalon® (chlorosulfonated polyethylene) membrane was originally constructed in 1978, and subsequently enlarged (height added) with installation of a new Hypalon® liner and a concrete weight coat in 1982. The BM brine pond was removed from service in September 1998 and closed in 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 seepage from before 1982 renovations of the pond, or also from operations occurring before the SPR. 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 would support an interpretation of no apparent direct communication with the shallow zone in this area both from the measured salinity levels and head difference. The flow gradient in the deep zone beneath the former BM brine pond has also helped to limit and restrict pre-DOE salinity impacts found to the east keeping the movement more easterly and in the vicinity of the former historic unlined brine storage. The shallow zone well BM PZ1S, the most directly down gradient well from the former large brine pond, continues to show a decreasing to flat salinity trend. No significant overall shift is noted as the 2010 through 2014, data show a nearly flat tendency. The shallow zone well BM MW1S also maintains a steadily freshening 5-year trend even with large swings in the dataset evident in 2010 to 2011 timeframe continuing into 2013 and 2014. Well BM BP1D, located south of the former SPR brine pond maintained a 5-year downward trending and overall was found below 10 ppt through 2014 with all 2014 measurements found to be BDL.

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 down gradient of the location of former below grade unlined brine retention ponds from operations that preceded SPR ownership. The high salinity of the deep well may also indicate some limited hydraulic communication of the two ground water zones occurring in or just up gradient of their location. Water levels confirm continued hydraulic separation but with an increasing head difference of about 5.6 feet versus 2011's low number. However, both the wells reveal steady freshening indicative of a slow moving saltwater slug passing and dispersing.

From the time the former SPR brine pond was closed in 1999, the shallow ground water could have moved an estimated 75 feet laterally. However, given the anticipated long lag-time for vertical migration and then the lateral distances required to reach the nearest monitor wells, it is expected to be a considerable time for post-closure salinity changes to become evident in the annual monitoring.

Suspect historical brine contamination located south of the site's maintenance building may be responsible for producing another area of elevated salinity. An active source has neither been identified nor associated with any known historical SPR operations or incidents, and therefore it most likely predates SPR occupation. Salinity measurements exceeding ambient levels (> 20 ppt) have also been observed historically in both zones at wells BM MW2S and BM MW2D, with the shallow well BM MW2S fluctuating at or below 10 ppt then experiencing a big swing in 2009 (spike and return) with subsequent data moderating to present. 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 of that historic saltwater release; being affected more by diffusion and dispersion rather than direct flow. The head difference here is downward between the two wells and the underlying zone is more heavily impacted (trending from 60 to 70 ppt) in 2014 and fluctuating around a slightly upward trending trace that has reversed since last year.

Salt water effects are 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. The well pair BM MW4S and BM MW4D is also down to side gradient, respectively, of an onsite anhydrite disposal area and their data do not reveal any impacts.

5.3.4 St. James

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

5.3.5 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 regional southerly flow direction towards the north in the vicinity of the coast below Lake Charles. The fresh/saline water interface is approximately 213 m (700 ft) bls off the sides of the West Hackberry dome and more shallow directly over the diapir where our site is situated. Possibly a result of the piercement by the diapir, laterally limited permeable water bearing soil found affected and monitored at the West Hackberry site is much nearer the ground surface, with a shallow sandy zone at roughly 6 m (20 ft) bls and a deeper more silty 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 linear velocity estimated for the shallow zone is from 50 to 200 feet of movement per year, which results from both a wide permeability range and varying gradients across the site. The deep zone exhibits a generalized velocity estimated to be only 7.5 feet per year (ft/yr), which is largely due to the more silty and clayey nature of the sands combined with the ambient low hydraulic 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 was one of five adjoining ponds comprising a pond system and solids management system that handled brine and anhydrite solids pumped from the construction of storage caverns. Brine pond construction activity implemented per the state approved brine pond-decommissioning plan was concluded in November 1999.

Eleven monitoring wells and 15 former recovery wells (Figure C-11) have been installed on the WH site in five phases. All were historically 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 C-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 30; in the late fall 2006 three wells which were not part of any outside monitoring agreement (WH RW1S, WH RW1D, and WH RW2D), were plugged and abandoned due to cap maintenance construction activity for a closed anhydrite pond, bringing the final site total wells down to 27. Salinity data are depicted in the five-year trending graphs for all of these wells, which are available in Appendix C; however, certain wells are tested for salinity only once per year per the 2002 site-wide monitoring proposal approved by LDNR in early 2004.

WH personnel began using the low flow technique for sampling all non-pumping wells in December 1995. Water level measurements from both zones for the spring quarter of 2014 have been reduced to elevations, contoured, and are presented as Figures C-12 and C-13, Shallow Zone and Deep Zone, respectively. The contour map of the water levels in the underlying deep zone reveals a rather flat surface for the semi-confined water bearing zone. The pressure gradient (potentiometric surface) is flat (low) across the site and continues to promote only very slow travel times and indecisive travel paths beneath the site on this portion of the dome. The general appearance is that of a confined to semi-confined water bearing zone, receiving some recharge potential (mounding) in the vicinity of wells WH P1D, WH P2D, and especially WH P4D, and with a potentiometric "sink" suggested with the measurements determined within the limited area bounded by the wells WH RW3D, WH RW4D, and WH MW1D.

Over the years the slug of shallow zone saltwater seepage from the former brine pond, being removed from any source, has changed its shape, is growing smaller, and drifts slowly towards

the east and while elongating northerly. Of note again this year, all the plume affected wells in the shallow monitoring zone: WH P3S, WH P4S, and WH P12S, all reveal downward (freshening) to flat (WH P12S) 5-year trending. The implication is that fresher recharge is continuing to aid with the diffusion and dispersal of the saltwater slug. The center of the slug is now found within a 30 ppt contour circumscribing the two wells: WH P3S and WH P4S, with 2014 average annual salinity values of 37 ppt and 30.8 ppt, respectively. The shape of the slug is oriented essentially N-S, which has been greatly influenced by the salinity reduction to BDL at the WH RW2S well location, and then also by the freshening conditions occurring at well WH P3S. This is a slow attenuation process primarily driven by dilution and diffusion. The regional drought has also had an influence, especially with the shallow zone, although the basic flow regimes, shallow and deep, appear to remain fairly constant with no local offtake (pumpage) nearby.

Well WH P4S is located on the southeast corner of the former brine pond within the main portion of the saltwater slug and this year's five-year trace moderating (becoming flatter and lower) continuing to show a downward trend of freshening. A more steady-state with many of the 5-year traces, reflective of gradual dispersion and diffusion of the stratified saltwater, is now evident.

The well WH P3S, in the center of the historic saltwater slug, is also showing moderation in terms of the wide historical fluctuations and also in terms of producing a span of freshening five-year trends commencing in 2006. This well responded rapidly to pumping shut-in with the current series of traces reflecting consistent freshening and indicative of a more mature steady-state plug of saltwater that is slowly undergoing general dispersal driven by the slow ground water movement and as aided by diffusion.

After sporadic spikes of elevated salinity were initially experienced with pond closure construction early in 1999, a general decreasing salinity trend developed at wells: WH P1S, WH P5S, and WH RW1S, along the west side of the former brine pond. Former pumping wells WH P1S and WH P5S both began exhibiting salinity below the 10 ppt cut-off within 2002, with nearby well WH RW1S joining them in that range for 2004 and remaining so through 2005 until it was plugged and abandoned in November 2006 as part of the closed south anhydrite pond cap maintenance project. Well WH P13S remains aligned with this group by maintaining a series of five-year traces of BDL values and with an even longer history of values below 10 ppt. Well WH RW2S has also joined the BDL group, presumably reflecting a long-term favorable response to the same 2006 cap maintenance activity.

Many shallow zone wells exhibited an obvious salinity drop upon cessation of active recovery, indicative of fresher recharge and 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 were formerly pulling a fresher water mix across their screened length when actively pumping. This improving salinity response will undoubtedly be delayed to the wells on the east and situated directly in the core of the slug as the overlying salt impregnated soils slowly respond to the now diminished percolation and to the slow post-closure recharge.

Ground water salinity conditions over most of the site continue to improve and have settled into long-term gradual freshening trends which commenced post-recovery. As the five-year window for each well has progressed beyond the former recovery operations. The graphs now reveal a more "quiet" shallow zone monitoring response which began occurring shortly after the pond system was shut-in in early 1999 and then continued when the recovery pumping ended in the spring of 2001. Shallow monitoring wells WH P8, WH P9, and WH P11 at caverns 8, 9, and 11, respectively, are located away from the former brine pond and intercept unaffected waters that are near ambient levels, comparable to up-gradient well WH P6S. Two of these wells (WH P8 and WH P11) have detected minor localized but historic impacts from former firewater line leakage and have since returned to ambient unaffected levels over the present five-year history. These two wells are tested only annually now for salt content per the approved monitoring plan.

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 at the site's perimeter and with the exception of well WH P12S, intercept ambient ground water. Well WH P12S is the only down gradient long-term [non-recovery] monitoring well that is affected by the shallow zone brine plume extending eastward from the former brine pond. Its salinity remains elevated (17.0 ppt annual average based on the 4 measurements in 2014) which is generally consistent since sampling began in 1992 (range 13 to 39 ppt, Std. D = 6.7 ppt, avg. = 24.94 ppt, n = 89). The overall trend since 1992 to present is slightly downward with a general short-term trace from 2002 to 2006 revealing a gradual rise just for that period. This year we see the salinity continuing to freshen and find that the 2014 annual average of 17.0 ppt also continues below the historic average of 24.94 ppt. This freshening regime occurring so distant from the source and at the leading edge of the recognized brine plume (some 300 feet) coupled with the corresponding freshening of well WH P3S may be indicative of gradual long-term dissipation and dispersal effects on the historic saltwater slug. This shallow zone well seems to be situated at the very edge of the diffusion "halo" and, which now, with no pumping-derived gradient, is undergoing natural attenuation from dispersion and diffusion. The positive changes with the shallow plume are now becoming easily recognizable in comparison the remainder of the site as a whole.

Well WH P12D, is the deep well complement to WH P12S, and has a long history of measurements below the 10 ppt cut-off. The early history of the well's traces included a long period of values below BDL (1 ppt); then a fairly rapid rise occurring in the years 2003 to 2004, presumably a lag-time response to the pond closure construction, was observed to peak around 7 ppt. The salinity then abruptly freshened throughout 2004 and has since presented a slow but steady rising salinity; from around 3 ppt to the present annual average for 2014 of 8.5 ppt. The climbing trend remains constant enough to warrant more closely watching the measurements and to also trying to deduce a reasonable explanation for the temporal influences at play. The impacted area for the deep zone wells is a smaller and more limited area found south of the former brine pond and more westerly near well WH P4D, some 300 feet away. The head difference (10.9 feet) confirms separation between the two zones here and remains persistently in a downward direction. The overlying shallow zone contains sufficiently high levels of salinity now, and in the past, that cannot be ruled out as a potential source for the deep well's long-term trending. As such, the long-term freshening observed with the shallower WH P12S well could potentially predict a positive freshening deep well response.

As defined in the final approved closure plan, the synthetic liner held in-place beneath the concrete weight-coat of the former brine pond was required to be pierced to preclude any future concerns with long-term hydraulics. As a result, the salt-affected soils beneath this liner, presumably, shall continue to respond naturally to rainfall conditions and events.

5.4 Water Discharge Effluent Monitoring

The water discharge permit-monitoring program fulfills the requirements of the EPA NPDES, and corresponding states RRC Rule 8 and 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 2014. These discharges are grouped as follows:

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

The SPR disposed of 0.62 million m^3 (3.76 mmb) of brine (mostly saturated sodium chloride solution with some infrequent discharges of lower salinities than normally attributed to brine) during 2013. Approximately 58.4 percent of the brine was disposed in the Gulf of Mexico via the BH (34.4percent of the total) and the BM (24.0 percent of the total) brine disposal pipelines. The remaining 41.6 percent was disposed in saline aquifers via injection wells at the WH site (40.5 percent of the total) and BC site (1.1 percent of the total). These figures represent an overall major project-wide decrease of brine disposal that translates to a nearly 83.5 percent reduction over the 2013 calendar year.

During 2014, 1,198 measurements and analyses were performed and reported to monitor wastewater discharge quality from the SPR in accordance with NPDES and corresponding state permits. With six total non-compliances experienced in 2014, the SPR was in compliance with permit requirements for 99.5 percent of the analyses performed.

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 variation observed during CY 2014 is discussed in separate site specific sections.

Discharge monitoring reports (DMRs) are prepared and submitted in accordance with site-specific permit requirements. All discharge permits issued to the SPR require quarterly reporting to the appropriate agency(s) (LDEQ, or RRC and EPA). Should a noncompliance or reportable bypass occur during the reporting period, an explanation of the cause and actions taken to correct the event is included in the corresponding quarterly report.

5.4.1 Bayou Choctaw

BC personnel performed and reported a total of 58 measurements on permitted outfalls and reporting stations to monitor LPDES permit compliance during 2014. Table 5-11 provides the permit required monitoring parameters and limits for the BC outfalls. There were zero permit non-compliances at BC in 2014 resulting in a 100 percent site compliance performance record for the year.

Most monitoring is related to water discharges regulated under the LDEQ Office of Water Resources LPDES permit. Discharges are from two package sewage treatment plants (STP), a permit limited vehicle rinsing station with the site's stormwater runoff from well pads, and pump pads (containment areas), addressed as a cross-reference to the LA MSGP and in the permit required SWPPP.

Table 5-11 Bayou Choctaw Outfall Sampling Parameters

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, GPD) <45 mg/l Avg. <45 mg/l max 6.0 – 9.0 s.u. <400 col./100 ml
Stormwater (from former named/numbered outfalls)	Systematic Visual Observation	1/quarter (if discharging)	maintain written observations
Vehicle Rinsing (without soaps and/or detergents)	Flow COD TSS Oil and grease pH	1/quarter 1/quarter 1/quarter 1/quarter 1/quarter	Estimate in GPD ≤200 mg/l avg and ≤300 mg/l max ≤45 mg/l <15 mg/l 6.0-9.0 s.u.

5.4.2 Big Hill

During 2014, 535 measurements were performed and reported to monitor NPDES and state discharge permit compliance. Table 5-12 provides the permit required monitoring parameters and limits for the BH outfalls. There were two total non-compliances during 2014 resulting in a 99.6 percent site compliance performance level. The permit non-compliances involved failure to provide two valid monthly measurements of salinity at the 008 stormwater outfall when the new permit became effective and changed the monitoring frequency from quarterly to monthly. With the advent of the new permit the salinity limitation reverted to report only therefore no numeric excursion was involved.

Water discharges at BH are regulated and enforced through the EPA NPDES permit program and the similar RRC discharge permit program (Rule 8). The discharges at the site involve brine to the Gulf of Mexico, hydroclone blow down into the ICW, effluent from the sewage treatment plant, and stormwater from well pads and pump pads. There were no discharges during 2013 f0rom the hydroclone blow down system.

Table 5-12 Big Hill Outfall Sampling Parameters

Location/ Discharge	Parameter	Frequency	Compliance Range
Brine to Gulf	Flow	Continuously	report only
	Exit Velocity	1/day	record
		1/month	18 fps min, 20 fps max (3 month rolling avg)
	Density	1/day	Record
		1/month	1160 kg/m^3 max (3 month rolling average
	Oil & Grease	1/month	<15 mg/l max,<10 mg/l avg.
	TDS	1/month	report only
	TSS	1/month	report only
	pH	1/month	6.0 - 9.0 s.u.
	Biomonitoring	4/year (minnow)	Lethal NOEC 2.6%
		4/year (shrimp)	Lethal NOEC 2.6%
	Integrity Tests	1/year	within 4%
Stormwater Outfalls (well pads & other containments)	Oil and Grease	1/six months	<15 mg/l
	TOC	1/six months	< 75 mg/l
	pH	1/six months	6.0 - 9.0 s.u.
	Salinity	1/six months	<8 g/l (ppt)
Raw Water Backwash	Flow	1/week(fed)	report
	TSS	1/week(fed)	report
	pH	1/week(fed)	6.5 to 9.0 su
Recirculated Raw Water	Flow	1/month	Report only
	pH	1/month	6.5 to 9.0 su
Sewage Treatment Plant	Flow	5 /week	Report
	BOD_5	1/month	<45 mg/l max and <20 mg/l avg.
	TSS	1/month	<45 mg/l max and <20 mg/l avg.
	pH	1/month	6.0 - 9.0 s.u.
Stormwater RWIS Transformer OWS	Oil and Grease	1/six months	<15 mg/l
	TOC	1/six months	< 75 mg/l
	pH	1/six months	6.0 - 9.0 s.u.
	Salinity(disch)	1/month	Report (g/l)
	Salinity(rcvstr)	1/month	Report (g/l)

5.4.3 Bryan Mound

BM personnel made and reported 558 measurements on permitted outfalls for the purpose of monitoring NPDES and state discharge permit compliance during 2014. Table 5-13 provides the permit-required parameters and limits for the BM outfalls. There were four permit non-compliances resulting in a site compliance performance level of 99.3 percent for the calendar year. The four non-compliances resulted from missing the monthly tests on a weekend offshore brine flow when the month closed out before the sampling oversight was discovered. The missed sample produced four separate instances of missing parameter data.

Water discharges at BM are regulated and enforced through the EPA NPDES permit program and the similar RRC discharge permit program for state waters (Rule 8).

Table 5-13 Bryan Mound Outfall Sampling Parameters

Location/Discharge	Parameter	Frequency	Compliance Range
Brine to Gulf	Flow	Continuously	Report
	Exit Velocity	1/day	Record
		1/month	18 fps min, 20 fps max (3 month rolling avg.)
	Density	1/day	Record
		1/month	1210 kg/m^3 max (3 month rolling avg.)
	Oil & Grease	1/month	$\leq$15 mg/l max, $\leq$ 10 mg/l avg.
	TDS	1/month	Report
	TSS	1/month	Report
	pH	1/month	6.0 to 9.0 su
	Biomonitoring	4/year (minnow)	Lethal NOEC 2.9%
		4/year (shrimp)	Lethal NOEC 2.9%
	Integrity test	1/year	Within 4%
Stormwater (Well pads & other containments)	Oil and Grease	1/six months	<15 mg/l max
	TOC	1/six months	<75 mg/l max
	pH	1/six months	6.0 to 9.0 s.u.
	Salinity	1/six months	< 8 g/l max
Recirculated Raw Water	Flow	1/month	Report
	pH	1/month	6.0 to 9.0 su
Sewage Treatment Plant	Flow	1/month	Report only
	BOD_5	1/month	<20 mg/l avg. <45 mg/l max
	TSS	1/month	<20 mg/l avg. <45 mg/l max
	pH	1/month	6.0 - 9.0 s.u.

5.4.4 West Hackberry

WH personnel performed and reported 47 measurements on permitted outfalls to monitor LPDES permit compliance during 2014. Table 5-14 provides the permit-required parameters and limits for the WH outfalls. There were no permit non-compliances during 2014 resulting in a 100 percent site compliance level. The water discharges at the WH site were regulated under the EPA (NPDES) permit administered by the state of Louisiana under the LPDES permit program.

Table 5-14 West Hackberry Outfall Sampling Parameters

Location/Discharge	Parameter	Frequency	Compliance Range
Stormwater (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), Raw Water Test Discharges (incl. Non-contact Once-through Cooling Water and Diversion Water)	Visual Observations made in accordance with Sector P (SIC Code 5171) of the current MSGP	1/quarter	Perform and record standardized observations and maintain onsite in accordance with the SWPPP and/or site instruction
External Vehicle Rinsing/Washing	Flow (Daily Max) COD TSS O&G pH	1/quarter 1/quarter 1/quarter 1/quarter 1/quarter	Report est. (gpd) ≤200 mg/l avg and ≤300 mg/l max ≤45 mg/l ≤15 mg/ 6.0 to 9.0 s.u.
Treated Sanitary Wastewater	Flow BOD_5 TSS pH fecal coliform	1/6months 1/6months 1/6months 1/6months 1/6months	Report est. (gpd) ≤ 30 mg/l avg and ≤ 45 mg/l max ≤ 30 mg/l avg and ≤ 45 mg/l max 6.0 to 9.0 s.u. ≤ 200 col./100 ml avg and ≤ 400 col./100 ml max

5.5 Surface Water Quality Surveillance Monitoring

Surface waters of the BC, BH, BM, and WH SPR sites were sampled and monitored for general water quality according to the SPR EMP in 2014. 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 Appendix D, Tables D-1 through D-4. Observed values that were below detectable limit (BDL) were assigned a value of 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 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 to 0 percent) indicate the standard deviation is small, relative to the mean, such as would be the case with very stable data, or if a preponderance of the measurements fell below the method limit of detectability.

5.5.1 Bayou Choctaw

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

Hydrogen Ion Activity - The annual median values of pH for all the monitored stations ranged from 7.2 to 7.7 s.u., which is consistent with ambient conditions of the surrounding waters. The complete range for all measurements at all stations for 2014 is 7.0 to 8.4 s.u. Fluctuations observed are attributed to environmental and seasonal factors such as variations in rainfall, temperature, and aquatic system flushing.

Temperature - Observed temperature ranged from 2.9 °C to 27.8 °C. Temperature fluctuations were consistent among all stations and are attributed solely to meteorological conditions since the BC site produces no thermal discharges.

Salinity - Average annual salinities in 2013 ranged from 0.5 ppt (indicating below detectable limits) to 0.7 ppt at (Station F). Wetland stations A, C, D, E, and G revealed below detectable limits throughout the year in their respective databases. Two measurements of the 77 made were found above BDL in 2014. Station F is situated in the wetland waters subject to variable conditions (highest CV of all stations) and station B is located on the N-S Canal adjacent to the newly converted Cavern 102. Higher water conditions and therefore more flushing may have influenced the salinity readings this year in response to the return of a near normal rainfall pattern for the region.

Oil and Grease – Only two quantifications above BDL for O&G were spread amongst the seven reporting stations. This basically means that for 2014, O&G levels were found to be measurable in 10 percent or less of the samples taken over the year at all of the stations. No definitive source is identifiable nor did any oil spillage occur at the site; and the levels measured are too small to result in producing a visible sheen or reportable quantity. The total range in the measurements was from BDL to 6.0 mg/l, with stations B and E having no quantifiable measurement each during the year.

Dissolved Oxygen - Overall, DO average and median levels are relatively low (below a suggested minimum threshold <5 mg/l supportive of aquatic life). The range for all stations is 0.5 mg/l to 6.1 mg/l, with annual means and medians for all stations ranging from 1.1 mg/l to 4.7 mg/l. These low numbers are attributed to high temperature and high natural organic loading combined with low flow and minimal flushing typically observed at times in the two wetland area stations. The peak level of 6.1 mg/l occurred at station G.

Total Organic Carbon - Average annual TOC concentrations ranged from 9.7 to 12.2 mg/l. High

TOC readings typically 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. The highest value measured was 41.3 mg/l occurring at Station E suggesting low flows to stagnant water for several months as Station E also had the highest average TOC for this year. The relatively low values observed around the site sampling locations as well as the peaks produced no discernible physical impacts and are not out of line with the natural setting or system receiving episodic rainfall.

General Observations - Based on the above discussion, the following general observations are made regarding the quality of BC surface waters.

- The surrounding surface waters continue to have a relatively neutral to slightly basic pH, with infrequent more basic excursions attributable to a localized flushing (runoff) action with the episodic rainfall.
- Observed salinity measurements remained generally low and within the historical range.
- Temperature variations were caused by seasonal changes. There are no thermal processes used at any SPR site.
- Low minimum and annual average DO levels are attributed to high temperatures and organic loading resulting from low flow and minimal flushing typically observed in backwater swamp areas.
- This year two of the seven stations reported measurable oil and grease levels. The highest measurement (6.0 mg/l) is not enough to produce a visible sheen. The values are not indicative of any relatable spill events at the facility, as no oil releases occurred during the year. These data do, however, reveal a recognizable improvement over the number of occurrences (shows) in the database when compared to the previous two years.

5.5.2 Big Hill

Monitoring stations were established at five locations (Figure D-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. It must be noted that Station A had no sampling this year. Because this sample point is located at an overflow point to a former onsite stock pond that first receives the site's treated effluent, it became impossible to obtain a sample due to the location being overtaken with vegetative growth backfill from the generally low-flow conditions throughout the past several years. Parameters tested include pH, temperature, SAL, O&G, DO and TOC (Table D-2).

Hydrogen Ion Activity - The 2014 data show the pH of site and surrounding surface waters remained between 6.2 and 7.9 s.u. The annual median values of pH for each of the monitored stations ranged from 7.1 to 7.5 s.u. and indicate that in general the area waters sampled became slightly more acidic versus last year's readings.

Temperature - Temperatures observed in 2014 ranged from 6 °C to 28 °C exhibiting the characteristics expected from seasonal meteorological changes. All stations reported very similar ranges and temporal fluctuations throughout the year.

Salinity – Long-term average annual salinities are usually quite low for the BH stations and physical setting and the individual monthly tests typically range from fresh on the site all year

long to a maximum, usually in the upper teens, associated with the tidally influenced RWIS location on the ICW (Station C) nearest the Gulf. Because of its location, Station C also routinely has a higher mean and a higher median salinity as compared to the other stations. This year two stations reported highly variable salinity data with their CV values well above 100 percent. However, the means at three of the four sampled locales dropped (freshened) versus 2013. This observation may be related to continued relief from the persistent drought conditions that plagued the area into 2012. The short duration but more frequent rains tend to flush and dilute observed salt contents.

Two of the stations (B & D) which are close to the main site and a surface water reservoir below the site produced BDL measurements in their respective datasets; with the remaining two stations revealing improving (less salty) conditions. Station A was incapable of producing flowing samples that could be safely obtained in 2014.

Oil and Grease – Only one oil & grease value was found above the historic detectable limit of 5 mg/l this year. No indication of oil impacts from SPR activities was found or observed during any of the sampling episodes. Station E had the single measurement of 13.3 mg/l and the occurrence could not be directly related to site activity at this great distance from the site.

Dissolved Oxygen - Dissolved oxygen generally is greatest in the winter and spring and lowest from summer through fall. DO peaks were observed in the months of September through March and the lowest values were determined in the summer to early fall generally in the June to August timeframe this year. The lowest variability of a full 12 month set of data points was found at the RWIS measuring point of the ICW (Station C) with a CV value of 30.6 percent where the general size of the water body is expected to impart a more consistent dissolved oxygen level but not entirely without variation in the year. The station with the most DO variability during the year was sampling station B with a CV of 63.9. The overall range in DO this year is found to be 0.1 mg/l to 12.3 mg/l with a mean range of 5.8 mg/l to 7.2 mg/l from all tests and stations. Four of the monitoring stations produced samples during the year with DO levels below 1 mg/l. Levels below 1.0 mg/l cannot be expected to support much aerobic life; values below 2.0 mg/l generally define anoxic conditions. The low values were not persistent and may have been associated with varying degrees of flushing, peak primary production, or both.

Total Organic Carbon - Average annual TOC concentrations varied from 8.1 to 19.6 mg/l over the year at the four monitored stations. The range in TOC from all samples is 6.0 to 31.8 mg/l. Stations D and E had noticeably higher levels of TOC than other stations. The consistently higher TOC levels observed are believed to be a result of intermittent reduced flushing (dry spells) combined with higher organic loading reaching the receiving waters and stagnating off and on throughout the year.

General Observations - Based on the above discussion, the following general observations are made regarding the quality of BH surface waters.

- The fresh surface waters have a slightly basic tendency this year in terms of the range of median pH, however, with the receiving waters tested showing a tendency to be slightly more acidic than in 2013, in terms of median values.
- The observed salinity measurements were lower at the site and increased in natural fashion from fresh water to an intermediate brackish water at the ICW. The flushing action occurring post-Hurricane Ike, is concluded, and at least temporarily, the more frequent rainfall diluted and freshened the salt content in many of the sampled locations this year.
- Surrounding surface waters were neither contaminated nor affected by SPR crude oil with only one O&G measurement made from the four stations monitored. This low value was not persistent nor did it cause any discernible impacts.
- Temperature variations followed seasonal meteorological changes.
- In general, low dissolved oxygen and high total organic carbon fluctuations were within typical ranges indicative of seasonal meteorological and biological influences for such a setting and range of environments. DO levels did drop below 1.0 mg/l this year at 3 of the 4monitored stations and TOC values did not rise above 31.8 mg/l. The TOC values are noticeable natural improvements in their own right versus last year's datasets.

5.5.3 Bryan Mound

Surface receiving waters surrounding the BM site were monitored during 2014. Blue Lake has seven sampling stations and Mud Lake has three established stations. Surface water monitoring stations are identified in Figure D-3. Stations A through C and E through G are located along the Blue Lake shoreline to monitor effects of site runoff. Stations H and I are located along the Mud Lake shoreline to monitor effects of site runoff. Stations D and J, located further from the site, serve as controls. The results from these controls will not be included in the analysis, but will serve as references.

Parameters monitored in the BM surface waters include pH, temperature, salinity, oil and grease, dissolved oxygen, and total organic carbon (Table D-3). Mud Lake water levels were high enough this year to accomplish 10 monthly sampling events which is better than 2013 and Blue Lake had water levels high enough for sampling at certain stations in at least 11 of 12 months.

Hydrogen Ion Activity - In 2014, the pH range for Blue Lake and Mud Lake stations was from 6.5 to 8.4 s.u. for the combined datasets. The control point for Blue Lake produced a similar range of 6.9 s.u. to 8.4 s.u. The range for the Mud Lake control was 6.5 to 8.0 s.u. The results reveal a slightly basic condition for Blue Lake, with a slightly less basic Mud Lake, while also proving an analogous condition for the controls. 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 this year are comparable to the normal range of variability historically seen at the BM site.

Temperature - Temperatures observed in 2014 ranged from 14.4 °C to 30.8 °C and reflect an almost complete set of monthly ambient surface water testing in Blue Lake and a full range of seasonal samples for Mud Lake. The observation can be made, however, that the range of fluctuation is attributed to ambient meteorological events.

Salinity - Observed salinity fluctuations ranged from BDL to 34.9 ppt in Blue Lake and from BDL to 38.6 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 ICW Station G on Blue Lake had both the larger incidence of variation and also the largest salinity measurement in Blue Lake all year, which even so was below the maximum numbers found in Mud Lake in 2014.

Oil and Grease – All samples at the eight stations and two control locales were below the detectable limit (5.0 mg/l) displayed as 2.5 mg/l for statistical calculations. These data favorably reflect continued good site housekeeping and effective site spill prevention, control, and response efforts.

Dissolved Oxygen - During 2014, DO was measured from nine times at each Mud Lake station to twelve whereas, Blue Lake, reflecting a fresher regime, typically would be expected to have a higher oxygen carrying capacity. This year the higher means and median DO levels are found to be very similar in both lakes. Fluctuations in DO levels in each lake are consistent with their respective control points. All measurements indicate "no apparent impact" from SPR operations. Blue Lake means and medians that range from 7.4 mg/l to 8.1 mg/l and 5.9 mg/l to 7.9 mg/l respectively, verify that overall DO levels were adequate for aquatic life throughout the year. Mud Lake's lowest DO measurement of 4.6 mg/l, was about the same as Blue Lake's low of 3.3 mg/l this year; however, means for the Mud Lake stations were above 7.3 mg/l and medians were found above 7.0 mg/l support the likelihood that lower DO levels although not unheard of, are infrequent, and that Mud Lake must receive a higher degree of overall mixing that may be influential to the available DO for the water body.

Total Organic Carbon - In 2014, all 83 TOC measurements of Blue Lake ranged from 12.7 to 46.9 mg/l. The 20 TOC observations made at each of the two Mud Lake stations beyond the control were somewhat lower ranging from 8.4 mg/l to 21.9 mg/l. Both control points have results that are similar to their respective lakes. The TOC levels observed in both lakes, however, are indicative of healthy, unaffected ambient conditions.

General Observations - Based on the above discussions, the following general observations are made regarding the quality of BM surface waters.

- 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 only just slightly more basic again this year based upon somewhat higher measurements being taken at the more numerous Blue Lake stations.
- Temperature and salinity fluctuations observed during the period tested are attributed to meteorological and tidal conditions rather than site operations.
- TOC is found to be about the same in both receiving waters this year.
- 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 and overall were found to be somewhat lower in both lakes in 2014 versus 2013.

5.5.4 West Hackberry

In 2014, six surface water quality stations (Figure D-4) were monitored monthly at WH. Parameters monitored (Table D-4) include pH, temperature, salinity, dissolved oxygen, oil and grease, and total organic carbon.

Hydrogen Ion Activity - The pH of surface waters ranged between 6.8 and 8.9 s.u., and annual median values ranged from 6.6 to 8.0 s.u. from all stations. The ambient waters measured were slightly more basic in overall range than last year's data. Stations D and E, sampling main site run-off produced the highest median values this year of 7.9 to 8.0 s.u. Station D, also produced the highest single value of 8.8 s.u. for all stations. Although the travel paths and long but intermittent travel times over crushed limestone placed for erosion control and traffic ability would tend to raise pH levels, the rainfall events of 2014 reduced that tendency. Fluctuations of observed pH were relatively minor and could only be attributable 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.

Temperature - Observed temperatures in 2014 were consistent with observations at other sites and were indicative of regional climatic effects. No off-normal measurements were observed. Recorded temperatures ranged from 5 °C to 34 °C and were found very consistent among stations.

Salinity - 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 ICW (Station F). Salinity ranges observed in these water bodies (7.9 to 21.0 ppt in Black Lake) and 1.4 ppt to 14.0 ppt in the ICW) are more conducive to supporting euryhaline organisms with variable salinity tolerance and those with sufficient mobility to avoid salinity stresses that occur with seasonal changes. Station F on the ICW reflected a wider range due to the influences of the tides and proximity to diluted but saltier Gulf waters. However, mean annual salinity observed at the ICW (8.3 ppt) was lower than stations in Black Lake (12.7 to 13.5 ppt) due largely to the fresher water influences received from more northerly drainage ways to the ICW and brackish water with limited movement to or from Black Lake. Main site Stations D and E had the lowest salinities, with 23 out of 24 samples being BDL. Salinities observed at these two upland site stations were therefore salt free 96% of the year. In general it may be said that the salinity measurements this year in Black Lake are slightly higher than those taken in 2013 with the remaining stations reporting slightly less salty values.

Oil and Grease – With the exception of a single value all observed O&G levels were below the detectable limit (5 mg/l) for all six monitoring stations during 2014. The single value at the onsite station D did not produce any sheen or noticeable odor at sampling. The result was scrutinized with the contract laboratory and remains inexplicable in terms of discernible or noticeable impact in the field or with how the large value of 114 mg/l could have occurred without producing obvious physical signs. These data are reflective of effective spill prevention and good housekeeping practices being maintained by site personnel.

Dissolved Oxygen - Minimum DO levels were at concentrations that support aquatic life, ranging from 2.5 to 5.6 mg/l from all stations. Dissolved oxygen was most variable at onsite Station E as opposed to the open and flowing receiving water stations. Since all other parameters have similar patterns with the other stations, Station E's variable and wider ranging DO values can be attributed to natural factors, such as aeration and biological oxygen demand. Station E, this year, produced the lowest single measurement (2.5 mg/l) and Station C, the single highest value (13.5 mg/l). Greater surface area and water movement through currents and wave action always provide continuous aeration of the lake and ICW water. Mean DO values ranged from 7.4 to 8.6 mg/l across the six sampling stations.

Total Organic Carbon - TOC concentrations for 2014 ranged from 3.4 to 12.9 mg/l with site stations D and E experiencing both the highest and lowest single values of all the stations again this year. This range is not out of line with the nature of these water bodies and is very consistent with though more variable with the measurements obtained during the year at all Black Lake stations. The average annual TOC concentrations by station ranged from 4.6 to 8.0 mg/l with station D experiencing the most variability and the largest range throughout the year. Because the variation is so consistent among the remaining stations, and especially so for the Black Lake stations, it is indicated that these measurements reflect a return of near normal rainfall to Black Lake and the surrounding environs.

General Observations - The following observations are made, based on the above discussion, concerning operational impacts on the WH aquatic environs.

- pH and temperature were observed within ranges routinely expected from the archival history, setting and conditions experienced in the year. Measurements of pH from all stations remained fairly stable, and in general, the waters remained slightly basic. The measurements and observations made appear to be reflective of the return to more abundant coastal derived rainfall and the typical seasonal influences.
- Detectable salinity levels were found mainly in Black Lake and the ICW. The salinity measurements made throughout 2014 were consistent with the ambient and slightly brackish receiving water environment, reflective of the return of abundant coastal derived rainfall to the area.
- Oil and grease measurements are made quarterly throughout the year by routine in order to include seasonality in the dataset. Historically, the O&G tests here are typified by BDL measurements. With the exception of the single spurious measurement the site maintained a complete BDL record at all stations and for all samples made during the year and for the previous two years prior. This is reflective of a focus on good housekeeping associated with all operations and a high degree of attention on spill prevention.
- All dissolved oxygen levels at site and Black Lake stations were sufficiently high and do not appear adversely affected by site operations. Onsite stations D produced the lowest level of all stations and stations D and E the higher variability and the larger ranges. None of the data from either locale suggest any impact or effects from SPR operations.
- 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 observed at the onsite drainage station D

results from the wider range of the values found (D had both the highest value and lowest values) of all sample locations during the year but nothing indicative of any impact, insult or impairment.

5.6 Waste Management

The waste minimization program reduces the generation of all wastes including hazardous, non-hazardous municipal solid, construction and demolition (C&D) and E&P wastes.

The SPR successfully met their waste goals for FY2014 by diverting at least 50% of hazardous waste, non-hazardous waste and C&D waste. This year waste management goals were based on diversion instead of a numerical target as in previous years.

SPR goals are developed in accordance with our Environmental Management System and are set by Fiscal Year. Environmental staff members were able to assist in this success by a thorough review of the potential waste streams, evaluation of recycling alternatives, communication with SPR personnel, and consultation with federal and state regulatory agencies as required.

During CY 2014, 47% of non-hazardous E&P wastes (585,864 lbs.) generated was recycled, 74% of non-hazardous wastes (918,138 lbs.) and 83% of C&D wastes (76,900 lbs.) generated was recycled and managed in accordance with state solid waste programs. Hazardous waste that was generated during CY 2014 (542.1 lbs.) consisted primarily of pigging waste from pipeline clean out. Materials recycled during CY 2014 are delineated in Table 5-15.

Table 5-15 SPR Recycled Materials

CATEGORY	RECYCLED (LBS)	RECYCLED (METRIC TONS)
Aluminum-Plastic Comingled	1,105	0.50
Antifreeze	68	0.03
AFFF	42,772	19.40
Ballasts	155	0.07
Blast Abrasives	667,000	302.54
Capacitors	15	0.01
Cardboard	28,139	12.76
Electronics	2,572	1.16
Fuel Filters	4	0.001
Lamps, Non-Hazardous	285	0.13
Oil Filters	178	0.08
Office Paper	136,988	62.13
Plastic	803	0.36
Scrap metal	26,457	12.00
Toner Cartridges	4,083	1.85
Used Oil	7,484	3.39

5.7 Chemical Management

All people using chemical containing products on the SPR are required to choose chemical products that are approved and listed on the Qualified Products List (QPL). The QPL is used to control and limit the quantity of toxic constituents found in chemical products, and also the potential for the generation of hazardous waste generated on the SPR.

Personnel requesting chemical containing products forward the MSDS to the Chemical Management Specialist who reviews the product for potential impacts to the environment, adherence to green requirements in the SPR Building Specifications for paints, adhesives, sealants; recycled content in materials; and exclusion constituents that contain EPA's 17 High Priority Toxic Chemicals.

The Chemical Management Specialist confers with the Industrial Hygienist regarding concerns he may have from a health and safety standpoint; and with the Waste Management Specialist to discuss the potential for waste generation that might occur from the use of the requested materials. If necessary, the Water or Air Specialist may also be brought into the review. The sub-contractor or site personnel are contacted when additional information is needed as to the proposed use of or quantity needed for the job. If the product is rejected for use, an acceptable substitute is presented.

The goal is to approve products that reduce the quantity of toxic constituents in cleaning chemicals, reduce VOCs in paints, adhesives, sealants and solvents, and manage the toxicity of rodenticides.
The SPR Chemical Management Program is successful in restricting use of chemical products to those that are more environmentally friendly and safer for employees. One of the key tools to select chemical products is the SPR QPL.

5.8 Pollution Prevention

The SPR's Pollution Prevention program integrates P2 activities into all SPR operations to minimize risks to the environment. All SPR employees have P2 responsibilities under this program as every employee generates waste which must be appropriately managed. A few of the many ongoing successful SPR P2 projects include paper use reduction, municipal solid waste diversion, paint waste elimination, exploration & production (E&P) waste recycling, sustainable acquisition, and spill prevention.

FY2013 saw a considerable increase in SPR well drilling and workover activities which have potential to generate huge volumes of waste, much of it non-hazardous. By properly managing the projects on the front end, zero hazardous drilling wastes were produced. Contractor waste management plans and controlled use of approved chemical products with less environmental impact were critical to the success of this accomplishment.

SPR P2 also includes after hours volunteer outreach activities. During 2013 SPR employees participated in Christmas recycling opportunities (including tree recycling), Earth Day promotion involving household food waste collecting non-expired food items for the Food Bank, Paper Waste Reduction Promotion, seed planting at local schools, and beach sweep events to prevent debris from washing into waterways and onto beaches.

P2 announcements and suggestions are communicated via the SPR's bi-monthly newsletter "ESPRIT", and routine email distributions including pertinent local information and useful web links. These communications are published on the MOC Environmental webpage, which is available to all SPR employees. In 2013, the SPR continued its aggressive integration of the P2 and EMS programs into its business operations, providing both cost savings and pollution reduction.

5.9 Sustainability

The SPR Sustainability Program was initiated in 2007 with the advent of EO 13423 and broadened in 2009 with EO 13514, but it has never been a unique and separate program. It focuses on resource conservation and pollution prevention, so it includes the objectives of the air, water, waste, and chemical management programs that were well established prior to 2007. Like the other programs, the sustainability program is planned, implemented, monitored and measured, evaluated, reported, and improved through the SPR EMS.

Many SPR sustainability goals – identified as "objectives" in the EMS – were created during the initial development of the SPR EMS, after evaluating SPR activities and recognizing the environmental aspects of these activities that must be controlled. These are referred to as SPR-specific "institutional" objectives. Other sustainability goals identified and mandated by the executive orders were included in the EMS in 2007 and 2009. All goal/objectives and their targets are called "performance measures" and are discussed as follows.
Forty-two performance measures were tracked by the SPR EMS in FY 2013. A target (preferably a metric that can be measured) is established for each objective. Some objectives have two targets, a "minimum" level that all DOE contractors should meet and a more challenging "stretch" level.

Performance measures are either discretely identified in the M&O contractor's contract Work Authorization Directives (WADs) as contract objectives, or they support the WADs, or they are delineated by the goals of Executive Orders 13423 and 13514.

Performance measures are agreed upon for each fiscal year by DOE and the M&O contractor and tracked for success. Some focus on specific disciplines, such as the Environmental or Emergency Management departments, while others involve all disciplines. All performance measures were related to significant environmental aspects or interests to top management.

Refer to Tables 5-16 and 5-17 for a synopsis in meeting performance measures. Institutional performance measures have been monitored and measured annually for more than 7 to 11 years. They are based strictly on SPR-specific environmental aspects. Of the 20 institutional performance measures tracked in FY 2013, 19 were met or surpassed at the more challenging stretch target level. One did not meet the stretch target (ID # 19 in Table 5-16) but surpassed the minimum target.

Table 5-17 delineates the performance measures that support the sustainability goals of Executive Orders 13423 and 13514. Of the 25 performance measures (six of which are also considered institutional) tracked in FY 2013, 14 were achieved, 8 were progressing toward achievement, and 3 had not yet shown progress.

Table 5-16 FY 14 Institutional Objectives & Targets with Performance

Aspect	Objective	Performance Status
1) Discharges	Reduce permit exceedances reported on the Discharge Monitoring Reports *Minimum: ≤8/year* *Target: ≤4/year*	Four
2) Spill, Air Emission, Monitoring, Wetlands Disturbance, Drainage, Navigation, Public Exposure	Avoid Clean Water Act, Clean Air Act, and RCRA (waste) enforcement actions (Notices of Violation – NOVs) *Minimum & Target. 0/year*	Zero
3) Spills	Reduce reportable occurrences of releases from operational facilities *Minimum: ≤8/year* *Target: ≤4/year*	One
4) Waste	Divert at least 50% Hazardous Solid Waste. *Target: ≥50%398 lbs./year* .	59.7%
5) Waste	Develop strategies to reduce municipal solid waste sent to landfills and assist the agency in achieving FY 2020 Greenhouse Gas reduction targets. *Target: 1 Strategy/year*	1 Strategy
6) Waste	Divert at least 50% of non-hazardous solid waste *Target = ≥50%*	59.1%
7) Green Procurement	Increase purchasing of EPA designated recycled content products (Affirmative Procurement) *Minimum: N/A* *Target: 100%*	YTD 100%
8) Green Procurement	Increase purchasing of bio-based products. *Minimum: N/A* *Target: 100%*	100%
9) Waste	Increase use of the Qualified Products List (QPL) *Minimum: N/A.* *Target: 100% of products sampled for QPL*	<100%
10) Waste, Spill, Air Emissions Resource Use	Review all P.R.s, designs, SOWs, and other documents submitted for Environmental review. *Minimum: N/A* *Target: 100%*	100%
11) Environmental Monitoring	Submit environmental documents on time to DOE & Regulators (timeliness and quality) *Minimum: N/A* *Target: 100%*	100%
12) Spill Monitoring & Surveillance Results	Submit annual Pipeline Integrity Report by October 31st for previous fiscal year. *Minimum: N/A* *Target: On Schedule*	On Schedule
13) Spill	Ensure key emergency equipment is available. *Minimum: 90%* *Target: 100%*	100%

Aspect	Objective	Performance Status
14) Spill Fire	Ensure BOAs are in place for spill response and clean up at each site. *Minimum: 1/site* *Target: 2/site*	Surpass Target
15) Spill Fire	Ensure emergency preparedness and response capabilities through quarterly training ERT members. *Minimum: 95% ERT trained/site* *Target: 100% ERT trained/site*	100%
16) Spill	Successfully complete PREP drills / exercises. *Minimum: N/A* *Target: 100% PREP objectives tested/site/yr.*	100%
17) Public Involvement	Plan/administer community outreach program. Complete community outreach activities using the Annual DOE SPR Public Outreach Plan as a baseline. *Minimum: Complete all activities.* *Target: Complete additional activities.*	100%
18) Wildlife Exposure	Provide habitat on site to protect wildlife. This is a 3-year objective to be achieved by end of CY09 for Clean Texas. *Minimum: N/A* *Target: ≥92.7 ac total (BC = 8 ac, WH = 37.7 ac, BH = 2 ac, BM = 45 ac)*	Maintain Target
19) Spill Air Emissions Waste	Meet weighted average (MPAR) of quality of maintenance, preventive maintenance completion, maintenance support, scheduling effectiveness, productivity, corrective maintenance backlog, readiness of critical must-operate equipment. *Minimum: 95%/month Target: 98%/month*	96%
20) Resource Use	Conduct PdM program identifying potential equipment failures. Minimum: 90% weighted avg PdM index/mo Target: 95% weighted avg PdM index/mo	100%

Table 5-17 FY 14 Objectives & Targets with Performance that Support EO 13423 & EO 13514

#	EO Goal	Aspect	Objective	Target	Performance	Success
1	Energy Efficiency and Scope 1 and 2 green house gas reduction	Air Emissions	Reduce Scope 1 and 2 green house gas emissions	Reduce by 28% by FY 2020 compared to a FY 2008 baseline	No SF6 was added or lost from equipment in FY 2014. Monitoring and management of existing sources of SF6 will continue; and as equipment containing SF6 reaches the end of service, replacements will be sought that do not use SF6 so long as they meet functional requirements. Current circuit breaker performance requirements, however, necessitate continued use of SF6. Today, non-SF6 replacements, such as vacuum circuit breakers, are not appropriate for SPR needs, but effort will continue to locate non-SF6 equipment when replacement is scheduled. In FY 2014, 30 lbs. of R-22 was replenished at BC, indicating that an equivalent amount had been lost to the atmosphere. Although R-22 is an ozone depleting substance (ODS), it is not a green house gas. No other refrigerants were replaced on the SPR. Methane is lost from brine ponds at BC and BH, brine tanks at BM and WH, crude oil tanks at BM, and frac tanks used at all storage sites except BC. The degas plant began operations on August 25, 2014, at WH. The GHG generated during the 36 days that it ran in FY 2014 are captured in this SSP. The plant generated CO2 from combustion of gasses stripped from crude oil. Process emissions were 89% lower in FY 2014 (950.14 mt) than in baseline FY 2008 (8,586.256 mt) primarily because there were only about five weeks of degasification (degas) operations at WH in FY 2014 compared to year-long degasification in FY 2008 at BM. Excluding GHG from degas operations at both sites, process GHG emissions were only 21.09 mt in FY 2014 compared to 57.725 mt in baseline FY 2008 due to higher crude oil tank use (landing losses) at BM in FY 2008. The primary sources of methane emissions in FY 2014 were frac tanks, followed by the crude oil tanks	Baseline: 35,971.2 mt FY14: 14,590.4 mt Objective met in FY14 with a 59.4% reduction. Electricity consumption (Scope 2 GHG) drives the success of this performance measure, and its consumption is driven by mission. There is a much greater chance of achieving the target during years such as FY 2014 when there are fewer fluid movements.

#	EO Goal	Aspect	Objective	Target	Performance	Success
					and brine tanks/ponds. These emissions were quickly eclipsed by CO2 emissions from the degas plant when it began operation in August at WH. The SPR FAST fleet is comprised of leased light duty cars and trucks and DOE owned heavy duty vehicles such as vacuum trucks, fire trucks, passenger busses, armored vehicles, and high water vehicles. These vehicles use gasoline and diesel. The fleet GHG contribution was greatest at WH in FY 2014 as well as in baseline FY 2008; the least has been BC. The fleet at all sites generated less GHG in FY 2014 than in FY 2008, with an overall reduction of 56%. SPR non-fleet fuel consumption and GHG generation was 23% and 26% greater, respectively, in FY 2014 than in baseline 2008. More diesel was burned in FY 2008 and FY 2014 at all sites except WH where more gasoline was consumed both years. Large non-fleet vehicles (i.e. cherry pickers, back hoes, and fork lifts) and other equipment (i.e. emergency generators and portable pumps) burn diesel fuel. Consequently, a greater portion of scope 1 GHG originated from using diesel, including at WH in FY 2014. In FY 2014 fuel consumption and GHG generation increased dramatically above baseline at BC, above baseline at BH and WH, and decreased below baseline at BM and NO/SW. Fuel consumption Increases in FY 2014 were mission-driven (i.e. supporting fueling emergency generators during electrical shutdowns, and supporting workover operations). Substantial drops in fuel consumption and GHG generation occurred in FY 2014 at BM and NO/SW where relatively little fuel is used and, therefore, minor variations in consumption result in substantial change. A total of 1.091 mt of GHG was emitted in FY 2014 in the on-site treatment of waste water. The slight decrease (-4%) over baseline FY 2008 was due to a slightly lower total headcount (GHG calculations are based on headcount) at the storage sites in FY 2014. The substantial percent difference	

#	EO Goal	Aspect	Objective	Target	Performance	Success
					observed in GHG in FY 2014 at BM compared to the other sites is due to the higher number of employees at BM in 2008 for operating the degas plant. The degas plant was moved to WH in FY 2014; therefore this site experienced and increased headcount and change in GHG emissions. Overall, waste water emissions are a relatively minute GHG source on the SPR. SPR consumed almost 31,980 MWH of electricity in FY 2014. This equates to about 15,457 mt of scope 2 GHG emissions. The following (Figures 5 and 6) is a breakdown by site. Overall, scope 2 GHG generation was 41% lower in FY 2014 than in baseline FY 2008, far surpassing the FY 2014 incremental target (-19%) and FY 2020 final target (-28%). The massive GHG reduction at BM alone drove the overall reduction to well beyond the final target. The primary energy consuming activities in FY 2014 were fluid-movement related at all storage sites and the start-up of crude oil degasification (degas) at WH at the very end of the FY. Baseline energy used at BM in FY 2008 was much greater than the other sites in that year as well as FY 2014 due to year-long degas operations. With no degassing occurring at BM in FY 2014, energy consumption and GHG generation at BM was dramatically less than that of the baseline. In FY 2014 BM was not involved in a crude oil test sale, and its overall energy consumption was lower than BH and WH which were both involved in the April-May sale. Due to its size, BC consumed the least amount of energy of the four storage sites in both baseline FY 2008 and FY 2014. Working conditions and space management in the office environment at NO did not substantially change from the baseline year to FY2014; consequently the change (a slight increase) in GHG generation was very small. Data from the power meter system at WH was used to show the dramatic effects of mission-related activities on	

#	EO Goal	Aspect	Objective	Target	Performance	Success
					electricity consumption. Energy used during the FY 2104 42-day April/May crude oil test sale was compared to energy used during the comparatively "quiet" month of June that followed. The test sale used 6.9 times more electricity (2,791 MW) than used during the month of June (405.3 MW). During the test sale, 83% of the energy was consumed by large pumps, while only 4% was used by buildings and 13% by other energy consuming equipment. During June, the pumps used only 12% of the energy, while the buildings used almost twice as much (22%),and other energy consuming equipment used over five times as much (66%) as the pumps. These drastic shifts in energy consumption and distribution make it very difficult to achieve the energy reduction goals (Scope 2 GHG and energy intensity). Overall, the goal was surpassed in FY 2014 with a 59.4% reduction in Scope 1 and 2 GHG.	
2	Energy Efficiency and Scope 1 and 2 GHG reduction	Air Emissions	Provide on-site renewable energy generation	In FY 2014, renewable energy sources will supply 7.5% of the Department's (DOE) annual electricity consumption	There are no large renewable energy generation projects at the SPR sites. A SPR cost saving reinvestment program is in place whereby money saved from using power for process operations during off-peak times during the day at the SPR sites is used to purchase annual renewable energy credits (RECs) -wind credits - in order to show DOE's leadership as a pace setter in the advancement of installation of cost-effective green renewable projects. In FY 2014 RECs were purchased by the SPR MOC on behalf of the Department of Energy. The SPR purchased 100% new renewable wind credits (3,918 MWH) from DeWind's Frisco and Little Pringle II wind farms located in Hansford and Hutchinson counties, Texas, with the most current vintage at $2.75 per MWH ($10,774.50 total cost). These facilities were commissioned in 2012 and 2010, respectively, with a combined capacity of 30 MWH. This REC purchase met the SPR's FY 2014 target of purchasing 7.5% of the total FY 2013 energy consumption from a non-hydroelectric new, renewable energy source. It far exceeds	Goal not met yet, but REC's supplement this deficiency.

#	EO Goal	Aspect	Objective	Target	Performance	Success
					the EPACT 2005's target of a 3% purchase for the fiscal year and exceeds the EO 13423 mandate of acquiring at least half (50%) of the statutorily required renewable energy from new (constructed after 1999) renewable energy sources.	
3	Scope 3 GHG reduction	Air Emissions	Reduce Scope 3 GHG	Reduce by 13% by FY 2020 based on a FY 2008 baseline.	Business air travel by prime SPR contractors overall decreased dramatically in FY 2014 over FY 2011, resulting in a 69% decrease in GHG (Figure 7). All sites surpassed the FY 2014 incremental target (-5%) and the final FY 2020 target (-13%). Most air travel originates from the NO main office. Annual air travel will vary based on SPR projects and other activities where physical presence of personnel is preferred or needed, but limited budget and the use of teleconferencing help reduce air travel and GHG emissions. Business ground travel (vehicle rentals and personal vehicle use) by prime SPR contractors overall decreased in FY 2014 over FY 2011, resulting in a 23% decrease in GHG (Figure 8). This surpasses the incremental target for FY 2014 (-5%) and the final FY 2020 target (-13%). Site ground travel in FY 2014 was greater than in baseline FY 2011 only at BH, and this was due to the exclusive use of personal vehicles in FY 2014. SPR-wide in FY 2014, more than 20 times as much GHG was generated from the use of personal vehicles (272.485 mt) than from rentals (13.426 mt total) for business travel. The larger GHG contributions by NO, WH, and BH were due to more travel events (NO) and longer distances traveled in personal vehicles (WH and BH). Effort continues to reduce travel through teleconferencing and reducing travel distances. Teleconferencing reduces or eliminates travel costs which benefits budgeting, and is also promoted to reduce scope 3 GHG. Commuting GHG generated by DOE and all prime contractors decreased by 6% in FY 2014 over baseline FY 2011, based on commuting surveys taken both years (Figure 9). The results are not surprising because the outcome of the survey is strongly affected by the number of SPR employees the survey represents and the mix of car and truck/SUV	Baseline: 4,723.1 mt FY14: 5,120.2 mt Objective not yet met with an observed 8.4% increase in GHG. Effort is being made to reduce travel through teleconferencing and reducing travel distances. Teleconferencing reduces or eliminates travel costs which benefits budgeting, and is also promoted to reduce scope 3 GHG. Given the time for achieving the goal (until 2020), and the effort vehicle manufacturers are taking to make their products more fuel efficient, a 13% reduction in commuting GHG is plausible. Reduction in T&D GHG is entirely affected by reduction in electricity consumed. No appreciable reduction in GHG from site sewage plants is expected, unless there is a reduction in personnel. GHG from landfilling organic waste will be reduced as less organic waste is generated and

#	EO Goal	Aspect	Objective	Target	Performance	Success
					owners who choose to take the survey. The total number of SPR employees was almost 2% lower in FY 2014 (841 employees) than in baseline FY 2011 (855 employees). Fewer personnel equates to fewer miles driven. About 7.4 million miles were driven in cars and trucks in FY 2011 and 7.2 million miles in FY 2014. The mix of miles driven by cars versus trucks favored trucks more in FY 2011 (62% of the miles driven that year) than in FY 2014 (52% of miles driven that year). Trucks are assigned a higher GHG emissions factor than cars; therefore the more miles driven by trucks will result in greater emissions calculated. Unless the future SPR personnel headcount changes more dramatically, GHG from commuting is not expected to change until personnel eventually replace their current vehicles with more fuel efficient ones. GHG emissions factors used in future commuter surveys should change to acknowledge improved vehicle efficiency. Given the time for achieving the goal (until 2020), and the effort vehicle manufacturers are taking to make their products more fuel efficient, a 13% reduction is plausible. The losses from transmitting and distributing (T&D) electric power from the generation source to the SPR sites is directly proportional to the amount of energy consumed. The amount of Scope 3 GHG equivalent to T&D losses is in step with Scope 2 GHG equivalent to electric power consumed. The 41% drop in Scope 3 GHG generation between FY 2008 and FY 2014 is exactly the same for energy consumed. Although the storage sites operate their own small package wastewater treatment plants, NO is serviced by a municipal plant. In FY 2014, 0.928 mt of GHG were generated by NO. This is slightly less (-4%) than the FY 2011 baseline (0.967 mt), as would be expected; the calculation is based on head count, and the NO headcount decreased slightly in FY 2014. All sites generate municipal solid waste (MSW) streams that	more is recycled.

#	EO Goal	Aspect	Objective	Target	Performance	Success
					can generate GHG, but putrescible waste generation is very limited. There are no food services and no composting at the sites. Other organic waste streams such as wood are recycled if possible. Overall, GHG generated from biodegrading wastes in landfills increased by 0.4% in FY 2014 over baseline FY 2008. Differences in the amounts of GHG generated by site wastes are directly related to the amount of solid waste disposed from each site. BM and WH generated less waste, and therefore less GHG, in FY 2014 than in FY 2008. BC, BH, and NO/SW generated more waste in FY 2014, therefore more GHG. WH had the greatest reduction; hurricane related clean-up activities and construction in the FY 2008 baseline year generated substantially more waste than in FY 2014. NO generated the greatest amount of municipal solid waste (trash) in both years due to much larger workforce than at the storage sites, resulting in the greatest amount of GHG. Its slight increase in FY 2014 is based on more trash pick-ups than in FY 2008.	
4	Energy Efficiency and Scope 1 and 2 green house gas reduction	Energy Use	Reduce energy intensity	Reduce by 30% by FY 2015 based on a FY 2003 baseline.	The SPR's energy consumption in FY 2014 was 31,980 MWH while that of the FY 2003 baseline was 45,594 MWH. This is a 30% decrease in FY 2014. Energy use fluctuates annually due primarily to fluid movements, not to building load. Fluid movements use pumps, and pumps use a lot of energy. These mission-driven activities can not support energy intensity reduction. In addition, goal square footage for the entire SPR dropped 25% from FY 2003 to FY 2014 which makes target achievement a greater challenge. Overall, SPR energy intensity decreased by 9% in FY 2014 compared to baseline FY 2003. The FY 2014 incremental reduction target (-27%) and final target (-30%) were not met. BC, BH, and BM met both targets in FY 2014. The targets can not be met at NO due to the decrease in building total square footage (from 226,734 SF to 102,822 SF) that occurred after FY 2003. DOE ended the lease of a nearby large but relatively low energy-intensive warehouse and replaced it with a leased warehouse at Stennis that is excluded from the energy intensity goal. Site processes at WH (i.e. fluid movements and crude oil degasification) in	Baseline: 334,237 Btu/GSF FY14: 304,710 Btu/GSF 9% reduction Objective not yet met.

#	EO Goal	Aspect	Objective	Target	Performance	Success
					FY 2015 caused the increase in energy consumption over FY 2003 and consequently the increase in energy intensity. As with the GHG reduction goal, mission-critical activities increase energy use and create a challenge to achieve the reduction target by FY 2015. The following SPR activities continue to support reduction of energy intensity: • Modified Recovery Pumping Equipment (RPX) Exercises - This exercise consists of a field inspection of RPX equipment assembled in a layout using approved Letters of Instructions and drawings. Verification of instructions and any obstacles discovered within the pump or piping path will be documented with action assignments. This exercise stresses proper layout and assembly of the emergency pumping equipment. It does not require that the diesel pumps be run, and therefore eliminates diesel fuel consumption and CO2 emissions. • Table Top System Test Exercises (STEs) - Energy Management and SPR Operations will continue to schedule quarterly table-top STEs which do not actually use the large pumps and motors to move crude oil into pipelines to nearby oil terminals. The exercises consist of detailed discussions of each person's/organization's role or responsibilities, the procedures to be followed, and the coordination necessary to conduct the exercise scenarios supplied in the plan. Site field tours of equipment or grounds may also be conducted during the exercises. These exercises do not consume electric power through operational processes, and therefore eliminate those CO2 emissions. • Lighting Pilot Tests Induction Lighting Induction lighting provides higher lumens and better lighting with fewer shadows and dark areas.	

#	EO Goal	Aspect	Objective	Target	Performance	Success
					The lamps have extremely long life (100,000 hours), are highly sustainable (maintenance-free) and energy efficient (average 50% power reduction), and provide higher light quality (excellent color rendering index), instant on, better light output, and reduction in Scope 2 GHG emissions and hazardous waste when disposed. In FY 2013, induction flood lamps were installed at BC around new Cavern 102. Two flood lamps were also installed at the Security entry portal at BM. Potentially, these lamps could incrementally replace outdoor high pressure sodium lights used at the storage sites. As a replacement for fluorescent lighting, induction lighting was successfully tested in 2011 at BC in a small fire foam building and the tool room. They were also installed in the BM and BC maintenance bays in 2012 and 2013, respectively. LED Lighting The use of light emitting diode (LED) lighting inside buildings at Big Hill continues to grow. In FY 2014 40 fluorescent bulbs were replaced with LED lamps, with an expected energy savings of about 8,000 KWH per year. Previously in 2011 and 2012, 170 fluorescent bulbs were replaced with LED lamps, and in FY 2013 eleven incandescent bulbs were replaced. The effort expended to retrofit LED tube lamps is not much greater than that of replacing fluorescent lamps. • Green Building Specifications – Building standard specifications have been reviewed and updated to include design and materials that support sustainability. Reduced energy intensity was included where applicable. These specifications will be applied to future construction projects where appropriate.	

#	EO Goal	Aspect	Objective	Target	Performance	Success
					• Data Center Energy Efficiency - Improving computing equipment's energy efficiency has been an issue. The SPR has one small (1200 sq ft) data center at NO. Energy efficiency improvements have been made through equipment choice and using virtualization. End-user energy efficiency has been improved through using virtual desktops, thin client equipment, and power management strategies. Since SPR systems are designed for virtual delivery to desk top services at the storage sites and other remote locations, it would easily support greater telecommuting effort. • A feasibility study was conducted in FY 2011 - 2012 on the data center to look for opportunities to reduce energy consumption of the data center and server operations. The HVAC system was the focus for improvement, replacing 13 year-old equipment with new, more energy efficient units.	
5	Energy Efficiency and Scope 1 and 2 green house gas reduction	Air Emissions	Reduce Departmental fleet petroleum use and increase use of alternative fuels. Acquire alternative fuel light duty vehicles.	Reduce petroleum use by 2% annually and by 30% by FY 2020, based on a FY 2005 baseline. Increase use of alternative fuels by 10% year over year. Strive to meet 75% acquisition of alternative fuel vehicles by FY 2015, if available.	No alternative fuel is currently used in the SPR light duty vehicles. All fleet cars, SUVs, and pick-up trucks are leased to the SPR by GSA. DOE continues to review and approve the EPACT 2005 Section 701 alternative fuel vehicle waiver request for the SPR. There continues to be no liquefied petroleum gas (LPG) and E85 service infrastructure around SPR sites; consequently the SPR does not use these fuels in its vehicles. LPG/gasoline trucks leased several years ago have been replaced with conventional gasoline and flex fuel counterparts, and gasoline hybrids. Use of E85 fuel will increase if it becomes available within the region; 57% (63 vehicles, all light-duty trucks and light-duty SUVs) of the leased fleet are "flex fuel" E85 compatible. Two small low-speed electric utility vehicles are still used on the SPR at the Stennis Warehouse, relics of an unsuccessful attempt to replace small gasoline utility vehicles with electric equivalents. A small fleet and chargers were purchased by DOE for each storage site. The vehicles were not highway-worthy and not classified as light-duty. The effort failed because the vehicles were unreliable and remained so despite	Met vehicle reduction target. No increase in alternate fuel use. Baseline fuel used: 126,404 gal FY14 fuel used: 49,384 gal. Surpassed fuel reduction goal with a 61% reduction The SPR will continue to do the following • "Right size" fleet capacity • Continue annual submission of alternative fuel vehicle (AFV) waiver until alternative fuel infrastructure develops

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					experimenting with absorbed glass mat batteries to improve battery performance. These vehicles would perform much better in an indoor environment; they were not water tight and had no means of defrosting the windshield during rain and cold weather. The variety and performance of electric vehicles was re-examined in FY 2014. No new technology was found that would improve charging or range performance. Batteries used ten years ago in the SPR electric fleet are still used today. There are now electric low-speed vehicles that resemble their conventional counterparts, including windshield wipers, interior air fans, and heaters. However, their cost is as much or greater than conventional vehicles. Additionally, GSA in this region no longer leases electric low-speed vehicles. Mileage and fuel consumption of DOE leased fleet vehicles [cars, pick-up trucks, and sport utility vehicles (SUVs)] are tracked in the FAST database. In FY 2014 eight Ford Fusion hybrid sedans, one Ford Escape hybrid SUV, and four Chevrolet C 1500 Silverado hybrid trucks were part of the SPR fleet and supported the fuel reduction goal. The leased vehicle fleet was reduced by one vehicle in FY 2013, from 111 vehicles to 110, and remained at that level throughout FY 2014. Petroleum fuel consumption by leased vehicles in FY 2005 was unusually high, 126,404 gal of gasoline, according to FAST. Two hurricanes (Katrina and Rita) that year resulted in heavy vehicle use between sites as personnel were temporarily stationed at different work locations to conduct the mission to drawdown. In FY 2005 16,055 gal of alternative fuel LPG was consumed by fleet trucks at BH and WH, but none has been used since due to lack of fueling infrastructure and vehicle engine repair issues. The last LPG truck was returned to GSA in FY 2011.	around SPR sites. • Replace the fleet with more hybrids (as budget allows) and high mileage conventional vehicles if an E85 (85% ethanol/15% gasoline blend) fuel infrastructure does not develop in this region. • For business, individuals support carpooling when applicable. Mini-vans remain in the fleet for this purpose. Management is involved with enforcing the rules concerning car pooling. M&O travel procedures require video and web conferencing consideration as primary option, before checking out a fleet vehicle for a trip.

#	EO Goal	Aspect	Objective	Target	Performance	Success
					A total of 107,025 gallons of petroleum fuel were consumed in FY 2014 by the entire FAST fleet. Of this, 99,817 gallons were gasoline and 7,208 gallons were diesel. Law enforcement and emergency vehicles are exempted from this goal. Removing these vehicles, the fuel totals are 46,216 gallons of gasoline and 3,168 gallons of diesel (49,384 gal total). Fuel consumption in FY 2014 was 61% less than that of FY 2005. Based on FY 2014 performance, the compliant FAST fleet has met and surpassed the incremental target (-18%) and the final FY 2020 target (-30%).	
6	Energy Efficiency and Scope 1 and 2 green house gas reduction Water use efficiency and management	Energy and Water Use	Install metering for electricity and water.	To the maximum extent practicable, install advanced metering for electricity and standard metering for water.	A total of 29 standard electrical utility meters are used at the SPR, including the NO office. BC, BH, and WH have a utility meter at their main substations, and BM has three. Utility meters also monitor much smaller electric loads at other site locations such as brine disposal wells, off-site valve actuators and cathodic protectors, trailer and work-over rig yards, raw water intake structures, and the degas plant. A total of 24 power sub-meters have been installed at the storage sites, in each site substation, control center, maintenance building, and administration building, and at the property warehouse at BM. Replacement of the power monitoring control communication (PMCC) system at each storage site and related software upgrades allow these meters to perform like advanced meters. Meter data is captured on 15 or 30-minute demand periods and stored by a data historian for analyses. The PMCC and software upgrades also provide electrical monitoring of 83 large 4160V pumps. Motor management relays on each pump allow the pumps to be monitored as if advanced-metered, including continuous recording and tracking data. This provides metering of a large portion of the process load. The process load is much greater than the hotel load of the buildings.	Objective met for metering electricity, but no progress for sub-metering potable water. Currently there are no plans to sub meter water.

#	EO Goal	Aspect	Objective	Target	Performance	Success
					Each storage site has one water meter that monitors site-wide potable water consumption. Sub-metering has not been implemented. Gas meters have not been installed in separate buildings or process areas at the storage sites. Steam metering is not applicable on the SPR.	
7	Energy Efficiency and Scope 1 and 2 green house gas reduction	Energy Use	Install cool roofs	Install cool roofs, unless uneconomical, for applicable building roof replacements.	No cool roofs were installed in FY 2014. Cool roof requirements and applicability will be evaluated on all future roof replacements of existing buildings and new buildings.	Objective will be met when the appropriate application occurs.
8	Energy Efficiency and Scope 1 and 2 green house gas reduction Water use efficiency and management	Energy and Water Use	Train personnel to direct energy and water management programs.	Trained personnel will direct energy and water management programs and dedicate all or a substantial portion of their time to effective implementation of energy and water management plans. DOE facility energy managers are to be certified energy managers by 9/12.	In FY 2014 the SPR had not yet identified a person to become a certified energy manager, although focal points had been identified for DOE and the M&O contractor. SPR staff will continue to enhance their current knowledge base by attending conferences if possible, participating in teleconferences, and taking FEMP sponsored web-based training.	Objective not yet met. Energy and water management issues were handled by the M&O Environment and Sustainability department (three personnel) and supported by personnel from other departments such as Property and Engineering.
9	Energy Efficiency and Scope 1 and 2 green house gas reduction	Air Emissions	Reduce or eliminate the use of sulfur hexafluoride (SF6).	Establish a sulfur hexafluoride (SF6) management program to control and reduce or eliminate SF6 fugitive emissions.	The SPR will control and, when practicable, reduce or eliminate fugitive emissions from sulfur hexafluoride (SF6). Due to its high dielectric strength, SF6 is used as an insulating gas in some DOE-owned high-voltage circuit breakers. Key SF6 potential emission sources have been identified at West Hackberry (WH), Big Hill (BH), and Bryan Mound (BM) and are being monitored and managed to prevent its release. The SPR has very small quantities (340 lbs. total) of SF6. Maintenance contracts for repairing and maintaining these circuit breakers specify that SF6 be	SF6 use can not be eliminated, but it is managed.

#	EO Goal	Aspect	Objective	Target	Performance	Success
					captured and removed during service if the service could otherwise cause SF6 emissions. All chemical product purchasing is monitored to control, reduce, or eliminate chemicals like SF6.	
10	High performance sustainable design	Project Design	Increase number of high performance sustainable buildings on the SPR	15% of enduring buildings larger than 5,000 GSF on the SPR must be compliant with the five guiding principles of the High Performance Sustainable Building by 2015.	In FY 2014 no buildings complied with the Guiding Principles, but eight buildings were identified for upgrading to meet the 15% target by FY 2015. In 2011 the DOE A/E contractors conducted a gap analysis to identify necessary projects required to bring these buildings into compliance, and a schedule and cost estimates were developed. A budget module for funding was created by DOE in FY 2012, and it has been updated annually thereafter.	Objective not yet met, but the SPR is prepared for building upgrading when funding is available.
11	Water use efficiency and management	Water Use	Reduce potable water use	Reduce potable water intensity by 16% by FY 2015 and 26% by FY 2020, based on a FY 2007 baseline.	Potable water consumption and intensity decreased by 17% and 13%, respectively, in FY 2014 relative to baseline FY 2007 at SPR storage sites. The reduction in water intensity does not meet the FY 2014 incremental target (-14%) or the final target (-26%). The volume of potable water consumed at the storage sites is related to the level of mission/industrial activity more so than use in buildings. Potable water can be used for cooling pump bearings and flushing pump seals when the pumps are operating. It can also be used to dissolve salt obstructions in brine piping and serve as the water source for site fire systems. BC uses the least amount of potable water because raw water from adjacent Cavern Lake is used for the fire system and pump bearing cooling. Brine injection pumps are the only pumps that use potable water for seal flush. WH has also decreased its dependency on potable water for pumps and the fire system use by substituting ILA water from the site's water well. BH uses potable water for pump seal flush and the fire system. BM supplies potable water to a recirculating system for cooling pump bearings, but it is expended for seal flush and the site fire system. Compared to FY 2007, potable water use in FY 2014	Baseline: 41.344 gal/SF FY14: 35.878 gal/SF 13% reduction in water intensity Objective not yet met. Water-conservation fixtures have been installed in buildings, and additional water conservation methods will focus on water conservation awareness campaigns and systems maintenance (leak detection and repair). Industrial uses must be examined to see if and how water use can be minimized.

#	EO Goal	Aspect	Objective	Target	Performance	Success
					dropped dramatically at BM (from about 13.9 M bbls to 4.6 M bbls) due to vastly lower pump operation. BC pumped similar volumes of fluids in FY 2007 and FY 2014 (5.6 M bbls and 5.1 M bbls, respectively), but potable water consumption was much greater in FY 2007 due to the much heavier use of brine pumps for brine disposal while receiving crude oil ("Katrina Exchange"). Although WH pumped more fluids in FY 2014 than in FY 2007 (26.8 M bbls and 4.6 M bbls, respectively), much less potable water was used in FY 2014 because of the switch to ILA water. The only increase in potable water use was at BH where far more fluids were pumped in FY 2014 than in FY 2007 (29.3 M bbls and 1.9 M bbls, respectively). Another contributor to potable water reduction at BC may be the change in potable water supplies that occurred in FY 2011. In FY 2007, BC produced, chlorinated, and distributed its own potable water from an on-site well. The legs of the on-site distribution system were routinely opened and water was flushed to the ground to assure adequate chlorination throughout the system. Routine flushing ceased when the site was tied in to a municipal water system in 2011. The potential use of gray water to replace potable water in some circumstances was examined in FY 2014. Texas regulates gray water management, and their regulations [30 TAC Chapter 210 *(Use of Reclaimed Water)* and Subchapter F *(Use of Gray Water Systems)*] were applied to all storage sites to determine feasibility. Gray water from bathroom sinks and showers only could be reused. If gray water is used in an operational process, it must be treated to a standard that allows it to be used in that process. If it is used for landscape watering, dust control, or toilet flushing, it must meet specific standards for fecal coliform. The bottom line – it is not economically feasible to use gray water at the SPR storage sites since substantial plumbing modifications and additions would be needed in the buildings. If it were simply used for irrigation, it would be applied in an	

#	EO Goal	Aspect	Objective	Target	Performance	Success
					environment that is generally well-watered naturally by rainfall. Its one advantage is that under normal conditions it would reduce the hydraulic loading of the sites' wastewater treatment plants. Overall, however, using gray water would not be cost-effective. Fire system leaks at BH, BM, and WH increase the challenge to meeting the potable water reduction target. Fire system maintenance also requires periodic system flushing and flow testing.	
12	Water use efficiency and management	Water Use	Reduce industrial/land-scaping/agricul-tural (ILA) water use	Reduce ILA water consumption by 20% by FY 2020, based on an FY 2010 baseline.	The only fresh water defined as "industrial, landscape, and agricultural" (ILA) water on the SPR is sourced from a single deep well devoted to industrial usage at the West Hackberry site. Two other smaller wells supply unmeasured, small volumes of water for wash down purposes at the WH and BH raw water intake structures. ILA water consumption increased 47% in FY 2014 over baseline FY 2010. The increase in FY 2014 is due to greater demand for pump seal flush and bearing cooling. It is also the primary source of water for the fire system (potable water is the second source) and flushing brine strings. ILA water has substantially reduced the use of potable water for industrial purposes.	Baseline: 5.1 MM gal FY13: 7.5 MM gal 47% increase in use Objective not yet met. Increased reliance on raw water for more than leaching caverns and drawdown activities could help reduce both potable and ILA water consumption.
13	Pollution prevention and waste elimination	Waste	Minimize waste generation and pollutants through source reduction	Refer to objectives 4 and 5-in Table 5-16.	Refer to objectives 4 and 5 in Table 5-16.	Both targets achieved. Refer to objectives 4 and 5 in Table 5-16.
14	Pollution prevention and waste elimination	Waste	Divert non-hazardous solid waste (excluding construction/ demolition debris) for recycling.	Divert at least 50% of non-hazardous solid waste (excluding construction/demo-lition debris) by the end of FY 2015.	Refer to related objective 6 in Table 5-16. In 2014, 769.6 mt of non-hazardous, non-construction solid waste were managed. Of this, 38% (479.6 mt) was recycled. The primary non-hazardous waste streams that were recycled included blasting abrasives, exploration and production (E&P) wastes, aqueous fire fighting foam, scrap metal, cardboard, paper, aluminum, plastic, electronics, and used oil. Used oil is picked up by M&O contractor -approved vendors and burned as fuel in accordance with regulations	Target for non-hazardous, non-construction solid waste was not achieved (38% recycled), but the target for municipal solid waste was achieved (58%). To help minimize waste generation, waste

#	EO Goal	Aspect	Objective	Target	Performance	Success
					for used oil burned for energy recovery. The primary waste streams that were disposed as non-hazardous solid waste included municipal solid waste and E&P wastes that could not be recycled. "Municipal solid waste" is a subset of non-hazardous non-construction solid waste. Municipal solid wastes consists of unwanted materials, such as trash and organics that are generated by normal housekeeping activities and are not considered hazardous, radioactive, or covered under the Toxic Substance Control Act (TSCA). A total of 355.8 mt of municipal solid waste was generated on the SPR. Of this, 147.7 mt was disposed and 208.1 mt – or 58% - was recycled. The municipal solid waste diversion target was surpassed.	determinations are generated and documented on each waste stream, including those that are destined for recycling. Effort continues to segregate re-useable materials from the SPR wastes.
15	Pollution prevention and waste elimination	Waste	Divert construction and demolition materials and debris for recycling.	Divert at least 50% of construction/demolition materials and debris by the end of FY 2015.	Refer to related objective 6 in Table 5-16. In FY 2014, 221.0 mt of construction/demolition materials and debris were managed. Of this, 97%, or 215.0 mt, was recycled. The C&D waste diversion target was surpassed. The primary recycled constituents were scrap metal and blasting abrasives. The remaining material disposed included concrete, asphalt, and wood.	97% was diverted. Target was achieved. The SPR is opportunistic, particularly with construction activities where bulk wastes, such as scrap metal and concrete can be recycled. Construction contractors must submit waste management plans to the MOC for approval prior to work. Wastes expected to be generated are evaluated to determine if they can be reduced and recycled prior to generation. Construction contractors are assisted in maximizing their recycling.
16	Pollution prevention and waste elimination	Waste Green Procurement	Reduce paper use and acquisition	Reduce printing paper use and acquisition of uncoated printing/writing	The SPR continues to use GSA for all printing paper purchases. All paper purchased by the SPR is 30% post-consumer, in accordance with the affirmative procurement specifications for writing papers.	Target was achieved. A "Less-Paper" work style promotional campaign was successfully implemented in

#	EO Goal	Aspect	Objective	Target	Performance	Success
	Sustainable Acquisition			paper containing at least 30% post-consumer fiber.		FY 2013 to reduce printing/copying by all SPR personnel by10%. The number of boxes of paper consumed in NO decreased from 493 boxes in FY 2012, to 444 boxes in FY 2013 (almost -10%), to 433 boxes in FY 2014 (-12%). The amount of printing paper consumed by the SPR reproduction department continually decreased from FY 2000 through FY 2013. In FY 2000, 525 boxes of writing paper were used. Use declined to 113 boxes in FY 2005, 75 boxes in FY 2010, 69 boxes in FY 2011, and 48 boxes in FY 2012 and FY 2013. In FY 2014 use increased to 64 boxes, but with no apparent cause. Consumption is expected to wane with greater reliance on electronic documents.
17	Pollution Prevention and waste elimination Sustainable Acquisition	Green Procurement	Meet procurement sustainability requirements and include sustainable acquisition clause.	At least 95% of acquisitions include sustainability clause, leadership goal target is >75% of acquisitions. Strive for 60% for biobased products by the end of FY 2013.	Effort is made to include sustainable acquisition clauses in all appropriate procurement contract solicitations. Acquisition language and summaries of work include Federally-mandated products and service requirements. Twenty-eight construction contracts and three custodial contracts were generated in FY 2014, and they were evaluated for sustainable acquisition language. Only two of the construction contracts had an opportunity for purchasing sustainable items, and both included appropriate acquisition language. All three of the custodial contracts had sustainable product acquisition opportunities, but one did not include the	All targets, except for custodial contracts, were achieved. The SPR will continue to strengthen requirements for federally-mandated designated products in all purchasing programs as necessary. The SPR will continue to document procurement requirements and review

#	EO Goal	Aspect	Objective	Target	Performance	Success
					appropriate language. Overall success was 80% (4 out of 5 contracts), which falls short of the 95% target. Purchase requests and summaries of work for contracts undergo review to assure that environmentally preferable purchasing is conducted where appropriate. Electronic purchases must meet contract specifications that include Energy Star and EPEAT requirements. As requested in solicitations, vendors must provide "sample" equipment that are evaluated for contract compliance before the purchase is shipped to the M&O contractor. Appropriate language is included as needed in solicitations for providing products that are water efficient, bio-based, environmentally preferable, non-ozone depleting, recycled content, and non-toxic or less toxic. The BIG program pulls together chemical products, equipment, and materials that can be purchased as "environmentally preferable"; this includes electronics that are EPEAT and Energy Star registered.	requisitions and products to assure environmentally preferable purchasing.
18	Pollution prevention and waste elimination	Air Emissions Public Involvement Spill/Release Waste Natural Resource Preservation	Reduce or minimize quantity of toxic/hazardous chemicals and materials acquired, used, or disposed.	Refer to objectives 7, 8, 9, and 10 in Table 5-16.	Refer to objectives 7, 8, 9, and 10 in Table 5-16. For many years the SPR has employed the QPL for selecting chemical products. The QPL is updated continuously with the addition of new greener and safer products and the deletion of previously approved products that are no longer as green or safe as newer equivalents.	Targets achieved. Control and minimization of toxic chemicals have been audited at each site from FY 2009 through FY 2014, and will continue in FY 2015. Adherence with the QPL is part of this audit, with the expectation of 100% compliance. In FY 2014, four of the five sites were 100% compliant.
19	Pollution prevention and waste elimination	Waste	Divert compostable and organic material from the waste stream.	Increase diversion of compostable and organic material from the waste stream.	Currently the SPR does not compost with designated composting equipment. Cut grass from lawns around buildings is mulched in place by mowers. Cut grass in large open areas mowed with large tractors is also left in place. Except for on-site social events, food is not prepared (i.e. in a cafeteria) at the SPR, therefore, there is no substantial	Currently this goal has no significant impact on the SPR.

#	EO Goal	Aspect	Objective	Target	Performance	Success
					amount of food scraps regularly available for composting.	
20	Pollution prevention and waste elimination	Air emissions Public Involvement Spill/Release Waste Natural Resource Preservation	Implement integrated pest management and other appropriate landscape management practices.	Reduce use of chemical pesticides in landscape management. No numerical target has been set.	Due to security requirements, vegetation is generally maintained at a low height throughout the storage sites. Vegetation is managed mechanically, primarily, and chemically where mowing is too difficult or unsafe. Only non-restricted herbicides are used. Applicators are aware of the mixing requirements set by the herbicide label so that chemical solutions are applied at the appropriate concentration for the target vegetation.	Herbicide application is minimized due to material and manpower costs. In accordance with the intent of the QPL, pesticides, like other chemical products, will be evaluated in the future for reduced toxicity.
21	Pollution prevention and waste elimination Sustainable Acquisition	Air emissions Public Involvement Spill/Release Waste Natural Resource Preservation	Use acceptable alternative chemicals and processes that support procurement policies.	Refer to objectives 7, 8, 9, and 10 in Table 5-16. Increase use of acceptable alternative chemicals and processes that support procurement policies.	Refer to objectives 7, 8, 9, and 10 in Table 5-16. The SPR M&O contractor continually seeks new chemical products, especially those that are greener than previously approved equivalents. Requests for new products come from M&O personnel and subcontractors. Only chemical products found on the SPR Qualified Products List (QPL) are allowed to be used. The QPL is a dynamic list that is becoming greener with age.	Targets achieved. Selection of chemical products purchased is controlled. All purchase requisitions (PRs) are generated electronically and go through a review process where the PR is automatically routed to different functions (i.e. environmental, safety) for review and approval before reaching the buyer. All credit card purchases are tracked with a completed form that prompts the requestor to verify that any chemical products purchased are on the QPL. No chemical products can be purchased via check requests.
22	Scope 1 GHG Pollution prevention	Air Emissions	Reduce use of chemicals that would jeopardize achieving GHG	Refer to objectives 8, 9, and 10 in Table 5-16.	Refer to objectives 8, 9, and 10 in Table 5-16. Chemical products such as refrigerants and SF6 have been identified by location and inventoried. In FY 2014, 30 lbs. of R-22 was replenished at BC, indicating that an equivalent amount	The SPR has controls in place to reduce chemicals. Selection and purchase of chemical products will

#	EO Goal	Aspect	Objective	Target	Performance	Success
	and waste elimination Sustainable Acquisition		emission reduction targets.		had been lost to the atmosphere. Although R-22 is an ozone depleting substance (ODS), it is not a green house gas. No other refrigerants or SF6 were replaced on the SPR in FY 2014. Effort continues to reduce/eliminate VOC emissions from crude oil through leak awareness, reducing exposure of VOCs to the atmosphere, and using permitted structures such as crude oil storage tanks with emissions controls.	continue to be monitored and controlled.
23	Data Centers and Electronic Stewardship	Energy Use	Meter all data centers to measure monthly power utilization effectiveness (PUE)	Meter 100% of data centers by FY 2015.	No meter has been installed to measure data center energy consumption.	Target not met, but power usage data is available from power distribution unit (PDU) for all computing equipment operating in the data center. It can not track energy used by lighting and air conditioning, however.
24	Data Centers and Electronic Stewardship	Energy Use	Data centers will be energy efficient.	Data centers will have a maximum annual weighted average PUE of 1.4 by FY 2015.	At the time of the FY 2011 in-house efficiency study, the data center had a PUE rating of 1.8, an infrastructure efficiency (DCiE) rating of 0.56, and a HVAC system effectiveness rating of 1.3. All three ratings were slightly above (better than) that of a standard data center benchmark at the time in the FEMP guide; however, the SPR data center had a cooling system efficiency rating of 1.2 kW/ton, which was slightly below the standard. The building that houses the SPR data center does not currently reuse energy (i.e. heat) from the data center. Three separate power studies focusing on the HVAC system have been conducted on the data center. In 2012, a M&O contracted third party HVAC specialist provided four alternatives for improvement. All involved replacing the 13-year-old refrigeration units with more efficient air or water cooled units. The alternatives differed based on the inclusion of LED lighting (replacing compact fluorescent lighting), data center reconfiguration to improve air flow, adding ceiling insulation, and reducing the data center's footprint. Project costs were estimated at $190K to $270K,	Evaluation so far has shown that performance would approach the 1.4 PUE target but not meet it.

#	EO Goal	Aspect	Objective	Target	Performance	Success
					depending on the alternative. The results of the evaluation were presented by the M&O contractor to DOE SPRPMO for consideration. In FY 2013, a second study was conducted by an HVAC specialist contracted by the building owner, since cost estimates in the first study included high-dollar equipment that may not have been necessary for sufficient cooling. In FY 2014 a third study was conducted by the SPRPMO A&E contractor. DOE agreed with the recommendations of this study and will replace the old stand-alone HVAC units specifically designed for data center use with new, more efficient equivalents. This should reduce the PUE, but not to a 1.4 rating. Future Energy-Star rated server replacement will help lower the PUE incrementally.	
25	Data Centers and Electronic Stewardship	Energy Use	PC's laptops, and monitors will be energy efficient.	100% of eligible PC's, laptops, and monitors will have power management features activated by FY 2012.	100% of virtual current desk top function is available to users. Energy efficient thin client devices are available to 48% of users. All printers are set to go into power saver mode when not in use. All monitors are set to go to sleep after being idle for 20 minutes.	Target achieved. Effort is being made to manage power on all eligible equipment.

5.10 Wildlife

The four SPR storage sites are located on the Central and Mississippi Flyways. The coastal position of BM, BH and WH in particular make them the last resting and feeding stop for migrating birds before they make the arduous trip across the Gulf of Mexico, to the wintering areas in central and South America; and the first stopover when they migrate back to North America in the spring. Without places along the way that provide an adequate food supply for the quick replenishment of fat reserves, water, and shelter from predators, these birds are most likely will not survive.

In an effort to provide a resting place for migrating birds selected habitat areas at BH, BM and WH are not mowed from early fall through early spring to provide food and shelter, and nesting habitat for migrating and resident birds. Nest boxes and platforms are provided for waterfowl to raise their young. Purple Martin houses have been installed at WH and BH to attract mosquito eating Martins, and invasive vegetation has been removed and replaced with native materials. At all sites when ground nests for terns, Killdeer and Nighthawk are discovered they are flagged until the chicks have fledged. Equipment harboring active bird nests is designated for limited/restricted use.

Select SPR site personnel have received wildlife rescue training in order to relocate wildlife found on the site, and trained in rehabilitation techniques such as oiled wildlife response, which allows personnel to work under the supervision of a licensed rehabilitator or manage contract rehabilitators.

Besides wildlife habitat areas, activities focus on educating personnel about the wildlife that can be found in their area. At BM, interpretive signage that identifies the waterfowl species most likely to be seen are installed around the ponds in the habitat areas. Throughout the year informative papers and posters highlighting specific wildlife topics are developed and sent to the sites for posting on their wildlife bulletin boards.

The sites also conduct periodic avian inventories per the Memorandum of Understanding (MOU) between US Fish and Wildlife and DOE. Inventories are uploaded to the Cornell Ornithology Laboratory database and are used to assess the health and movement of populations of migratory birds. The SPR has an active dialog with Cornell ornithologists regarding unusual observations, and dearth or abundance of species.

BH developed a wildlife web page within the site's website that contains photographs taken of the different bird species observed and counted as well as other interesting wildlife information. BH has actively involved employees in their wildlife program by posting photographs taken by site personnel of wildlife seen on site.

In recent years raptors have experienced a decline in population due in large part to habitat destruction and more recently pesticide use in their wintering grounds. Mice and rats are the food source for raptors, and ingesting a prey that has eaten bait will result in secondary poisoning to the raptor. In an effort to follow the MOU and avoid negative impacts on raptor populations the most harmful of rat poisons have been removed from the SPR QPL, and those rodenticides that have a less harmful impact will be approved.

6 Quality Assurance

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

6.1 Field Quality Control

All field environmental monitoring and surveillance activities are performed in accordance with standard procedures, which are maintained in the M&O contractor Laboratory Programs and Procedures Manual, the EMP, and in individual sampling and analytical work instructions. These procedures include maintenance of chain-of-custody, collection of quality control (QC) samples, and field documentation.

6.2 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 Data Management System for retention, manipulation, and interpretation. The data are compiled and appear in various reports such as this SER, in support of assessments of the SPR, evaluations of explained events, and development of appropriate responses.

6.3 Performance Evaluation Samples

The Louisiana and Texas environmental agencies have mandated that any commercial laboratory submitting environmental results from samples to the state must be accredited by the state. The SPR laboratories by definition are not "commercial" and as a result are not required to participate. However, the laboratories analyze Performance Evaluation (PE) samples twice per calendar year and these data are provided to the appropriate state agency. Through this program, the Louisiana and Texas environmental agencies ensure 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 laboratories have successfully completed their 2014 round of blind samples. Resultant data were provided to the appropriate state agencies, via the 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 analyses.

6.4 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 6-1. Sufficient quality assurance analyses were performed in 2014 to verify the continuing high quality of SPR laboratory data.

6.5 Control of Subcontractor Laboratory Quality

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 vendor's list maintained by the M&O Contractor Quality Assurance organization. The successful bidder must be on the approved vendor's list prior to the start of the laboratory contract. Vendors on the approved list are reassessed by the M&O Contractor Quality Assurance and Operations and Maintenance organizations when there is evidence of poor performance.

Table 6-1 SPR Wastewater Analytical Methodology

Parameter	Method	Source*	Description
Biochemical Oxygen Demand	5210(B) 405.1	APHA EPA-1	5 Day, 20 °C 5 Day, 20 °C
Chemical Oxygen Demand	D1252-88(B) 410.4 5220(D)	ASTM EPA-1 APHA	Micro Spectrophotometric Proc. Colorimetric, Manual Closed Reflux, Colorimetric
Fecal Coliform	Part III-C-2 9222(D)	EPA-2 APHA	Direct Membrane Filter Method Membrane Filter Procedure
Residual Chlorine	4500-C1(G) 330.5 8021	APHA EPA-1 Hach	DPD Colorimetric Spectrophotometric, DPD DPD Method
Oil & Grease (Total, Recoverable)	413.1	EPA-1	Gravimetric, Separatory Funnel Extraction
Oil & Grease (Partition, Gravimetric)	5520-(B)	APHA	Gravimetric, Separatory Funnel Extraction
Total Organic Carbon	415.1 D4839-88 5310(C) D2579(A) 5310(B)	EPA-1 ASTM APHA ASTM APHA	Combustion or Oxidation Persulfate – UV Oxidation, IR Persulfate – UV Oxidation, IR Combustion – IR Combustion - IR

Parameter	Method	Source*	Description
Dissolved Oxygen	D888-87(D) 360.1 360.2 4500-O(C) 4500-O(G)	ASTM EPA-1 EPA-1 APHA APHA	Membrane Electrode Membrane Electrode Winkler Method with Azide Mod. Winkler Method with Azide Mod. Membrane Electrode
Hydrogen Ion conc. (pH)	D1293-84(A&B) 150.1 4500-H^+(B)	ASTM EPA-1 APHA	Electrometric Electrometric Electrometric
Total Dissolved Solids (Residual, Filterable)	160.1 2540(C)	EPA-1 APHA	Gravimetric, Dried at 180°C Gravimetric, Dried at 180°C
Total Suspended Solids (Residual, Non-Filterable)	160.2 2540(D)	EPA-1 APHA	Gravimetric, Dried at 103-105°C Gravimetric, Dried at 103-105°C
Salinity	D4542-85 (Sect. 7) 2520(B) & 2510 210B	ASTM APHA APHA (16th Ed.)	Refractometric Electrical Conductivity Hydrometric
Biomonitoring	1006.0 1007.0	EPA-3 EPA-3	*Menidia beryllina* 7 day survival *Mysidopsis bahia* 7 day survival

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

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

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

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

Hach = Hach Company, Hach Water Analysis Handbook.

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

End of Section

Appendix A1
Environmental Standards List

DESCRIPTION	STANDARD	AREA
National Environmental Policy Act Implementing Procedures	10 CFR 1021	MR
Compliance with Flood Plain/Wetlands Environmental Review	10 CFR 1022	MR
Occupational Radiation Protection - Applicable and Enforceable Portions	10 CFR 835	RP
Storage, treatment, and disposal of nondefense toxic and hazardous materials	10 USC 2692	HW
Boiler And Pressure Vessels - Degas Project Only	120 IAC	IS
(Aviation) Operating Requirements: Domestic, Flag, and Supplemental Operations	14 CFR 121	IS
(Aviation) Certifications and Operations	14 CFR 125	IS
(Aviation) Certification and Operations of Scheduled Air Carriers with Helicopters	14 CFR 127	IS
(Aviation) Rotorcraft External Load Operations	14 CFR 133	IS
(Aviation) Operating Requirements: Commuter and On-Demand Operations	14 CFR 135	IS
(Aviation) Agricultural Aircraft Operations	14 CFR 137	IS
(Aviation) Certification and Operation: Land Airport Serving Certain Air Carriers	14 CFR 139	IS
(Aviation) Repair Stations	14 CFR 145	IS
(Aviation) Objects Affecting Navigable Airspace	14 CFR 77	IS
(Aviation) Notification And Reporting - Accidents and Incidents	14 CFR 830	IS
(Aviation) General Operating and Flight Rules	14 CFR 91	IS
Oil and Gas Division	16 TAC 1.3	CW TS
Environmental Recycling	16 TAC 1.4	PP
Fish and Wildlife Coordination Act	16 U.S.C. §§ 661-666c	MR
Bald and Golden Eagle Protection Acts	16 U.S.C. §§ 668-668d	MR
Migratory Bird Treaty Act	16 U.S.C. §§ 703-711	MR
Endangered Species Act	16 USC Parts 1531-1544	MR
Radiation Control	25 TAC 1.289	IH IS RP
Commerce In Explosives (ATF)	27 CFR 55	IS, CS, FP
Imminent Danger	29 CFR 1903.13	IS
Posting of Notice: Availability of the Act, Regulations, and Applicable Standards	29 CFR 1903.2	IS
Recordkeeping and Reporting Occupational Injuries and Illnesses	29 CFR 1904	IS
General (1 through 8)	29 CFR 1910 SUBPART A	IS,FP
Adoption and Extension of Established Federal Standards (11 through 19)	29 CFR 1910 SUBPART B	IS
Walking-Working Surfaces (21 through 30)	29 CFR 1910 SUBPART D	IS

DESCRIPTION	STANDARD	AREA
Means of Egress (35 through 38)	29 CFR 1910 SUBPART E	IS
Powered Platforms, Manlifts, and Vehicle Mounted Work Platforms (66 through 68)	29 CFR 1910 SUBPART F	IS
Occupational Health and Environmental Control (94 through 98)	29 CFR 1910 SUBPART G	IH
Hazardous Materials (101 through 126)	29 CFR 1910 SUBPART H	IS,CS,FP
Personal Protective Equipment (132 through 139)	29 CFR 1910 SUBPART I	IS
General Environmental Controls (141 through 147)	29 CFR 1910 SUBPART J	IS,FP
Medical and First Aid (151)	29 CFR 1910 SUBPART K	MS
Fire Protection (155 through 165)	29 CFR 1910 SUBPART L	IS,FP
Compressed Gas and Compressed Air Equipment (169)	29 CFR 1910 SUBPART M	IS
Materials Handling and Storage (176-179, 181, 183-184)	29 CFR 1910 SUBPART N	IS
Machinery and Machine Guarding (211 through 213, 215, 219)	29 CFR 1910 SUBPART O	IS
Hand/Portable Powered Tools and Other Hand-Held Equipment (241 through 244)	29 CFR 1910 SUBPART P	IS
Welding, Cutting, and Brazing (251 through 255)	29 CFR 1910 SUBPART Q	IS
Special Industries (269) Power generation, Transmission	29 CFR 1910 SUBPART R	IS
Special Industries (268) Telecommunications	29 CFR 1910 SUBPART R	IS
Electrical (301 through 306, 331–335, 399)	29 CFR 1910 SUBPART S	IS
Commercial Diving Operations (401 through 402, 410, 420-427, 430, 440-441)	29 CFR 1910 SUBPART T	IS
Toxic and Hazardous Substances (1000 through 1450 except 1029, 1043, 1045, 1047, 1050-1051)	29 CFR 1910 SUBPART Z	IH
Designations for General Industry Standards Incorporated Into Body of Construction Standards	29 CFR 1926 APPENDIX A	IS
General (1 through 5)	29 CFR 1926 SUBPART A	MO
General Interpretations (10 through 16)	29 CFR 1926 SUBPART B	IS
General Safety and Health Provisions (20 through 35)	29 CFR 1926 SUBPART C	IS,FP
Occupational Health and Environmental Controls (50 through 66)	29 CFR 1926 SUBPART D	IS
Personal Protection and Life Saving Equipment (95 through 107)	29 CFR 1926 SUBPART E	IS,FP
Fire Protection and Prevention (150 through 159)	29 CFR 1926 SUBPART F	IS,FP
Signs, Signals, and Barricades (200 through 203)	29 CFR 1926 SUBPART G	IS
Materials Handling, Storage, Use, and Disposal (250 through 252)	29 CFR 1926 SUBPART H	IS
Tools - Hand and Power (300 through 307)	29 CFR 1926 SUBPART I	IS
Welding and Cutting (350 through 354)	29 CFR 1926 SUBPART J	IS
Electrical (400 through 408, 416-417, 431-432, 441, 449)	29 CFR 1926 SUBPART K	IS
Scaffolds (450 through 454)	29 CFR 1926 SUBPART L	IS
Fall Protection (500 through 503)	29 CFR 1926 SUBPART M	IS
Cranes, Derricks, Hoists, Elevators, and Conveyors (550 through 555)	29 CFR 1926 SUBPART N	IS
Motor Vehicles, Mechanized Equipment, and Marine Operations (600 through 606)	29 CFR 1926 SUBPART O	IS
Excavations (650 through 652)	29 CFR 1926 SUBPART P	IS
Concrete and Masonry Construction (700 through 706)	29 CFR 1926 SUBPART Q	IS
Steel Erection (750 through 752)	29 CFR 1926 SUBPART R	IS
Demolition (850 through 860)	29 CFR 1926 SUBPART T	IS
Blasting and the Use of Explosives (900 through 914)	29 CFR 1926 SUBPART U	IS
Power Transmission and Distribution (950 through 960)	29 CFR 1926 SUBPART V	IS
Rollover Protective Structures; Overhead Protection (1000 through 1003)	29 CFR 1926 SUBPART W	IS
Stairways and Ladders (1050 through 1060)	29 CFR 1926 SUBPART X	IS
Diving (1071 through 1092)	29 CFR 1926 SUBPART Y	IS
Toxic and Hazardous Substances (1100 through 1152 except 1129, 1145, 1147)	29 CFR 1926 SUBPART Z	IH
Hazardous Materials Information Development, Preparedness and Response Act	30 LA RS 2361-2379 SARA Title III	CS

DESCRIPTION	STANDARD	AREA
General Air Quality Rules	30 TAC 1.101	CA
Permits by Rule	30 TAC 1.106	CA
Control of Air Pollution from Visible Emissions and Particulate Matter	30 TAC 1.111	CA
Control of Air Pollution from Sulfur Compounds	30 TAC 1.112	CA
Control of Air Pollution from Hazardous Air Pollutants	30 TAC 1.113	CA
Control of Air Pollution from Volatile Organic Compounds	30 TAC 1.115	CA
Control of Air Pollution by Permits for New Construction or Modification	30 TAC 1.116	CA
Control of Air Pollution from Nitrogen Compounds	30 TAC 1.117	CA
Control of Air Pollution Episodes	30 TAC 1.118	CA
Electronic Reporting	30 TAC 1.19.3	CA
Water Quality Certification	30 TAC 1.279	CW
Applications Processing	30 TAC 1.281	CW
Public Drinking Water	30 TAC 1.290	CW
Water Rights, Procedural	30 TAC 1.295	CW
Water Rights, Substantive	30 TAC 1.297	CW
Occupational Licenses and Registrations	30 TAC 1.30	CW
Surface Water Quality Standards	30 TAC 1.307	CW
Sludge Use, Disposal, and Transportation	30 TAC 1.312	HW
Used Oil	30 TAC 1.324	PP
Spill Prevention and Control	30 TAC 1.327	CW
Waste Minimization and Recycle	30 TAC 1.328	PP
Municipal Solid Waste	30 TAC 1.330	PP
Underground and Aboveground Storage Tanks	30 TAC 1.334	HW
Industrial Solid Waste and Municipal Hazardous Waste	30 TAC 1.335	HW
Radioactive Substance Rules	30 TAC 1.336	RP
Groundwater Protection Recommendation Letters and Fees	30 TAC 1.339	CW
Regulatory Flexibility	30 TAC 1.90	MR
MOU between TCEQ and RRC	30 TAC 7.117	CW, TS
Planning Division	31 TAC 1.15	CW
Oil Spill Prevention and Response	31 TAC 1.19	CW
Natural Resource Damage Assessment	31 TAC 1.20	CW
Oil Spill Prevention and Response Hearings Procedures	31 TAC 1.21	CW
Fisheries	31 TAC II.57	MR
Wildlife	31 TAC II.65	MR
Resource Protection	31 TAC II.69	MR
Coastal Management Program	31 TAC XVI.501	CW
Coastal Management Program Boundary	31 TAC XVI.503	CW
Coastal Management Program	31 TAC XVI.504	CW
Council Procedures for State Consistency With Coastal Management Program Goals and Policies	31 TAC XVI.505	CW
Council Procedures for Federal Consistency With Coastal Management Program Goals and Priorities	31 TAC XVI.506	CW
Certain vehicles must stop at all railroad grade crossings (Explosives)	32 LA RS 173.1	TS
Permission for operation; crossing railroad grade crossings; markings	32 LA RS 251 Subpart J. Vehicles Transporting Explosives or Inflammables	TS
Equipment and inspection (Explosives)	32 LA RS 252	TS
Handling Class I (Explosive) Materials or Other Dangerous Cargo	33 CFR 126	CW
Control of Pollution by Oil and Hazardous Substances, Discharged Removed	33 CFR 153	CW

DESCRIPTION	STANDARD	AREA
Facilities Transferring Oil or Hazardous Material in Bulk	33 CFR 154	CW
Oil and Hazardous Material Transfer Operations	33 CFR 156	CW
Reception Facilities for Oil, Noxious Liquid Substances, and Garbage (MARPOL)	33 CFR 158	HW
Permits for Structures or Work in or Affecting Navigable Waters of the U.S.	33 CFR 322	CW
Permits for Discharges of Dredged or Fill Material into Waters of the U.S.	33 CFR 323	CW
Process of Department of Army Permits	33 CFR 325	CW
Enforcement	33 CFR 326	CW
Definition of Waters of the United States	33 CFR 328	CW
Definition of Navigable Waters of the United States	33 CFR 329	CW
Nationwide Permits	33 CFR 330	CW
Compensatory Mitigation for Losses of Aquatic Resources	33 CFR 332	CW, MR
Markings of Structures, Sunken Vessels and Other Obstructions	33 CFR 64	CW
Private Aid to Navigation	33 CFR 66	CW
Aids to Navigation on Artificial Islands and Fixed Structures	33 CFR 67	CW
Risk Evaluation/Corrective Action Program	33 LAC I.13	MR
Groundwater Fees	33 LAC I.14	MR
Permit Review	33 LAC I.15	MR
Departmental Administrative Procedures	33 LAC I.3	MR
Notification Regulations and Procedures for Unauthorized Discharges	33 LAC I.39	MR
Policy and Intent	33 LAC I.45	MR
Program Requirements	33 LAC I.47	MR
Organization and Personnel Requirements	33 LAC I.49	MR
On-site Inspection/Evaluation	33 LAC I.51	MR
Quality System Requirements	33 LAC I.53	MR
Sample Protocol/Sample Integrity	33 LAC I.55	MR
Maintenance of Accreditation	33 LAC I.57	MR
Emergency Response Regulations	33 LAC I.69	MR
General Provisions	33 LAC III.1	CA
Control of Emissions of Smoke	33 LAC III.11	CA
Emission Standards for Particulate Matter	33 LAC III.13	CA
Conformity	33 LAC III.14	CA
Rules and Regulations for the Fee System of the Air Quality Control Programs	33 LAC III.2	CA
Control of Emission of Organic Compounds	33 LAC III.21	CA
Odor Regulations	33 LAC III.29	CA
Standards of Performance for New Stationary Sources	33 LAC III.30	CA
Permit Procedures	33 LAC III.5	CA
Prevention of Air Pollution Emergency Episodes	33 LAC III.56	CA
Ambient Air Quality	33 LAC III.7	CA
General Regulations on Control of Emissions and Emission Standards	33 LAC III.9	CA
General Provisions	33 LAC IX.1	CW
Surface Water Quality Standards	33 LAC IX.11	CW
Louisiana Water Pollution Control Fee System Regulation	33 LAC IX.13	CW
Water Quality Certification Procedures	33 LAC IX.15	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.17	CW
State of Louisiana Stream Control Commission	33 LAC IX.19	CW

DESCRIPTION	STANDARD	AREA
The LPDES Program Definitions and General Program Requirements	33 LAC IX.23	CW
Permit Application and Special LPDES Program Requirements	33 LAC IX.25	CW
LPDES Permit Conditions	33 LAC IX.27	CW
Transfer, Modification, Revocation and Reissuance, and Termination of LPDES Permits	33 LAC IX.29	CW
Permits	33 LAC IX.3	CW
General LPDES Program Requirements	33 LAC IX.31	CW
Specific Decisionmaking Procedures Applicable to LPDES Permits	33 LAC IX.33	CW
Enforcement	33 LAC IX.5	CW
Effluent Standards	33 LAC IX.7	CW
Spill Prevention and Control	33 LAC IX.9	CW
General Provisions and Definitions	33 LAC V.1	HW
Definitions	33 LAC V.109	HW
Generators	33 LAC V.11	HW
Transporters	33 LAC V.13	HW
Treatment, Storage and Disposal Facilities	33 LAC V.15	HW
Containment Buildings	33 LAC V.18	HW
Tanks	33 LAC V.19	HW
Containers	33 LAC V.21	HW
Prohibitions on Land Disposal	33 LAC V.22	HW
Corrective Action Management Units and Temporary Units	33 LAC V.26	HW
Transportation of Hazardous Liquids by Pipeline	33 LAC V.30	TS
Financial Requirements	33 LAC V.37	HW
Universal Wastes	33 LAC V.38	HW
Small Quantity Generators	33 LAC V.39	HW
Used Oil	33 LAC V.40	PP
Recyclable Materials	33 LAC V.41	PP
Lists of Hazardous Wastes	33 LAC V.49	HW
Fee Schedules	33 LAC V.51	HW
Manifest System for TSD Facilities	33 LAC V.9	HW
General Provisions and Definitions (solid waste regulations)	33 LAC VII.1	HW
Recycling and Waste Reduction Rules	33 LAC VII.103	PP
Waste Tires	33 LAC VII.105	PP
Scope and Mandatory Provisions of the Program	33 LAC VII.3	HW
Solid Waste Management System	33 LAC VII.5	HW
Solid Waste Standards	33 LAC VII.7	HW
Enforcement	33 LAC VII.9	HW
Program Applicability and Definitions	33 LAC XI.1	HW
Enforcement	33 LAC XI.15	HW
Registration Requirements, Standards and Fee Schedule	33 LAC XI.3	HW
Spill and Overfill Control	33 LAC XI.5	HW
Methods Release Detection and Release Reporting, Investigation, Confirmation and Response	33 LAC XI.7	HW
Out of Service UST Systems and Closure	33 LAC XI.9	HW
General Provisions	33 LAC XV.1	RP
Notices, Instructions, and Reports to Workers; Inspections	33 LAC XV.10	RP
Regulation and Licensing of Naturally Occurring Radioactive Material (NORM)	33 LAC XV.14	RP
Transportation of Radioactive Material	33 LAC XV.15	RP
Licensing and Radiation Safety Requirements for Irradiators	33 LAC XV.17	RP

DESCRIPTION	STANDARD	AREA
Registration of Radiation Machines and Facilities	33 LAC XV.2	RP
Radiation Safety Requirements for Wireline Service Operations and Subsurface Tracer Studies	33 LAC XV.20	RP
Fee Schedule	33 LAC XV.25	RP
Licensing of Radioactive Material	33 LAC XV.3	RP
Standards for Protection Against Radiation	33 LAC XV.4	RP
Radiation Safety Requirements for Industrial Radiographic Operations	33 LAC XV.5	RP
Radiation Safety Requirements for Analytical X-Ray Equipment	33 LAC XV.8	RP
Advisory Council on Historical Preservation	36 CFR 800	MR
Pesticides	4 TAC I.7	CS
Asbestos	40 CFR 763	IH,CS
Criteria for State, Local, and Regional Oil Removal Contingency Plans	40 CFR 109	CW
Discharge of Oil	40 CFR 110	CW
Oil Pollution Prevention	40 CFR 112	CW
Designation of Hazardous Substances	40 CFR 116	CW
Determination of Reportable Quantities for Hazardous Substances	40 CFR 117	CW
State Certification of Activities Requiring a Federal License or Permit	40 CFR 121	CW
EPA Administrated Permit Programs: The National Pollutant Discharge Elimination System	40 CFR 122	CW
Procedures for Decision Making	40 CFR 124	CW
Criteria and Standards for NPDES	40 CFR 125	CW
Toxic Pollutant Effluent Standards	40 CFR 129	CW
Water Quality Planning and Management, Water Quality Standards	40 CFR 131	CW
Secondary Treatment Regulation	40 CFR 133	CW
Guidelines Establishing Test Procedures for the Analysis of Pollutants	40 CFR 136	CW
National Primary Drinking Water Regulations	40 CFR 141	CW
National Primary Drinking Water Regulations Implementation	40 CFR 142	CW
National Secondary Drinking Water Regulations	40 CFR 143	CW
Underground Injection Control Program	40 CFR 144	CW
Underground Injection Control Program: Criteria and Standards	40 CFR 146	CW
State Underground Injection Control Programs	40 CFR 147	CW
Sole Source Aquifers	40 CFR 149	CW
NEPA Purpose, Policy and Mandate	40 CFR 1500	MR
NEPA and Agency Planning	40 CFR 1501	MR
NEPA Environmental Impact Statement	40 CFR 1502	MR
NEPA Commenting	40 CFR 1503	MR
NEPA Predecision Referrals to the Council of Proposed Federal Actions Determined to be Environmentally Unsatisfactory	40 CFR 1504	MR
NEPA and Agency Decision Making	40 CFR 1505	MR
Other Requirements of NEPA	40 CFR 1506	MR
NEPA Agency Compliance	40 CFR 1507	MR
NEPA Terminology and Index	40 CFR 1508	MR
Freedom of Information Act Procedures	40 CFR 1515	MR
Privacy Act Implementation	40 CFR 1516	MR
Pesticide Registration and Classification Procedures	40 CFR 152	CS
Labeling Requirements for Pesticides and Devices	40 CFR 156	CS
Worker Protection Standards (Pesticides)	40 CFR 170	CS
Certification of Pesticide Applicators	40 CFR 171	CS

DESCRIPTION	STANDARD	AREA
General	40 CFR 220	CW
Section 404 (b) (1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material	40 CFR 230	CW, MR
Guidelines for Storage and Collection of Residential, Commercial, and Institutional Solid Wastes	40 CFR 243	HW
Comprehensive Procurement Guideline for Products Containing Recovered Materials	40 CFR 247	PP
Hazardous Waste Management System: General	40 CFR 260	HW
Identification and Listing of Hazardous Waste	40 CFR 261	HW
Standards Applicable to Generators of Hazardous Wastes	40 CFR 262	HW
Standards applicable to transporters of hazardous wastes	40 CFR 263	HW
Standards for Owners and Operators of Hazardous Waste, Treatment, Storage, and Disposal Facilities	40 CFR 264	HW
Standards for Management of Specific Hazardous Wastes	40 CFR 266	HW
Land Disposal Restrictions	40 CFR 268	HW
Requirements for Authorization of State Hazardous Waste Programs	40 CFR 271	HW
Approved State Hazardous Waste Management Programs	40 CFR 272	HW
Standard for Universal Waste Management	40 CFR 273	HW
Standards for Management of Used Oil	40 CFR 279	HW
Technical Standards and Corrective Action Requirements for Owners and Operators of UST	40 CFR 280	HW
Approved Underground Storage Tank Programs	40 CFR 282	HW
National Oil and Hazardous Substances Pollution Contingency Plans	40 CFR 300	CS
Designation of Reportable Quantities and Notification	40 CFR 302	CS
Emergency Planning and Notification	40 CFR 355	CS
Hazardous Chemical Reporting: Community Right-to-Know	40 CFR 370	CS
Toxic Chemical Release Reporting: Community Right-to-Know	40 CFR 372	CS
Reporting Hazardous Substance Activity When Selling or Transferring Federal Real Property	40 CFR 373	CS
General Provisions	40 CFR 401	CW
General Pretreatment Regulations for Existing and New Sources of Pollution	40 CFR 403	CW
Approval & Promulgation of Implementation Plans	40 CFR 52	CA
Ambient Air Monitoring	40 CFR 53	CA
Standards of Performance for New Stationary Sources	40 CFR 60	CA
Determination of Emissions from Volatile Compounds Leaks	40 CFR 60, Appendix A, Method 21	CA
Assessment and Collection of Noncompliance Penalties	40 CFR 66	CA
State Operating Permit Programs	40 CFR 70	CA
General	40 CFR 700	CS
PCB Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions	40 CFR 761	CS
Regulations of Fuels and Fuel Additives	40 CFR 80	CA
EPA Regulations Designating Areas for Air Quality Planning	40 CFR 81	CA
Protection of Stratospheric Ozone	40 CFR 82	CA
Confiscation and disposal of explosives	40 LA RS 1472.11	IS
Unlawful storage of explosives	40 LA RS 1472.12	IS
Abandonment of explosives	40 LA RS 1472.13	IS
Careless use of explosives	40 LA RS 1472.18	IS
Reckless use of explosives	40 LA RS 1472.19	IS
License; manufacturer-distributor, dealer, user, or blaster of explosives	40 LA RS 1472.3	IS
Possession without license prohibited; exceptions (Explosives)	40 LA RS 1472.4	IS
Reports of losses or thefts; illegal use or illegal possession (Explosives)	40 LA RS 1472.7	IS

DESCRIPTION	STANDARD	AREA
Energy Policy Act of 2005	42 USC 15801	MR, ABP, PP
Energy Conservation Reauthorization 1998	42 USC 6201 et seq.	MR, ABP, PP
Energy Policy and Conservation Act 1975 and 1994	42 USC 6291-6309	MR, ABP, PP
RCRA and Affirmative Procurement	42 USC 6962	MR, PP
National Environmental Policy	42 USC Chapter 55	MR
Air Pollution Prevention and Control	42 USC Chapter 85	CA
National Energy Policy Act of 1992	42 USC Chapter 91	MR, ABP, PP
Coastal Management	43 LAC I.7	CW
Water Resources Management	43 LAC VI	CW
Underwater Obstructions	43 LAC XI.3	TS
Pipeline Safety	43 LAC XI.5	TS
General Provisions (Statewide Order 29-B)	43 LAC XIX.1	CW
Pollution Control - Onsite Storage, Treatment and Disposal of Exploration and Production Waste (E&P Waste) Generated from the Drilling and Production of Oil and Gas Wells (Oilfield Pit Regulations)	43 LAC XIX.3	CW
Pollution Control (Class II Injection/Disposal Well Regulations)	43 LAC XIX.4	CW
Fees	43 LAC XIX.7	CW
Reporting	43 LAC XIX.9	CW
Class I, III, IV, and V Injection Wells (Statewide Order 29-N-1)	43 LAC XVII.1	CW
Hydrocarbon Storage Wells in Salt Dome Cavities (Statewide Order 29-M)	43 LAC XVII.3	CW
Certification (Water and Wastewater Operator Certification)	48 LAC V.73	CW
Drinking Water Program	48 LAC V.77	CW
Oil Spill Prevention and Response Plans	49 CFR 130	CS
General Information, Regulations, and Definitions	49 CFR 171	TS
Hazardous Material Tables, Hazardous Materials Communications Requirements and Emergency Response Information Requirements	49 CFR 172	TS
Shippers - General Requirements for Shipments and Packaging	49 CFR 173	TS
Carriage by Public Highway	49 CFR 177	TS
DOT Response Plans for Onshore Pipelines	49 CFR 194	TS
Transportation of Hazardous Liquids by Pipeline	49 CFR 195	TS
Drug and Alcohol Testing	49 CFR 199	TS
Commercial Driver's License Standards; Requirements and Penalties	49 CFR 383	TS
Endangered and Threatened Wildlife and Plants and Migratory Bird Permits	50 CFR 10, 13, 17, 21, 22	MR
General Provisions	50 CFR 450	MR
Disposal of Birds or Quadrupeds Becoming a Nuisance	56 LA RS 112	MR
US Department of Agriculture Federal Biobased Products Preferred Procurement Program	7 CFR 3201-3202	MR, PP, ABP
Pesticide	7 LAC XXIII	CS
Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)	7 USC 136	CS
Farm Security and Rural Investment Act (FSRIA) of 2002, Section 9002	7 USC 8102	MR, ABP, PP
Control of Nuisance Wild Quadrupeds	76 LAC V.1.25	MR
Nuisance Wildlife Control Operator Program	76 LAC V.1.27	MR
Stennis Warehouse Spill Prevention, Control, and Countermeasures Plan	AAA 4010.10	CW
Property Management Manual	AAA 7003.7	PP
Threshold Limit Values For Chemical Substances - Current Year & Applicable Substances	ACGIH TLV	IH
Area Contingency Plan for Lake Charles	ACP USCG	CW

DESCRIPTION	STANDARD	AREA
Area Contingency Plan for Port Arthur	ACP USCG	CW
Area Contingency Plan for New Orleans	ACP USCG	CW
Area Contingency Plan for Galveston	ACP USCG	CW
Area Contingency Plan for EPA Region 6	ACP-EPA	CW
Hazardous Materials Management Education Program Observations and Recommendations: Environmental Mgmt, Hazardous Waste Minimization, and Pollution Prevention for the SPR Operations	AIHMM	PP
Standard Methods for the Examination of Water and Wastewater	American Public Health Assoc.	CW
OSHA Referenced Standards	ANSI Standards	IS
Environmental Management Systems Specification With Guidance For Use	ANSI/ISO 14001:2004	MR
Compilation of Air Pollutant Emission Factors	AP-42	CA
Permit Regulations for the Construction and/or Operation of Air Emissions Equipment (Mississippi)	APC-S-2	CA
Amer. Petroleum Institute - Recommended Practices and Guides	API	MR
API Standard 653 for Tank Inspection, Repair, Alteration, and Reconstruction	API - Standard	CA
Environmental Effects of Army Actions	AR 200-2	MR
Integrated Logistics Support Procedures	ASI 4000.10	FP
SPR Plant Maintenance System	ASI 4330.16	FP,IS
Environmental Instructions Manual	ASI 5400.15	MR
Conduct of Operations at the SPR	ASI 5480.19	MO,MR
Accident Prevention Manual	ASI 5480.22	IS
Quality Assurance Instructions	ASI 5700.15	MR
Design Review Procedure	ASI 6430.15	MO,MR
Configuration Management	ASL 4700.1	MO,MR
SPR Environmental Monitoring Plan	ASL 5400.57	CW, CA
Fire Protection Manual	ASL 5480.18	FP
Emergency Readiness Assurance Plan	ASL 5500.10	MO,MR
Emergency Response Team Organization and Training Plan	ASL 5500.25	MO,MR
Emergency Management Plan and Implementing Procedures	ASL 5500.58	EM, FP
Drawdown Management Plan	ASL 6400.18	MO,MR
Cavern Inventory & Integrity Control Plan	ASL 6400.30	CW
Drawdown Readiness Program Plan	ASL 7000.397	MO,MR
OSHA Referenced Standards	ASME Standards	IS
Environmental Policy	ASP 5400.2	MR
Readiness Review Board	ASR 7000.7	MO,MR
Membership in BRAMA	BC BRAMA	EM
Membership in Greater Baton Rouge Industry Alliance	BC Greater BR Industry Alliance	EM
Membership in Iberville CAER	BC Iberville CAER	EM
Membership in the Iberville LEPC	BC Iberville LEPC	EM
Membership in West Baton Rouge LEPC	BC West Baton Rouge LEPC	EM
Bayou Choctaw Emergency Response Procedures	BCI 5500.3	EM, FP
Bayou Choctaw Spill Prevention, Control, and Countermeasures Plan	BCL 5400.16	CW
Safety Agreement with NEWPARK	BH & NEWPARK	EM
Membership in the LEPC	BH LEPC	EM
Membership in the Local Law Enforcement Agency for BH	BH LLEA	EM
Membership in Sabine-Neches Chiefs Mutual Aid	BH Sabine-Neches Chiefs Mutual Aid	EM
Big Hill Emergency Response Procedures	BHI 5500.4	EM, FP

DESCRIPTION	STANDARD	AREA
Big Hill Spill Prevention, Control, and Countermeasures Plan	BHL 5400.21	CW
Membership in the BMAT for BM	BM BMAT	EM
Membership in the Brazosport CAER	BM CAER	EM
Membership in the LEPC	BM LEPC	EM
Membership in the Local Law Enforcement Agency at BM	BM LLEA	EM
Agreement between BM and VDD on restrictions to working on Hurricane Levees near BM	BM VDD	EM
Bryan Mound Emergency Response Procedures	BMI 5500.5	EM, FP
Bryan Mound Spill Prevention, Control, and Countermeasures Plan	BML 5400.17	CW
Seminar on Site Characterization for Subsurface Remediations	CERI-89-224	CW
Fire Prevention and Protection; Emergency Services and Communication; and Hazardous Materials	Chapter 13 Jefferson Parish Code of Ordinances	FP
County Regulation of Matters Relating to Explosives and Weapons Subchapter A. Explosives	Chapter 235 TX Statutes, Local Government, Title 7	IS
Operation and Movement of Vehicles (Explosives)	Chapter 545 TX Statutes, Transportation, Title 7	TS
Vehicle Equipment (Explosives)	Chapter 547 TX Statutes, Transportation, Title 7	TS
Hoisting And Rigging Handbook	DOE HDBK, 1090-9	IS
DOE Waste Minimization reporting Requirements, Nov. 1994	DOE Guideline	PP
Waste Minimization Reporting System (Wmin) User's Guide	DOE Handbook	PP
Pollution Prevention Handbook	DOE Handbook	PP
Guidance for the Preparation of the Waste Minimization and Pollution Prevention Awareness Plan, Dec 1993	DOE Handbook	PP
EPA's Interim Final Guidance to Hazardous Waste Generators on the Elements of a Waste Minimization Program	DOE Memorandum	PP
For all applicable DOE Orders See Contract No. DE-FE0011020 Applicable Standards List	DOE Orders	MO,MR
Pollution Prevention Program Plan	DOE S-0118	PP
Paint Repair of Exterior Metal Surfaces	DOE Standard Spec. 17900	PP
Management of Polychlorinated Biphenyls (PCBs)	DOE/EH-0350	CS, HW
Performance Objectives and Criteria for Conducting DOE Environmental Audits	DOE/EH-0358	MR
Annual report on Waste Generation and Waste Minimization Progress	DOE/EM-0276	PP
Standard for Fire Protection of DOE Electronic Computer/Data Processing Systems	DOE/EP-0108	FP
Waste Minimization/Pollution Prevention Crosscut Plan 1994	DOE/FM-0145	PP
Fire Protection	DOE-STD-1066-2012	FP
Fire Protection for Relocatable Structures	DOE-STD-1088-95	FP
All SPR Environmental Permits as listed in the Annual Site Environmental Report (ASER)	Environmental Permits	CW, MR, AR
Protection and Enhancement of Environmental Quality	EO 11514	MR
Floodplain Management	EO 11988	CW
Protection of Wetlands	EO 11990	CW
Federal Compliance with Pollution Control Requirements	EO 12088	MR
Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations	EO 12898	MR
Marine Protected Area	EO 13158	CW
Responsibilities of Federal Agencies to Protect Migratory Birds	EO 13186	MR
Energy Efficient Standby Power Devices	EO 13221	PP
Preserve America	EO 13287	MR
Strengthening Federal Environmental, Energy, and Transportation Management	EO 13423	MR, EO, ABP, PP
Federal Leadership in Environmental, Energy, and Economic Performance	EO 13514	MR, PP

DESCRIPTION	STANDARD	AREA
Protocol for Equipment Leak Emission Estimates, Jun 1993	EPA 453/R-93-026	CA
Practical Guide for Groundwater Sampling	EPA 600/2-85/105	CW
Handbook for Analytical Quality Control in Water and Wastewater Laboratories	EPA 600/4-79-019	CW
Methods for Chemical Analysis of Water and Wastes	EPA 600/4-79-020	CW
Handbook for Sampling and Sample Preservation of Water and Wastewater	EPA 600/4-82-029	CW
Addendum to Handbook for Sampling and Sample Preservation, EPA 600/4-82-029	EPA 600/4-83-039	CW
Microbiological Methods for Monitoring the Environment, Water and Wastes	EPA 600/8-78-017	CW
Facility Pollution Prevention Guide	EPA 600/R-92/088	PP
Short Term Methods for Measuring the Acute Toxicity of Effluents to Aquatic Organisms	EPA 821-R-02-014	CW
Water Measurement Manual	EPA 832B81102	CW
Storm Water Management for Industrial Activities	EPA 833-R-92-002	PP
Engineering Support Branch Standard Operating Procedures and Quality Assurance Manual, 4/1/86	EPA Region IV	MR
Current National Water Quality Criteria	EPA Web Site	CW
EPA Waste Minimization Opportunity Assessment Manual	EPA, ISBN:0-86587-752-1	PP
Specification for 8’ and 12’ Unlighted and Externally Lighted Wind Cone Assembly	FAA AC 150/5345-27	IS
Heliport Design, January 4, 1988	FAA AC 150/5390-2	IS
Obstruction Marking and Lighting, October 1985	FAA AC 70/7460-1G	IS
For all applicable FAR and DEAR Clauses see Contract DE-FE0011020, Applicable Clauses List	FAR and DEAR Clauses	MR, PP, CA, CW, HW, CS
Factory Mutual - Approval Guide and Loss Prevention Data Sheets	FM	FP
Hazardous Waste Management Regulations (Mississippi)	HW-1	HW
Oil Cos. International. Marine Forum - International Oil Tanker and Terminal Safety Guide	ICIMF	IS
OSHA Referenced Standards	IEEE Standards	IS
Pollution Prevention Assessment Manual for Texas Businesses	LP 92-03	PP
Surface Water and Ground Water Use and Protection (Mississippi)	LW-2	CW
Regarding Implementation of the Executive Order 13186, “Responsibilities of Federal Agencies to Protect Migratory Birds"	MOU- USFWS	MR
MOU with ATFE for Louisiana Sites during Emergencies	MOU with ATFE in LA	EM
MOU with ATFE for the Texas Sites during Emergencies	MOU with ATFE TX	EM
MOU with the BCSO for BM during Emergencies	MOU with BCSO	EM
MOU with Cameron Parish Sheriff's Office for WH during Emergencies	MOU with CamPSO	EM
MOU with Calcasieu Parish Sheriff's Office for WH during Emergencies	MOU with CPSO	EM
MOU with Entergy	MOU with Entergy	EM
MOU with the FBI for Louisiana Sites during Emergencies	MOU with FBI in LA	EM
MOU with the FBI for the Texas Sites during Emergencies	MOU with FBI TX	EM
MOU with Ft. Polk for Louisiana Sites during Emergencies	MOU with Ft. Polk	EM
MOU with JCSO for BH during Emergencies	MOU with JCSO	EM
MOU with LA Homeland Security for Louisiana Sites during Emergencies	MOU with LA Homeland Security	EM
MOU with LA State Police for Louisiana Sites during Emergencies	MOU with LA State Police	EM
MOU with US Army 797th Explosive Ordinance Co. for the Texas Sites during Emergencies	MOU with US Army 797 EOC	EM
SPR Gas and Geothermal Heat Effects on Crude Oil Vapor Pressure, Dec. 1994	MP 94W0000131	CA
Power to capture or destroy animals injurious to property	MSC Section 49-1-39	MR
Nuisance Wildlife	MSC Section 49-7-1	MR
Laboratory Programs & Procedures	MSL 7000.133	CW, HW
National Association of Corrosion Engineers	NACE	FP, IS
National Electric Safety Code	NEC	FP, IS

DESCRIPTION	STANDARD	AREA
Fire Protection Handbook	NFPA	FP
Fire Code	NFPA 1	FP
Standard for Portable Fire Extinguishers	NFPA 10	FP
Standard for Fire Service Professional Qualifications Accreditation and Certification Systems	NFPA 1000	FP
Life Safety Code®	NFPA 101	FP, IS
Guide on Alternative Approaches to Life Safety	NFPA 101A	FP
Standard for Fire Officer Professional Qualifications	NFPA 1021	FP
Standard for Professional Qualifications for Fire Inspector and Plan Examiner	NFPA 1031	FP
Standard for Professional Qualifications for Fire Investigator	NFPA 1033	FP
Standard for Fire Service Instructor Professional Qualifications	NFPA 1041	FP
Standard for the Installation of Smoke Door Assemblies and other Opening Protectives	NFPA 105	FP
Standard for Industrial Fire Brigade Member Professional Qualifications	NFPA 1081	FP
Standard for Low-, Medium-, and High-Expansion Foam	NFPA 11	FP
Standard for Emergency and Standby Power Systems	NFPA 110	FP
Standard on Stored Electrical Energy Emergency and Standby Power Systems	NFPA 111	FP
Standard for the Installation of Sprinkler Systems	NFPA 13	FP
Recommended Practice for Fire Department Operations in Properties Protected by Sprinkler and Standpipe Systems	NFPA 13E	FP
Standard for the Installation of Standpipe and Hose Systems	NFPA 14	FP
Recommended Practice for Fire Service Training Reports and Records	NFPA 1401	FP
Standard for Fire Service Respiratory Protection Training	NFPA 1404	FP
Standard on Training for Initial Emergency Scene Operations	NFPA 1410	FP
Standard for Water Spray Fixed Systems for Fire Protection	NFPA 15	FP
Standard on Fire Department Occupational Safety and Health Program	NFPA 1500	FP
Standard on Emergency Services Incident Management System and Command Safety	NFPA 1561	FP
Standard on Fire Department Infection Control Program	NFPA 1581	FP
Standard on Comprehensive Occupational Medical Program for Fire Departments	NFPA 1582	FP
Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems	NFPA 16	FP
Standard on Disaster/Emergency Management and Business Continuity Programs	NFPA 1600	FP
Standard for Dry Chemical Extinguishing Systems	NFPA 17	FP
Standard for Fire Safety Symbols and Emergency Symbols	NFPA 170	FP
Standard for Automotive Fire Apparatus	NFPA 1901	FP
Standard for the Inspection, Maintenance, Testing & retirement of in Service Automotive Fire Apparatus	NFPA 1911	FP
Standard on Fire Hose	NFPA 1961	FP
Standard for the Care, Use, Inspection, Service Testing, and Replacement of Fire Hose, Couplings, Nozzles, and Fire Hose Appliances	NFPA 1962	FP
Standard for Fire Hose Connections	NFPA 1963	FP
Standard for Spray Nozzles	NFPA 1964	FP
Standard for Fire Hose Appliances	NFPA 1965	FP
Standard on Protective Ensemble For Structural Fire Fighting and Proximity Fire Fighting	NFPA 1971	FP
Standard on Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Fire and Emergency Services	NFPA 1981	FP
Standard on Personal Alert Safety Systems (PASS)	NFPA 1982	FP
Standard on Fire Service Life Safety Rope and Equipment for Emergency Service	NFPA 1983	FP
Standard on Vapor-Protective Ensembles for Hazardous Materials Emergencies	NFPA 1991	FP

DESCRIPTION	STANDARD	AREA
Standard on Liquid Splash-Protective Ensembles and Clothing for Hazardous Materials Emergencies	NFPA 1992	FP
Standard on Protective Clothing for Emergency Medical Operations	NFPA 1999	FP
Standard for the Installation of Stationary Pumps for Fire Protection	NFPA 20	FP
Standard on Clean Agent Fire Extinguishing Systems	NFPA 2001	FP
Standard on Flame-Resistant Garments for Protection of Industrial Personnel Against Flash Fire	NFPA 2012	FP
Standard for Smoke and Heat Venting	NFPA 204	FP
Standard on Selection, Care, Use, and Maintenance of Flame-Resistant Garments for Protection of Industrial Personnel Against Flash Fire	NFPA 2113	FP
Standard for Water Tanks for Private Fire Protection	NFPA 22	FP
Standard on Types of Building Construction	NFPA 220	FP
Standard for High Challenge Fire Walls, Fire Walls, & Fire Barrier Walls	NFPA 221	FP
Standard for the Protection of Records	NFPA 232	FP
Standard for the Installation of Private Fire Service Mains and Their Appurtenances	NFPA 24	FP
Standard for Safeguarding Construction, Alteration, and Demolition Operations	NFPA 241	FP
Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems	NFPA 25	FP
Standard Methods of Tests of Fire Resistance of Building Construction and Materials	NFPA 251	FP
Standard Methods of Fire Tests of Door Assemblies	NFPA 252	FP
Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source	NFPA 253	FP
Standard Method of Test of Surface Burning Characteristics of Building Materials	NFPA 255	FP
Recommended Practice for Fire Flow Testing and Marking of Hydrants	NFPA 291	FP
Flammable and Combustible Liquids Code	NFPA 30	FP
Fire Protection Standard for Pleasure and Commercial Motor Craft	NFPA 302	FP
Standard for the Control of Gas Hazards on Vessels	NFPA 306	FP
Standard for the Construction and Fire Protection of Marine Terminals, Piers, and Wharves	NFPA 307	FP
Standard for the Safeguarding of Tanks and Containers for Entry, Cleaning, or Repair	NFPA 326	FP
Recommended Practice for Handling Releases of Flammable and Combustible Liquids and Gases	NFPA 329	FP
Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines	NFPA 37	FP
Standard for Tank Vehicles for Flammable and Combustible Liquids	NFPA 385	FP
Standard for Heliports	NFPA 418	FP
Standard on Fire Protection for Laboratories Using Chemicals	NFPA 45	FP
Standard for Professional Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents	NFPA 472	FP
Standard for Competencies for EMS Personnel Responding to Hazardous Materials/WMD Incidents	NFPA 473	FP
Explosive Materials Code	NFPA 495	FP
Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas	NFPA 497	FP
Building Construction and Safety Code	NFPA 5000	FP
Fire Safety Standard for Powered Industrial Trucks Including Type Designations, Areas of Use, Conversions, Maintenance, and Operation	NFPA 505	FP
Standard for Fire Prevention During Welding, Cutting, and Other Hot Work	NFPA 51B	FP
ANSI Z223.1-2012 National Fuel Gas Code	NFPA 54	FP
Compressed Gases and Cryogenic Fluids Code	NFPA 55	FP
Guide to the Fire Safety Concepts Tree	NFPA 550	FP

DESCRIPTION	STANDARD	AREA
Liquefied Petroleum Gas Code	NFPA 58	FP
Standard on Industrial Fire Brigades	NFPA 600	FP
Standard for Security Services in Fire Loss Prevention	NFPA 601	FP
National Electrical Code	NFPA 70	FP, IS
Standard for Fire Retardant Treated Wood and Fire Retardant Coatings for Building Materials	NFPA 703	FP
Standard System for the Identification of the Hazards of Materials for Emergency Response	NFPA 704	FP
Recommended Practice for Electrical Equipment Maintenance	NFPA 70B	FP
Standard for Electrical Safety in the Workplace	NFPA 70E	FP
National Fire Alarm and Signaling Code	NFPA 72	FP
Standard for the Protection of Information Technology Equipment	NFPA 75	FP
Standard on Water Mist Fire Protection Systems	NFPA 750	FP
Recommended Practice on Static Electricity	NFPA 77	FP
Standard for the Installation of Lightning Protection Systems	NFPA 780	FP
Electrical Standard for Industrial Machinery	NFPA 79	FP
Standard for Fire Doors and other Opening Protectives	NFPA 80	FP
Recommended Practice for Protection of Buildings from Exterior Fire Exposures	NFPA 80A	FP
Standard for Fire Protection in Wastewater Treatment and Collection Facilities	NFPA 820	FP
Standard Classifications for Incident Reporting and Fire Protection Data	NFPA 901	FP
Standard for the Installation of Air-Conditioning and Ventilating Systems	NFPA 90A	FP
Standard for the Installation of Warm Air Heating and Air-Conditioning Systems	NFPA 90B	FP
Guide for Fire and Explosion Investigations	NFPA 921	FP
Standard for Smoke-Control Systems Utilizing Barriers & Pressure Differences	NFPA 92A	FP
SPR Qualified Products List	No number	PP,HW, CS
Construction of Geotechnical Boreholes and Groundwater Monitoring Systems Handbook (LDOTD and LDEQ)	No number	CW
FFPO and DOE Standard Environmental Contract Boilerplate	No Number	MO
SPRPMO Level III Design Criteria	No number	MO, MR
Earth Manual, 3rd Ed., U.S. Department of the Interior, Bureau of Reclamation	No number	CW
Louisiana's Suggested Chemical Weed Control Guide for 1994 (LA Cooperative Extension Services)	No number	CW
The Sterling Brine Handbook (Int'l Salt Co.)	No number	CW
Technical Guidance Package for Chemical Sources, Storage Tanks, TCEQ, Feb 2001	No number	CA
Membership in Louisiana Environmental Leadership Program (LaELP) http://www.deq.state.la.us/assistance/elp	No number	MR
Organizational and Management Assessments	NOI 1000.72	MR
Pipkin Ranch Road use restrictions in emergencies	Pipkin Ranch Road	EM
Mississippi DWFP Nuisance Animals	Public Notice LE-3799 and LEI 3799	MR
Louisiana Department of Environmental Quality Risk Evaluation/Corrective Action Program	RECAP (2003)	CW
Pollution Prevention Assessment Manual	RG-133	PP
Summary of Work	S# 01010	MR
Demolition of Facilities	S# 02050	MR
Excavation, Backfilling, & Compaction	S# 02222	MR
Dikes & Embankments	S# 02223	MR
Roadways (Texas)	S# 02230	MR
Roadways (Louisiana)	S# 02233	MR
Drilled and Belled Concrete Piers	S# 02362	MR

DESCRIPTION	STANDARD	AREA
Piles and Pile Driving	S# 02364	MR
Steel Sheet Piling	S# 02369	MR
Fences & Gates	S# 02444	MR
Sensor - Compatible Fences and Gates	S# 02445	MR
Signage	S# 02450	MR
Seeding	S# 02485	MR
Asphaltic Concrete Pavement	S# 02513	MR
Asphaltic Concrete Pavement (Louisiana)	S# 02514	MR
Cast-In-Place Concrete	S# 03300	MR
Shotcrete	S# 03361	MR
Grout	S# 03600	MR
Brick Masonry	S# 04210	MR
Concrete Unit Masonry	S# 04220	MR
Structural Steel green	S# 05120	MR
Metal Roof Deck	S# 05310	MR
Rough Carpentry	S# 06100	MR
Finish Carpentry	S# 06200	MR
Vinyl Sheet Piles	S# 06521	MR
Rigid Insulation	S# 07212	MR
Built-Up Bituminous Roofing	S# 07510	MR
Aluminum Clad Flashing Membrane	S# 07550	MR
Fluid Applied Roofing	S# 07560	MR
Sealants & Caulking	S# 07920	MR
Metal Doors & Frames	S# 08100	MR
Flush Wood Doors	S# 08211	MR
Hurricane Windows	S# 08520	MR
Glass & Glazing	S# 08800	MR
Gypsum Wallboard	S# 09250	MR
Ceramic Tile	S# 09310	MR
Resilient Rubber Flooring	S# 09650	MR
Resilient Tile Flooring	S# 09660	MR
Carpet - Glue Down	S# 09688	MR
Epoxy Flooring	S# 09722	MR
Interior Painting	S# 09900	MR
Painting (Buildings)	S# 09901	MR
Metal Toilet Partitions	S# 10162	MR
Toilet Room Accessories	S# 10800	MR
Prefabricated Industrial/Commercial Metal Building	S# 13121	MR
Modular Insulated Building	S# 13126	MR
Prefabricated Metal Shelter/Housing	S# 13127	MR
Prefabricated Fiberglass Shelter/Housing	S# 13128	MR
Duct Insulation	S# 15258	MR
Plumbing Systems	S# 15400	MR
Plumbing Fixtures & Trim	S# 15450	MR
Air Cooled Condensing Unit	S# 15695	MR
Packaged Terminal Air Conditioners	S# 15731	MR
Conduit	S# 16111	MR

DESCRIPTION	STANDARD	AREA
Wood Poles	S# 16503	MR
Lighting	S# 16510	MR
DOE Policy on Signatures of RCRA Permit Applications	SEN-22-90	HW
Nonhazardous Solid Waste Management Regulations and Criteria (Mississippi)	SW-2	HW
Texas Tier Two Reporting Forms and Instructions	TCRA, 505-507 SARA Title III	CS
Special Licenses and Permits	TPWC Chapter 43	MR
Birds; Protection of Nongame Birds; Destroying Nests or Eggs	TPWC Chapter 64	MR
Alligators	TPWC Chapter 65	MR
Disposition of Protected Wildlife	TPWC Section 43.024	MR
Alligators in Texas: Rules, regulations, and general information, 2013-2014	TPWD	MR
Texas Regulations for Control of Radiation - General provisions	TRCR part 11	RP
Texas Regulations for Control of Radiation - Fees	TRCR part 12	RP
Texas Regulations for Control of Radiation - Hearing and Enforcement Procedures	TRCR part 13	RP
Standards for Protection Against Radiation - Permissible Doses, Precautionary Procedures, Waste Disposal	TRCR part 21	RP
Notices, Instructions and Reports to Workers; Inspections	TRCR part 22	RP
Radiation Safety Requirements and Licensing and Registration Procedures for Industrial Radiography	TRCR part 31	RP
Licensing of Radioactive Material -Exemptions, Licenses, General Licenses, Specific Licenses, Reciprocity, Transport	TRCR part 41	RP
State Fire Marshall (Explosives)	TX Statute Chapter 417 State Fire Marshall	FP
Fire Protection Engineering for Facilities	UFC 3-600-01	FP
International Conference of Building Officials - Uniform Building Code and Uniform Fire Code	UFC/UBC	FP
Underwriter's Laboratory - Building Materials, Fire Resistance, Fire Prot. Equip., & Haz. Location Equip. Directories	UL	FP
West Hackberry Emergency Response Procedures	WHI 5500.9	EM,FP
West Hackberry Spill Prevention, Control, and Countermeasures Plan	WHL 5400.20	CW

Appendix A2

SPRPMO ES&H Directives

.Directive	Description
DOE O 151.1C	Comprehensive Emergency Management System
DOE O 225.1B	Accident Investigations
DOE O 231.1B	Environment, Safety and Health Reporting
DOE O 420.1B Change 1	Facility Safety
DOE O 422.1	Conduct of Operations
DOE O 430.1B Change 1 Change 2	Real Property Asset Management
DOE O 436.1	Departmental Sustainability
DOE O 440.2C Admin Change 1	Aviation Management Safety
DOE O 460.1C	Packaging and Transportation Safety
DOE O 460.2A	Departmental Materials Transportation and Packaging Management
DOE P 450.4A	Safety Management System Policy
SPRPMO O 231.1A Change 1 Change 2	Occurrence Reporting and Processing System
SPRPMO O 420.1C	Conduct of Operations Requirements for SPR Facilities
SPRPMO O 436.1	Site Sustainability
SPRPMO O 440.2B	Aviation Implementation Plan
SPRPMO O 451.1D	National Environmental Policy Act Implementation Plan

Directive	Description
SPRPMO P 451.1D	SPR Environmental Policy
SPRPMO N 450.7	Strategic Petroleum Reserve Environmental, Security, Safety & Health, and Emergency Preparedness Goals FY2011
SPRPMO N 450.4	Implementation of Environmental, Safety and Health Contractor Requirements Documents

Appendix B

DOE Policy
SPRPMO Policy 451.1D, "Environmental Policy Statement"

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

POLICY

SPRPMO P 451.1D

APPROVED: **6/24/14**

SUBJECT: SPR ENVIRONMENTAL POLICY

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1. **PURPOSE AND SCOPE.** This environmental policy applies to the facilities and pipelines that comprise the Strategic Petroleum Reserve (SPR). The mission of SPR is to store petroleum and maintain drawdown readiness. To achieve its mission, the Department of Energy (DOE) and SPR contractors will design, develop, construct, operate, and maintain SPR facilities and operations in a manner that shall be sustainable, resource-efficient, and will protect the quality of the environment consistent with all applicable environmental laws, regulations, and standards. Environmental protection will be integrated at all management levels and into all phases of activity.

   This environmental policy is implemented by SPR top management through an environmental management system (EMS) under an integrated safety management umbrella.

2. **POLICY STATEMENT.** The SPR operates only in an environmentally responsible manner.

   Environmentally responsible manner means that top management pledges all functional levels will:

   a. Comply with applicable Federal, State, and local environmental legal, regulatory, and other requirements which relate to the environmental aspects of SPR activities;

   b. Prevent pollution by undertaking 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 SPR Project Management Office will take action to reduce their volume and toxicity and ensure proper disposal; and

   c. Continually improve environmental performance via the EMS and by establishing and maintaining documented environmental objectives and targets.

DISTRIBUTION: All SPR Employees

INITIATED BY: APM, Technical Assurance

This Environmental Policy provides the framework for setting and reviewing environmental objectives and targets that assure excellence in environmental management. It is communicated to all persons working for or on behalf of the SPR, and is available on request at all SPR facilities and electronically on-line at www.spr.doe.gov and www.fluorfpo.com.

The SPR Environmental, Safety and Health Division of Technical Assurance is responsible for prompting the periodic review of this Policy by DOE and Fluor Federal Petroleum Operations top management as well as its update.

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

Appendix C

GROUND WATER SURVEILLANCE MONITORING

DURING 2014

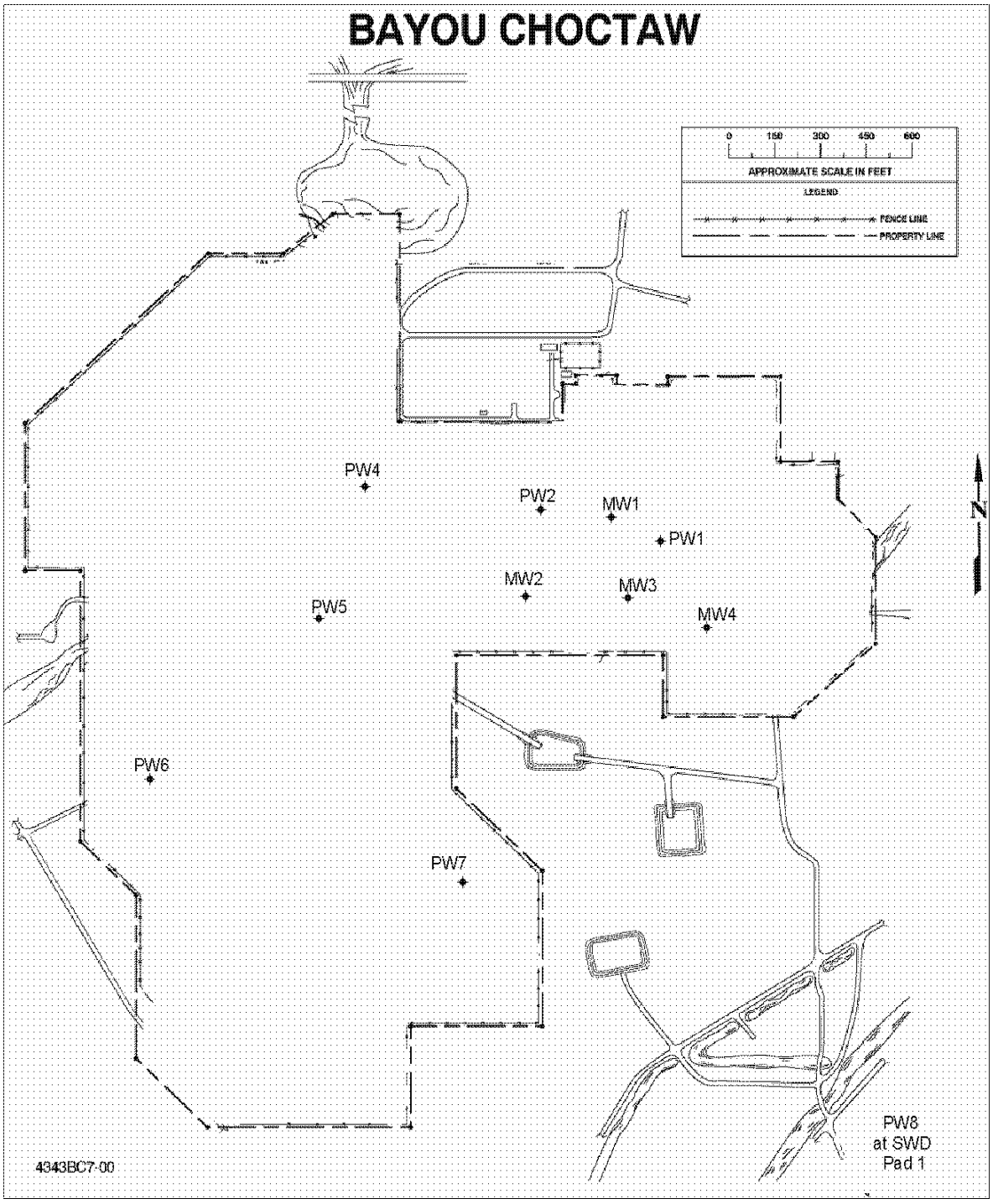


Figure C-1. Bayou Choctaw Ground Water Monitoring Stations

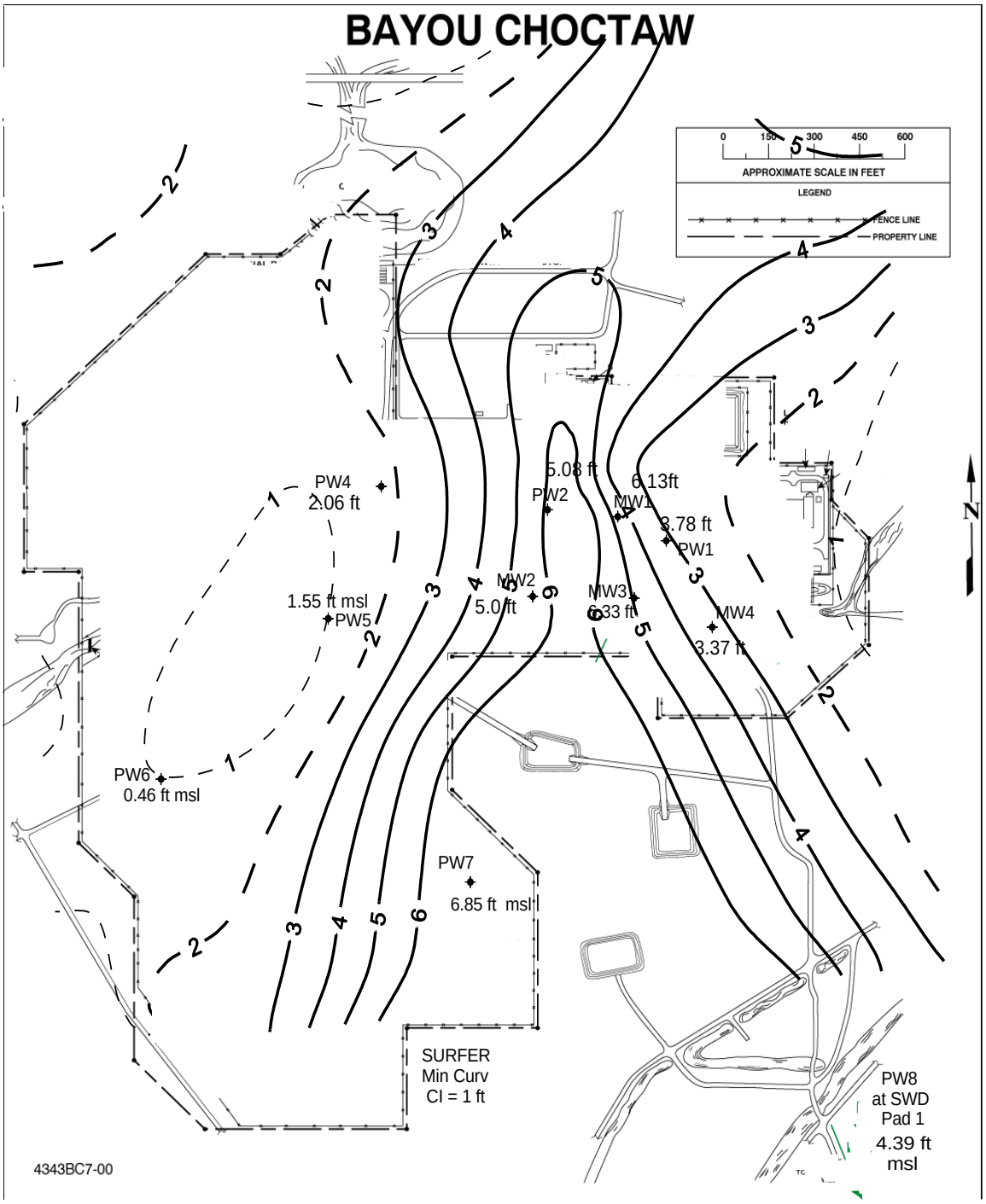


Figure C-2. Bayou Choctaw Ground Water Contoured Elevations Spring 2014

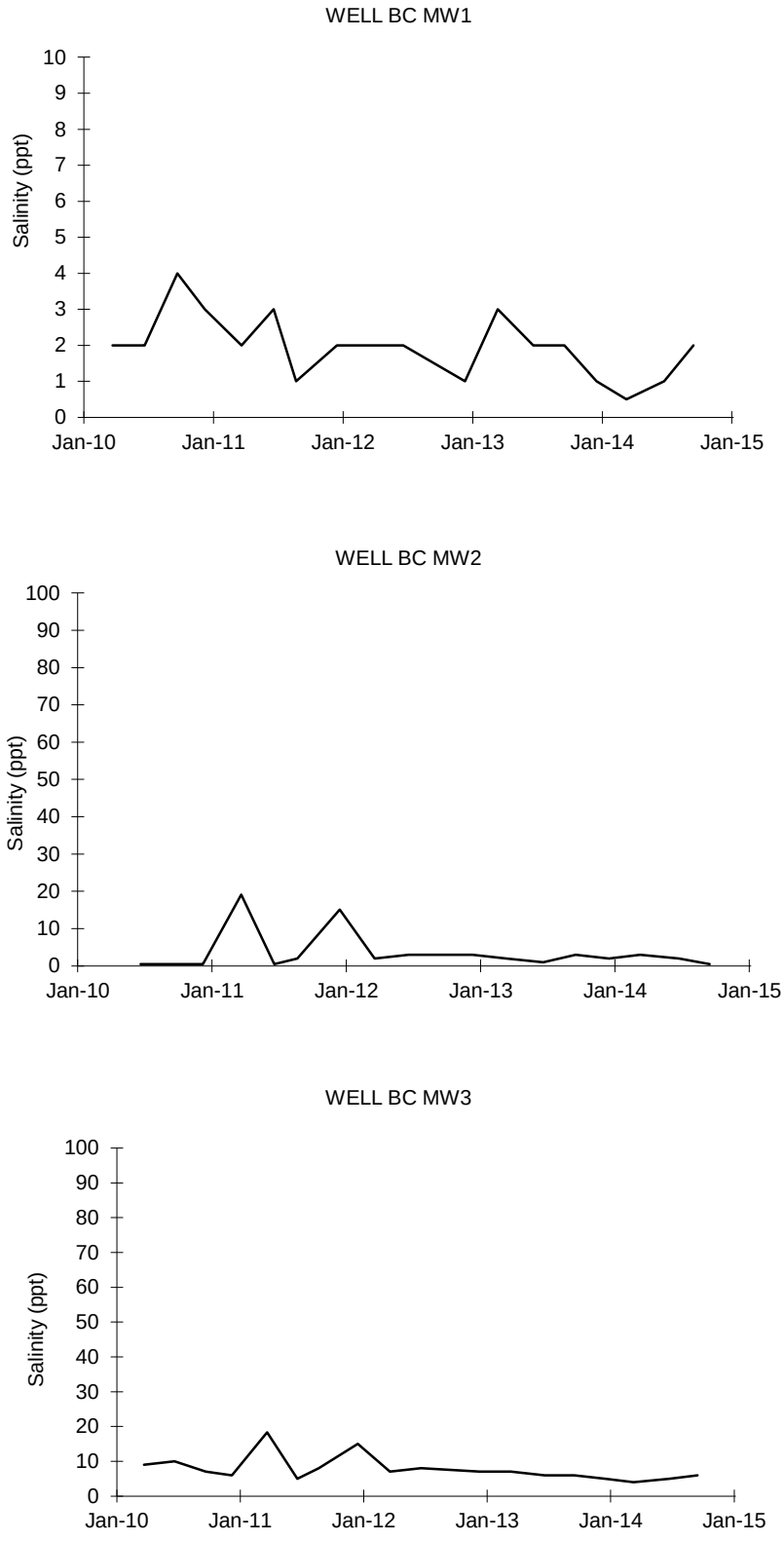


Figure C-3. Bayou Choctaw Ground Water Monitoring Well Salinities

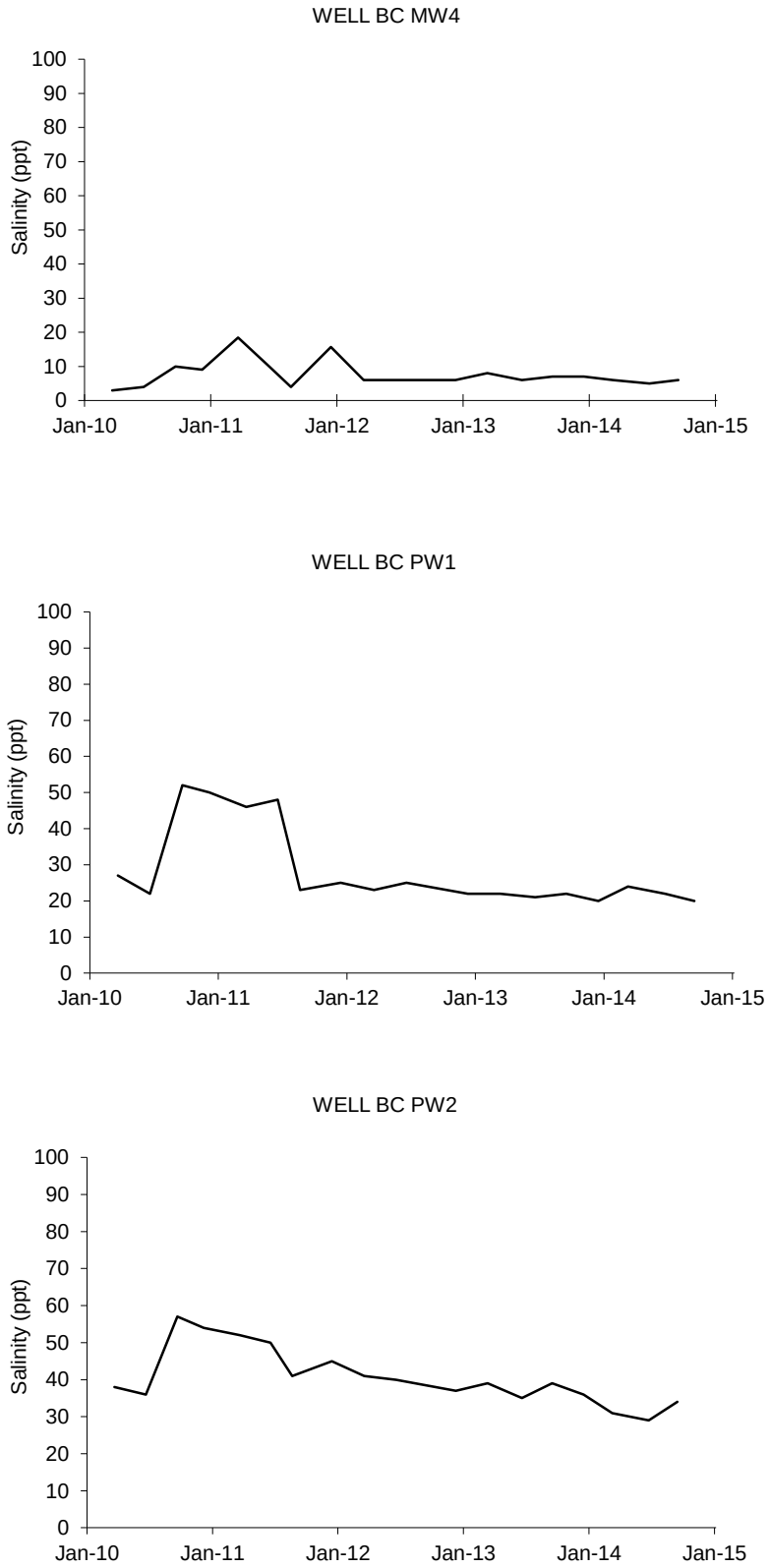
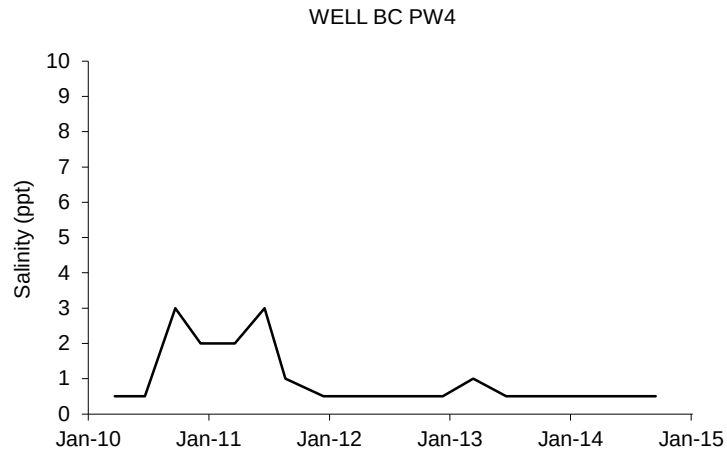
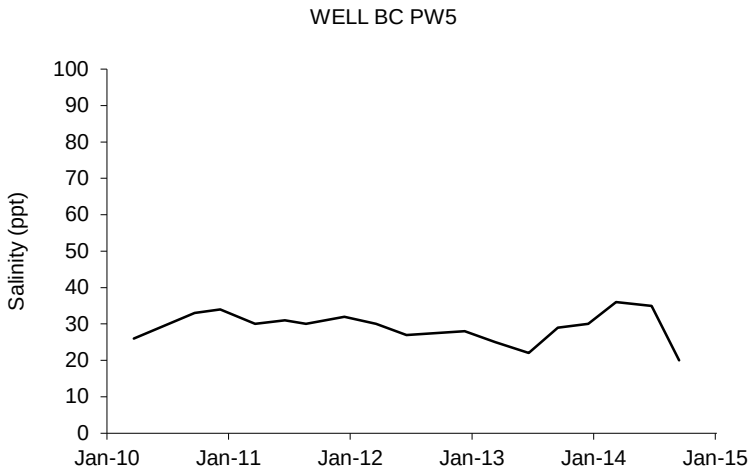


Figure C-3. Bayou Choctaw Ground Water Monitoring Well Salinities (continued)





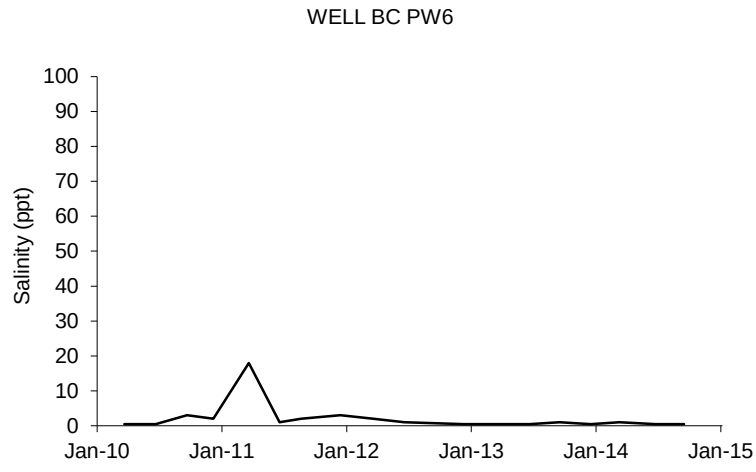


Figure C-3. Bayou Choctaw Ground Water Monitoring Well Salinities (continued)

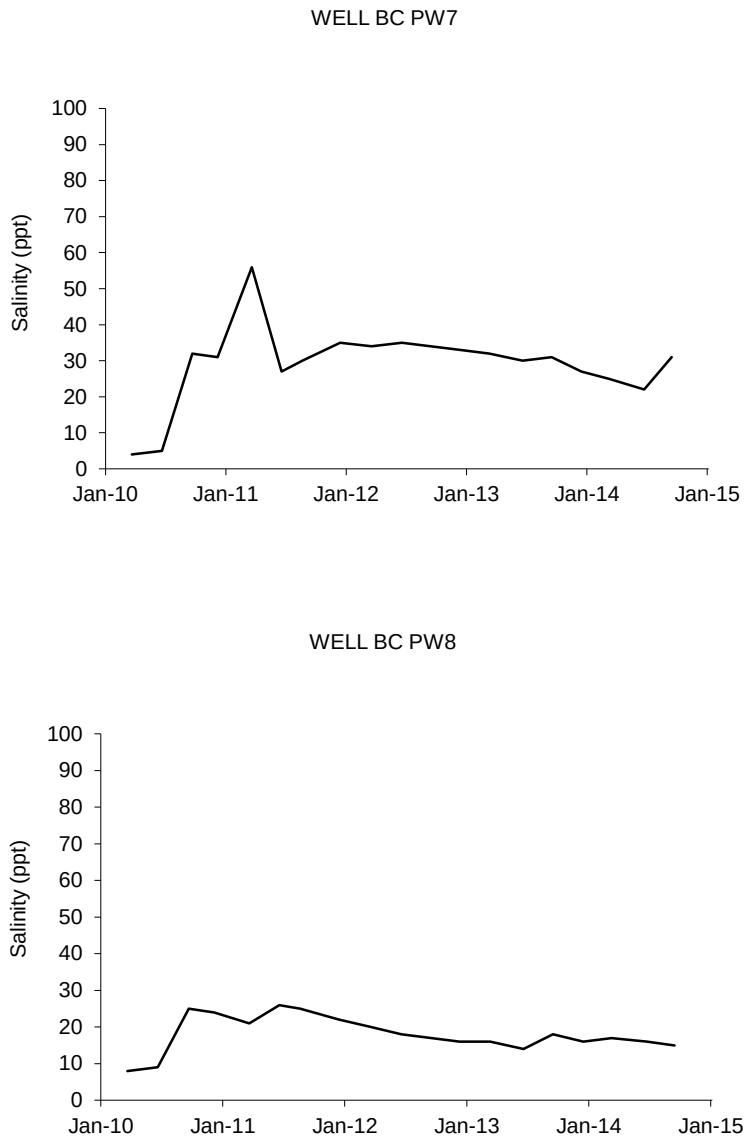


Figure C-3. Bayou Choctaw Ground Water Monitoring Well Salinities (continued)

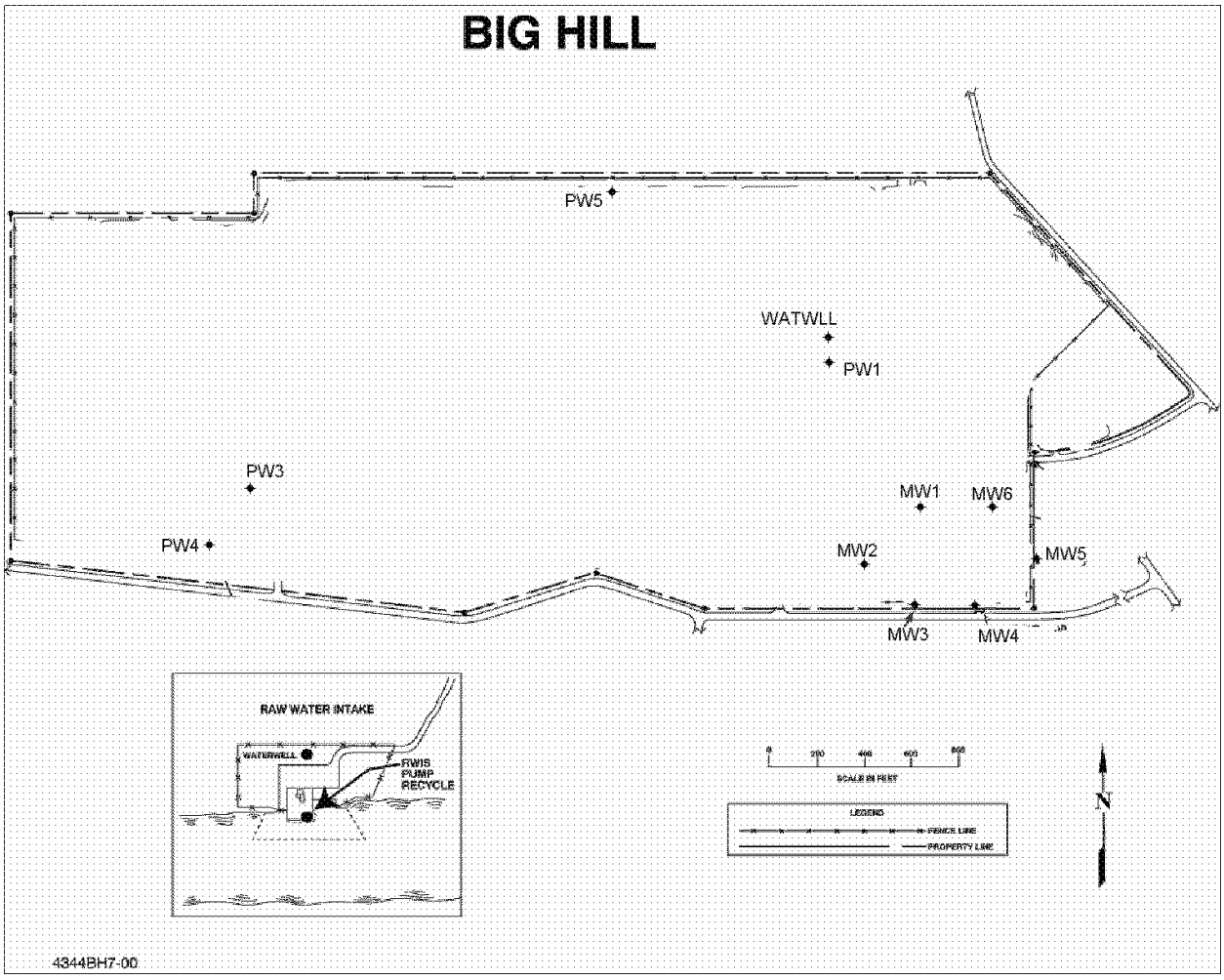


Figure C-4. Big Hill Ground Water Monitoring Stations

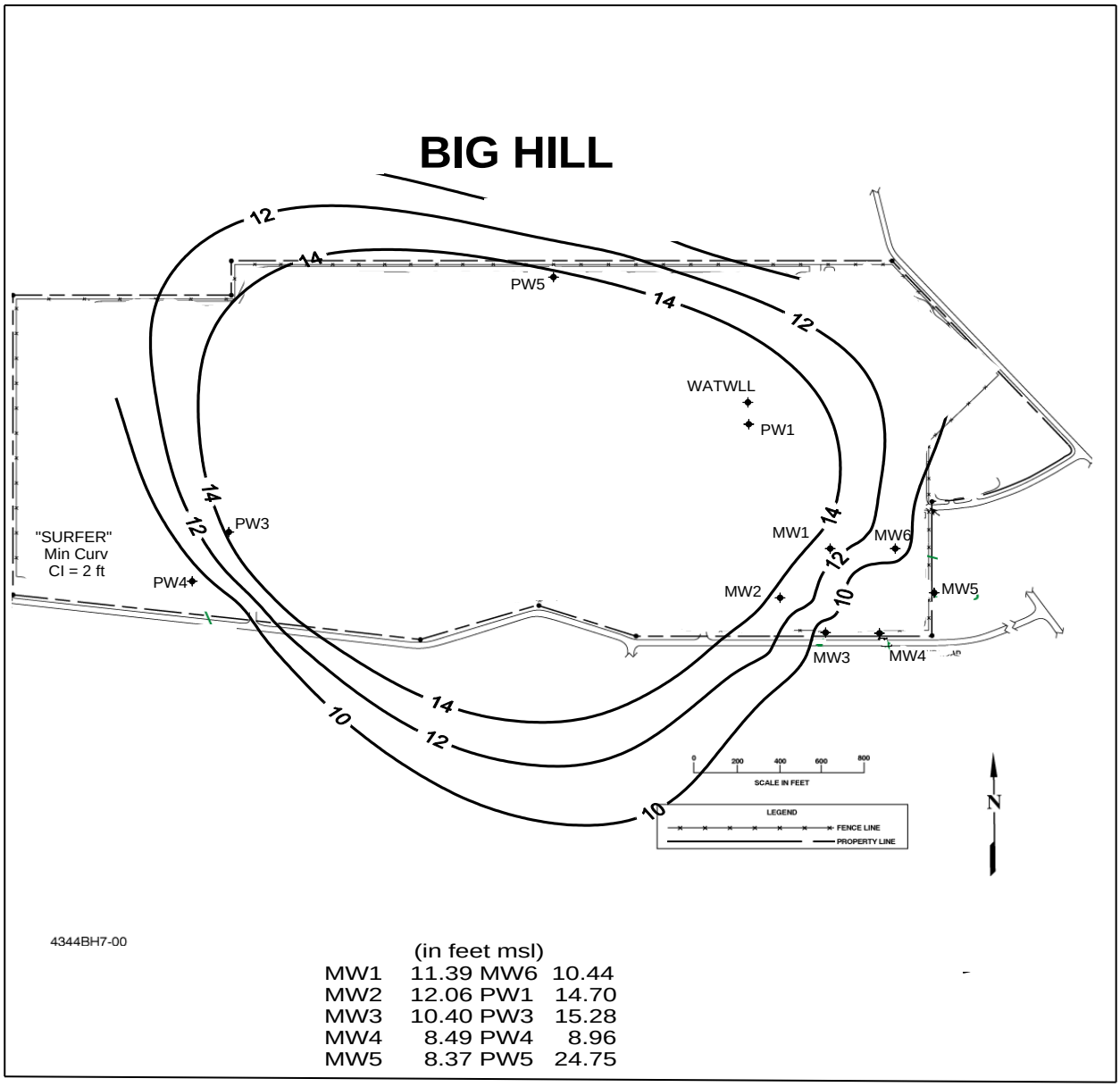


Figure C-5. Big Hill Ground Water Contoured Elevations Spring 2014

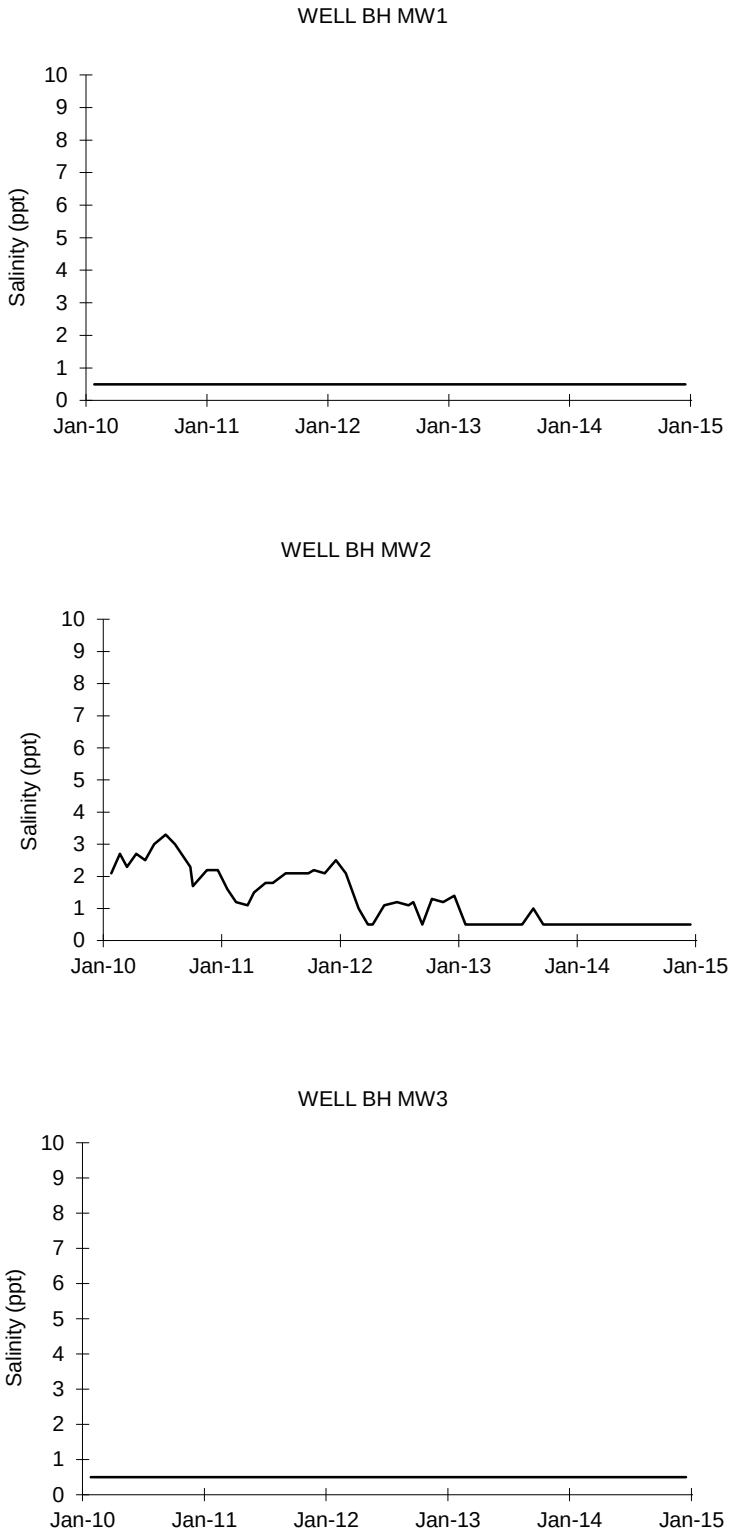


Figure C-6. Big Hill Ground Water Monitoring Well Salinities

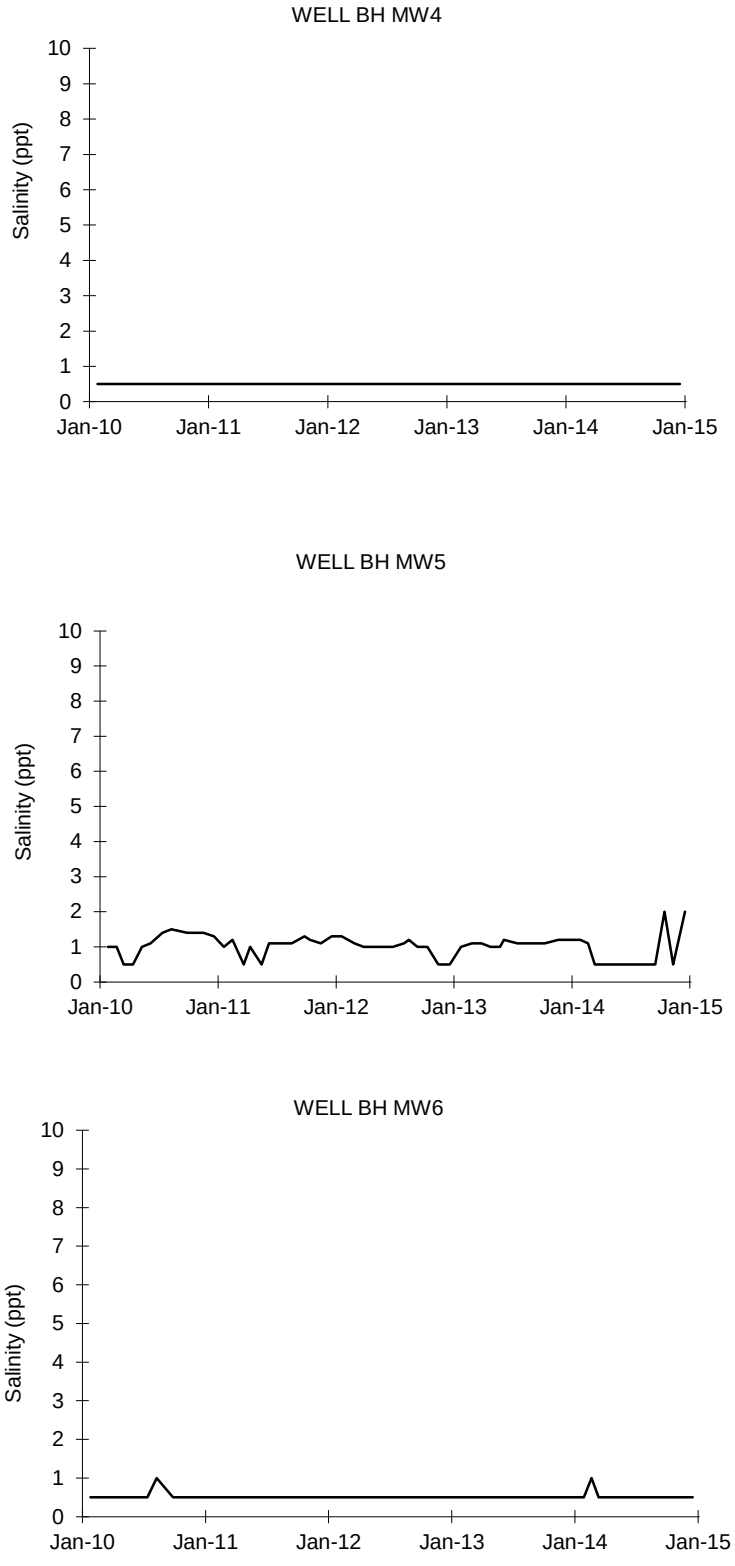


Figure C-6. Big Hill Ground Water Monitoring Well Salinities (continued)

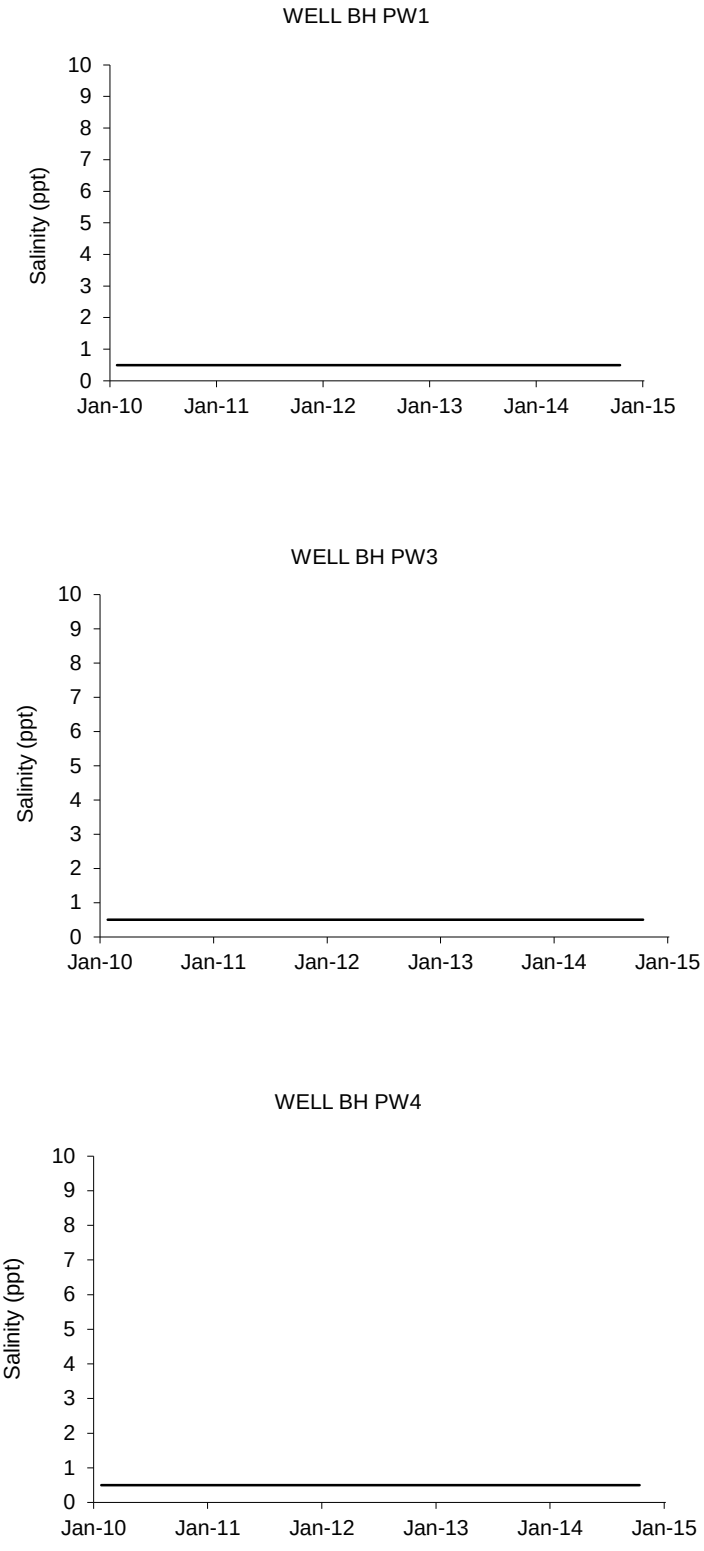


Figure C-6. Big Hill Ground Water Monitoring Well Salinities (continued)

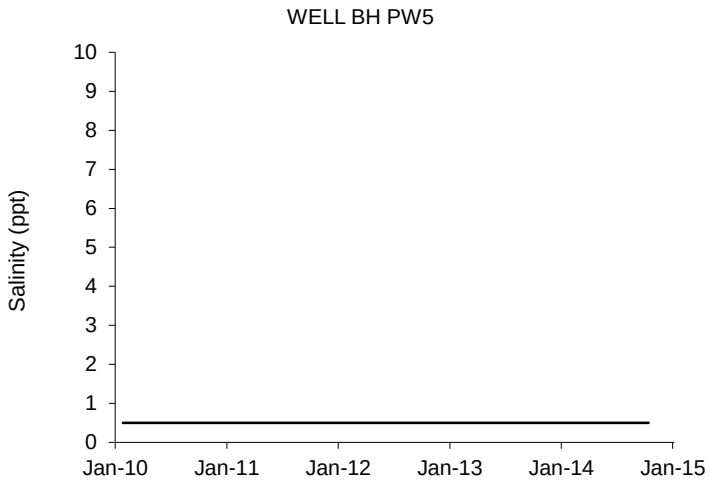


Figure C-6. Big Hill Ground Water Monitoring Well Salinities (continued)

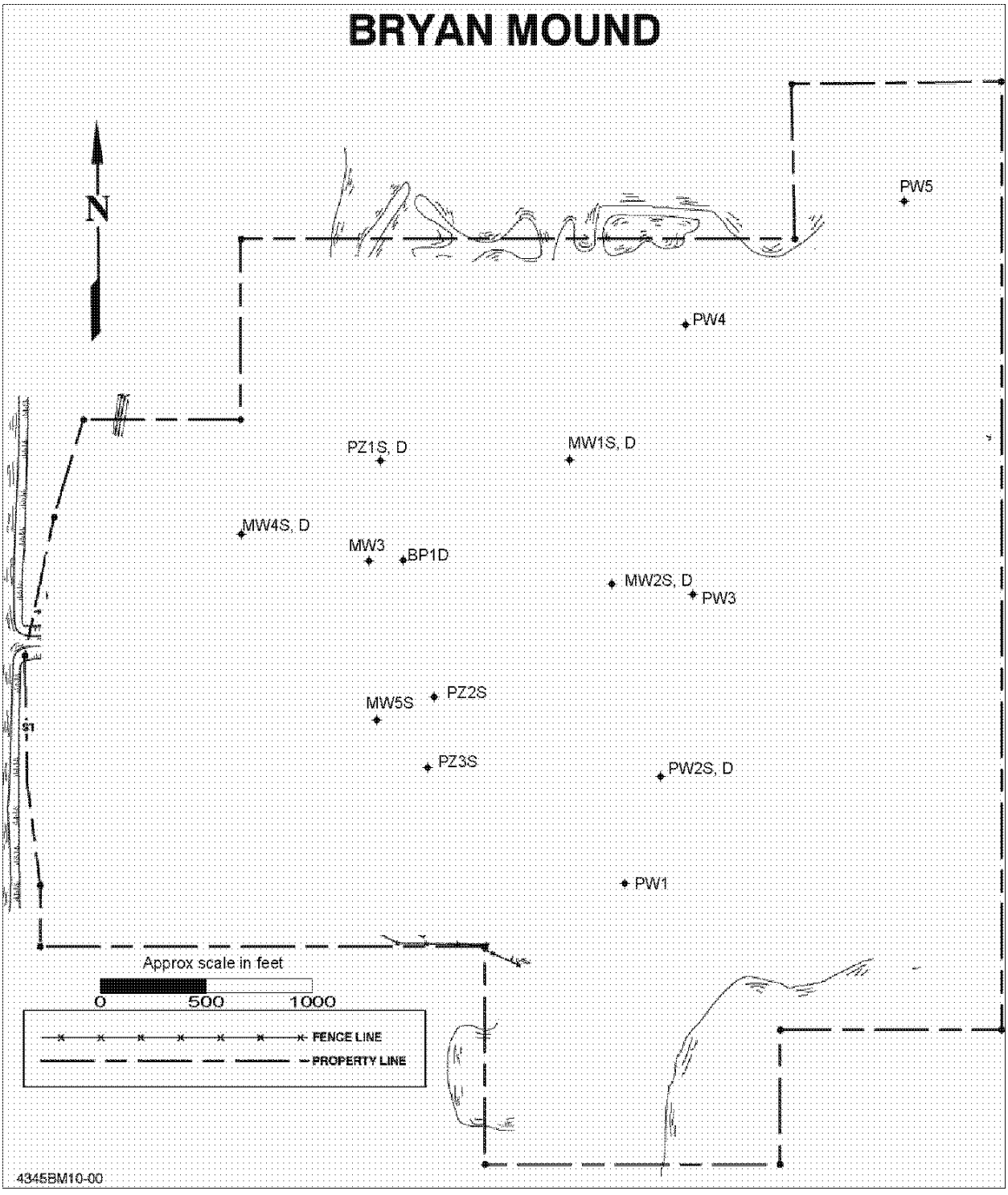


Figure C-7. Bryan Mound Ground Water Monitoring Stations, Deep and Shallow

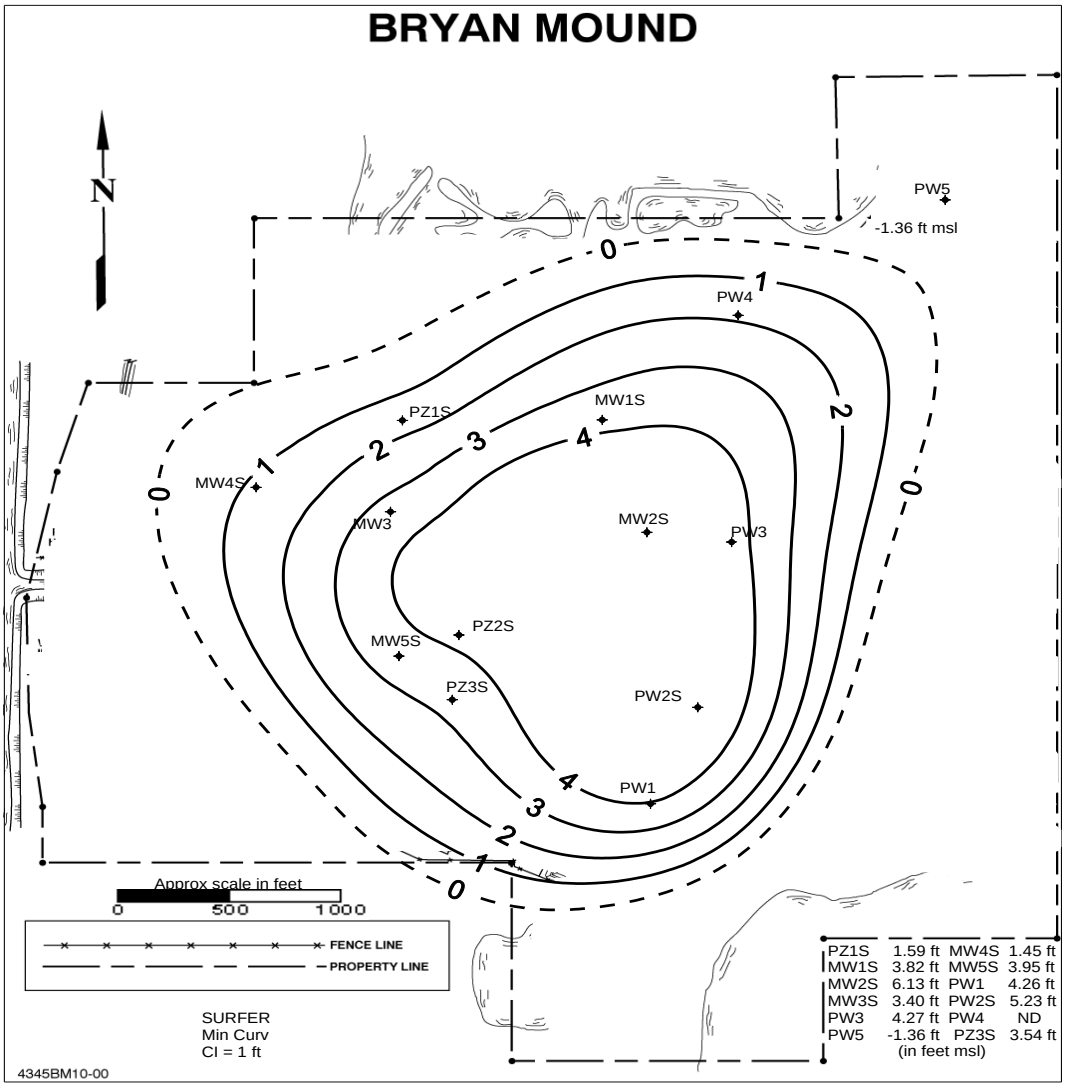


Figure C-8. Bryan Mound Shallow Ground Water Zone Contoured Elevations Spring 2014

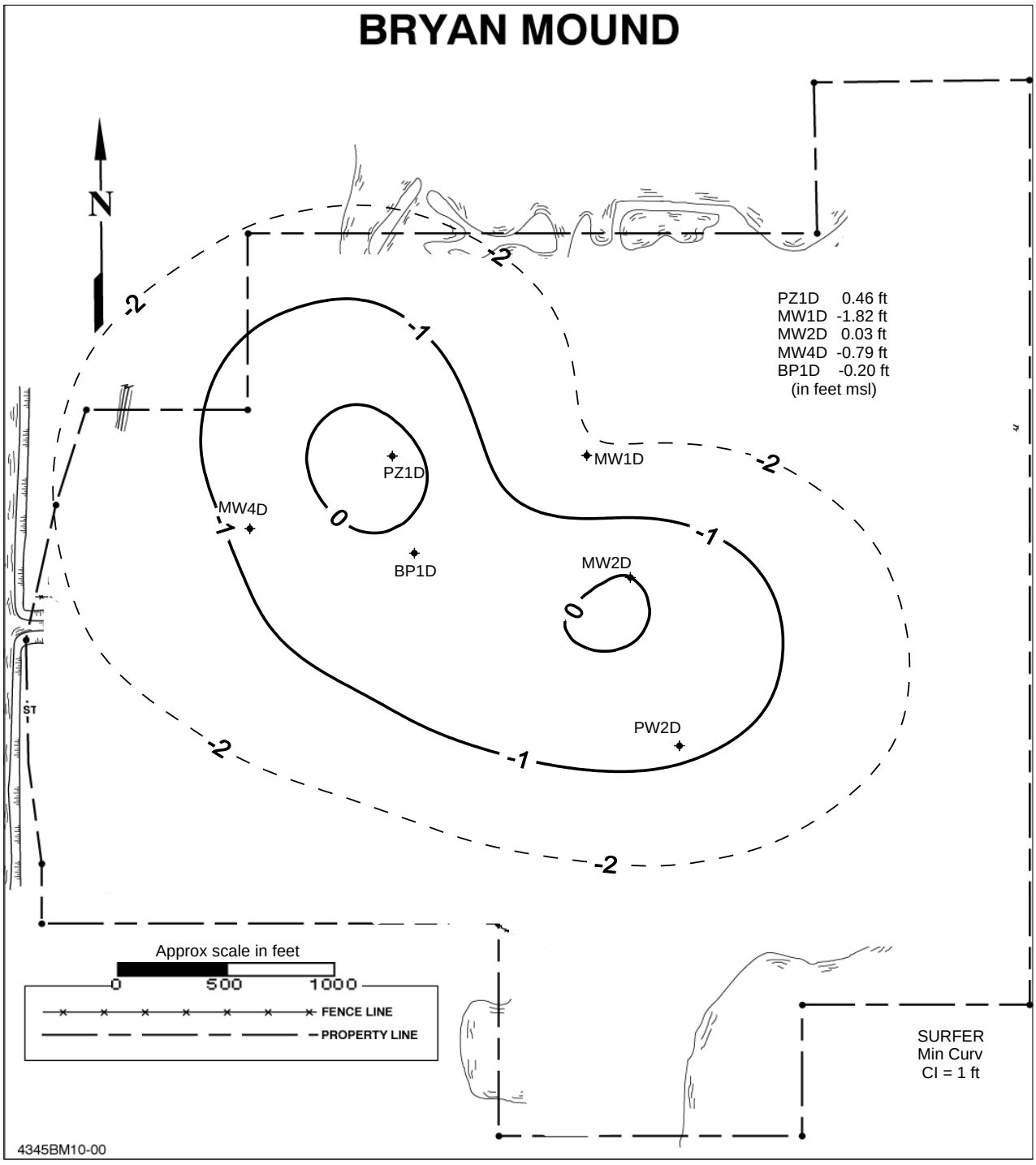


Figure C-9. Bryan Mound Deep Ground Water Zone Contoured Elevations Spring 2014

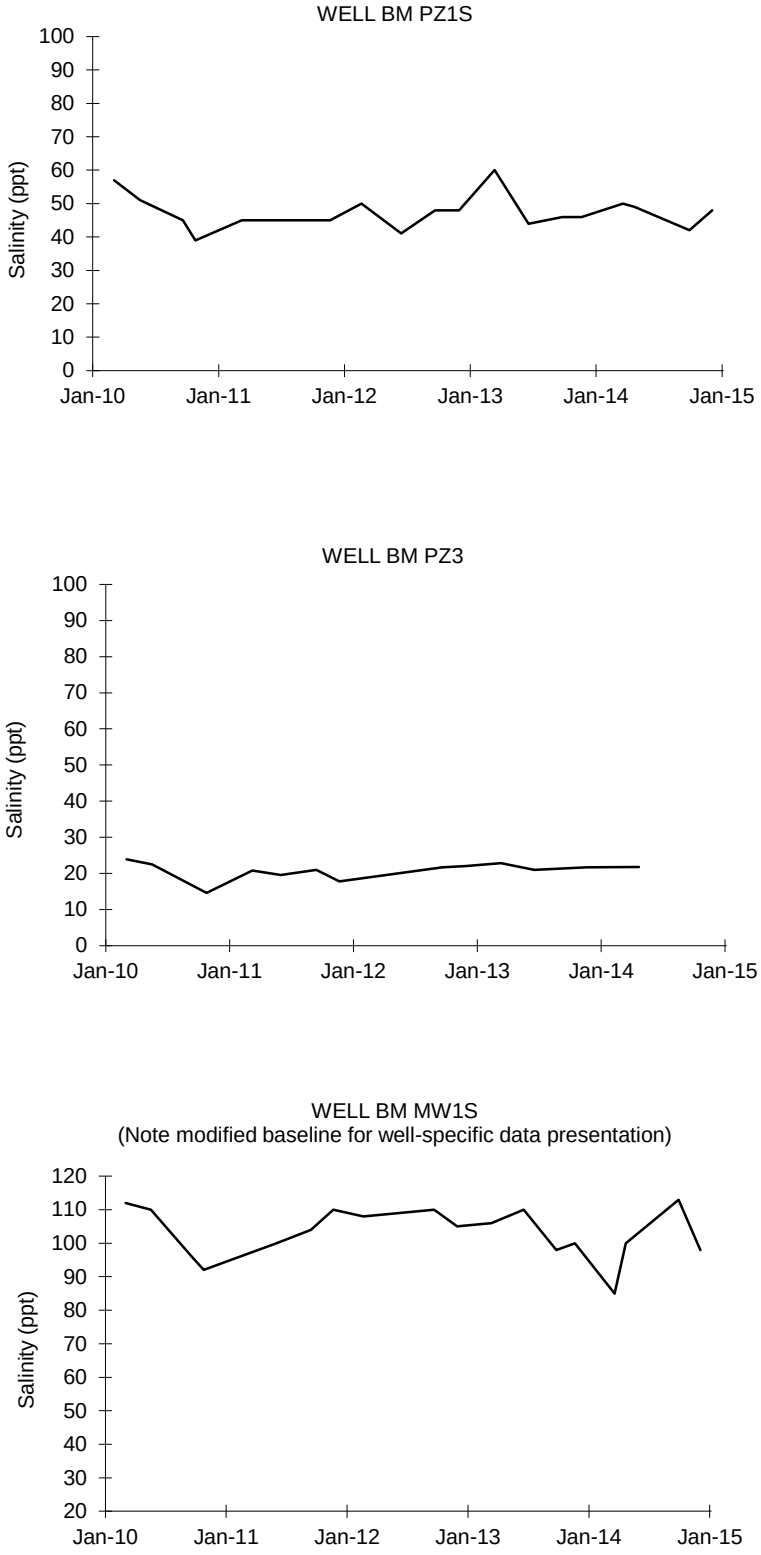
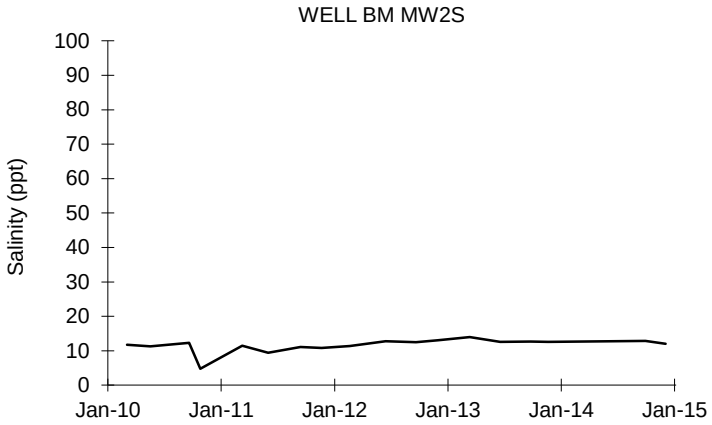
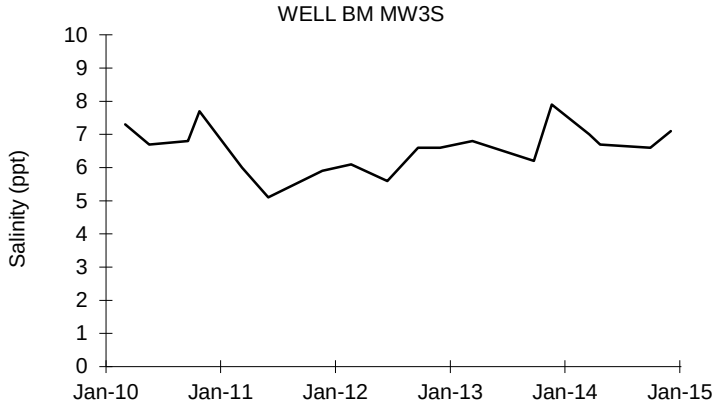


Figure C-10. Bryan Mound Ground Water Monitoring Well Salinities





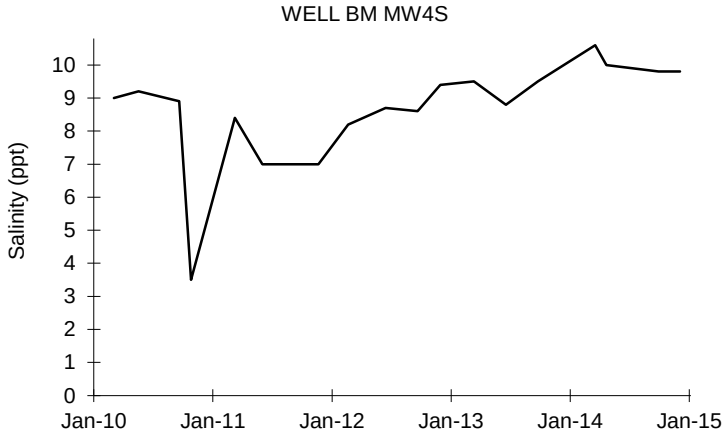


Figure C-10. Bryan Mound Ground Water Monitoring Well Salinities (continued)

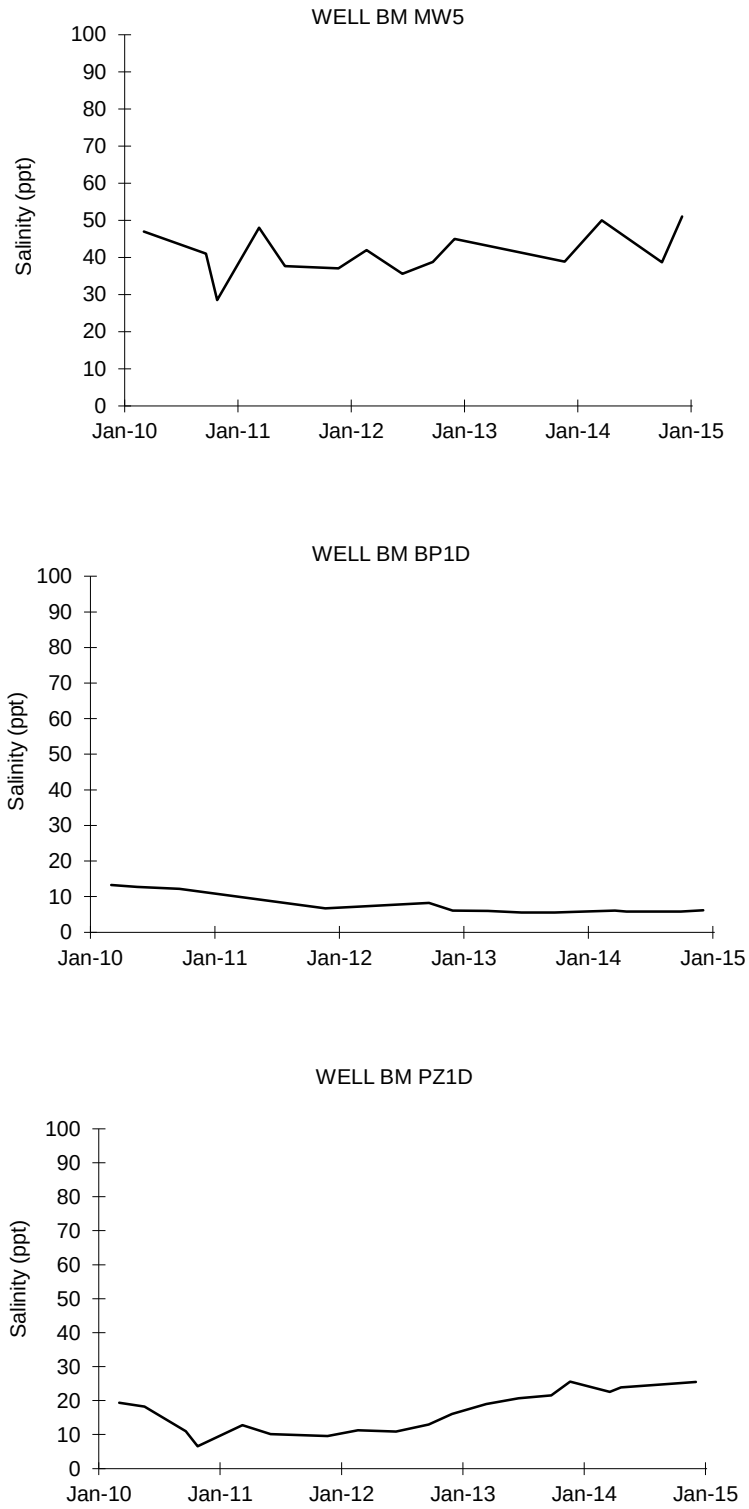
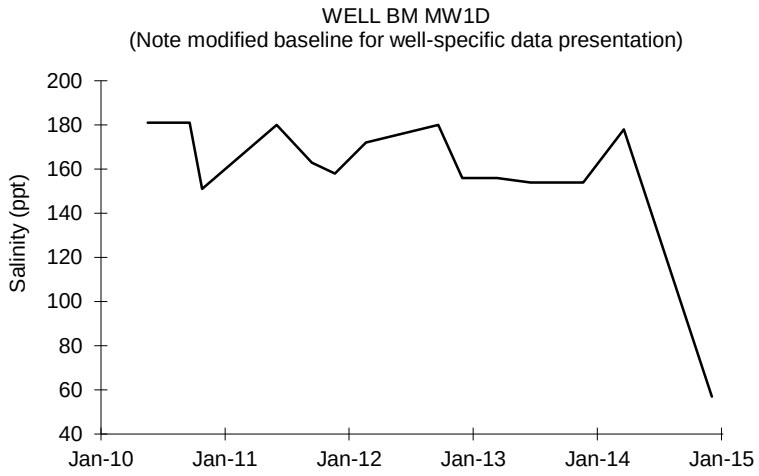
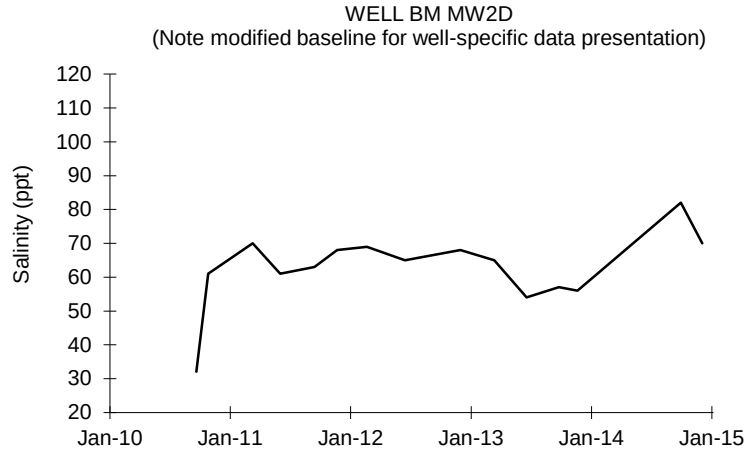


Figure C-10. Bryan Mound Ground Water Monitoring Well Salinities (continued)





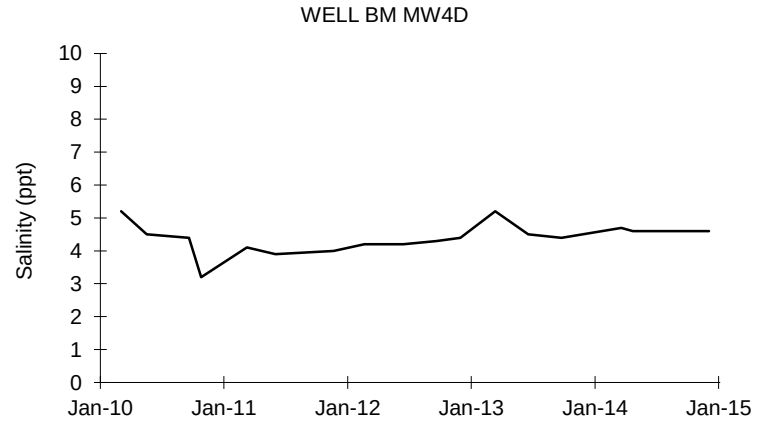


Figure C-10. Bryan Mound Ground Water Monitoring Well Salinities (continued)

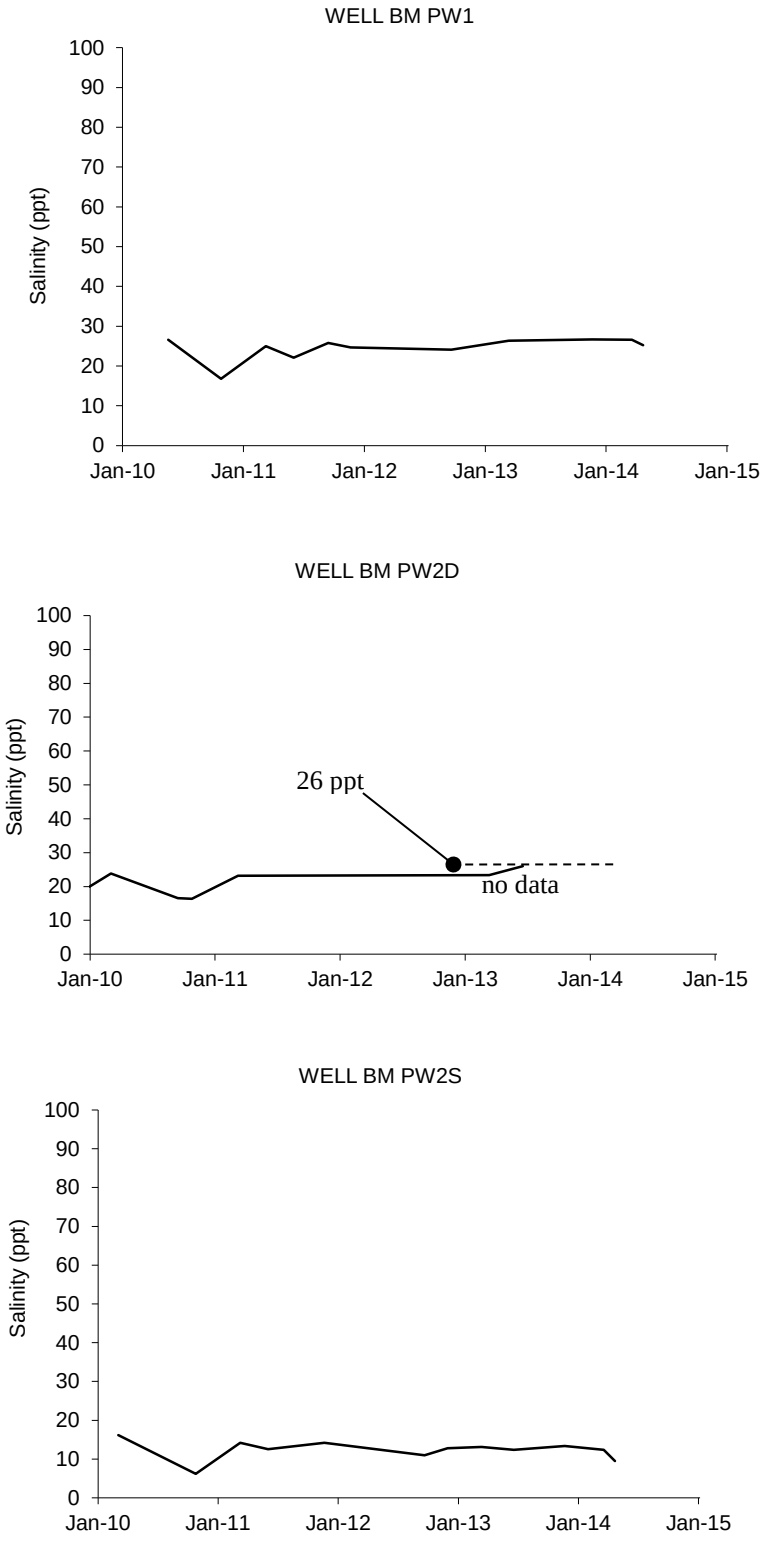
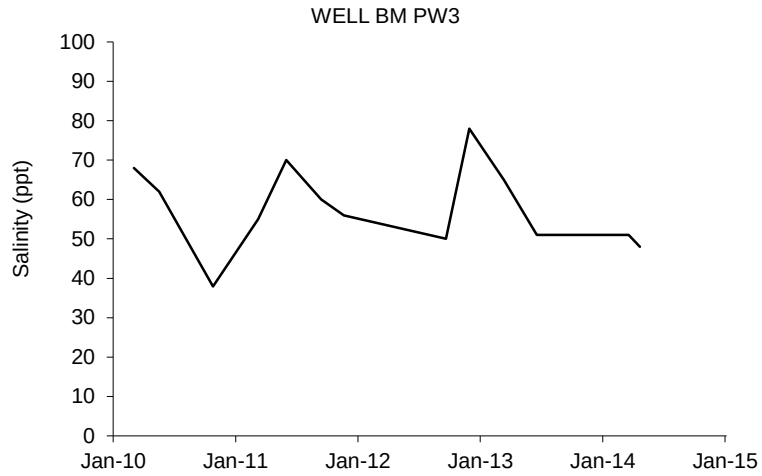
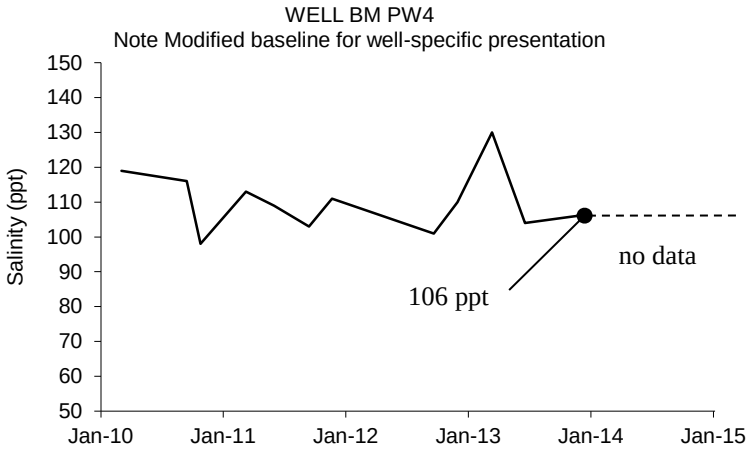


Figure C-10. Bryan Mound Ground Water Monitoring Well Salinities (continued)





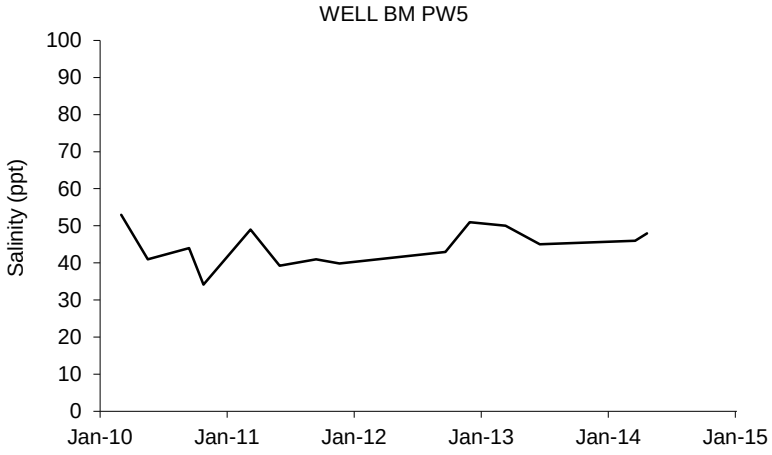


Figure C-10. Bryan Mound Ground Water Monitoring Well Salinities (continued)

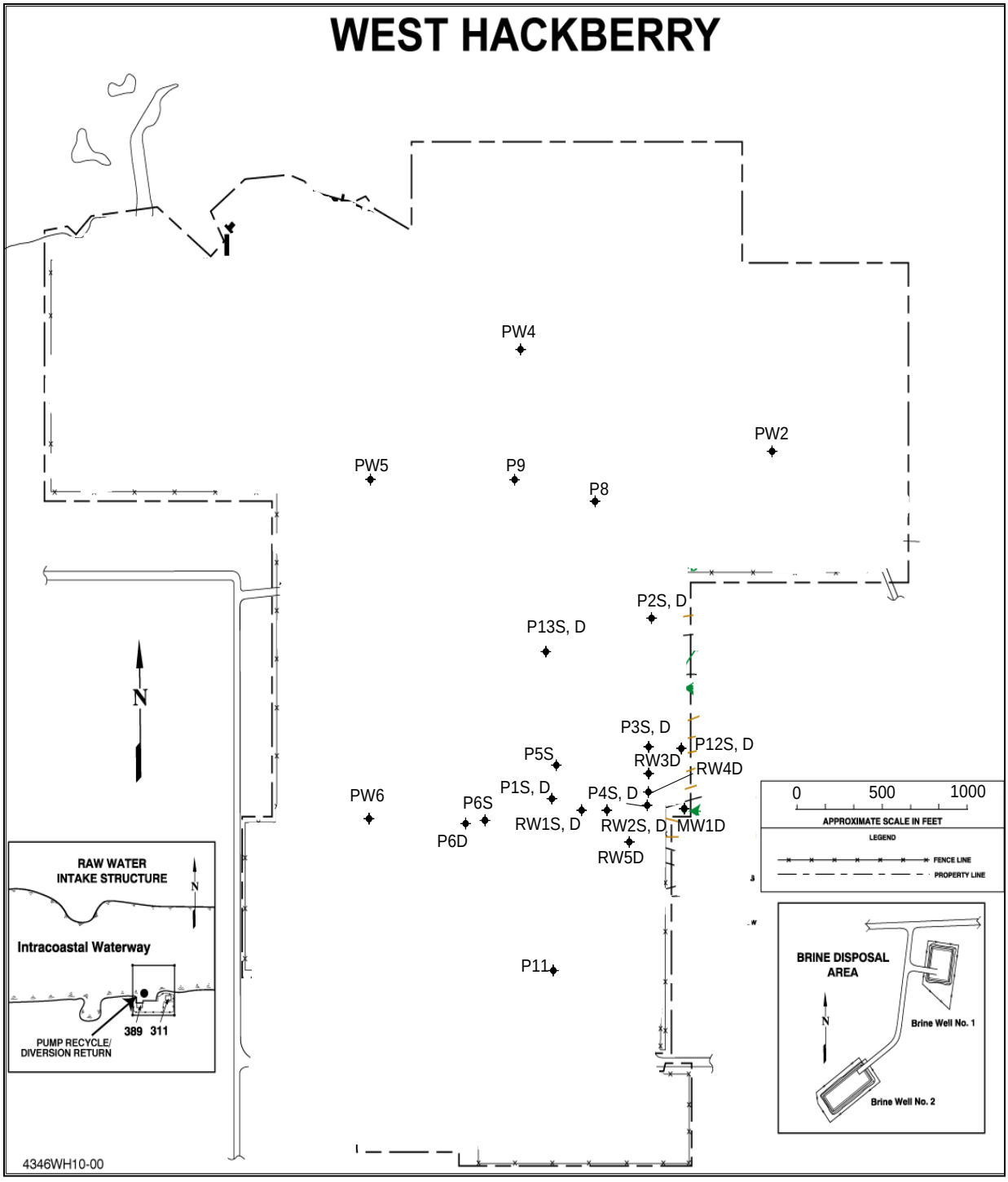


Figure C-11. West Hackberry Ground Water Monitoring Stations, Deep and Shallow

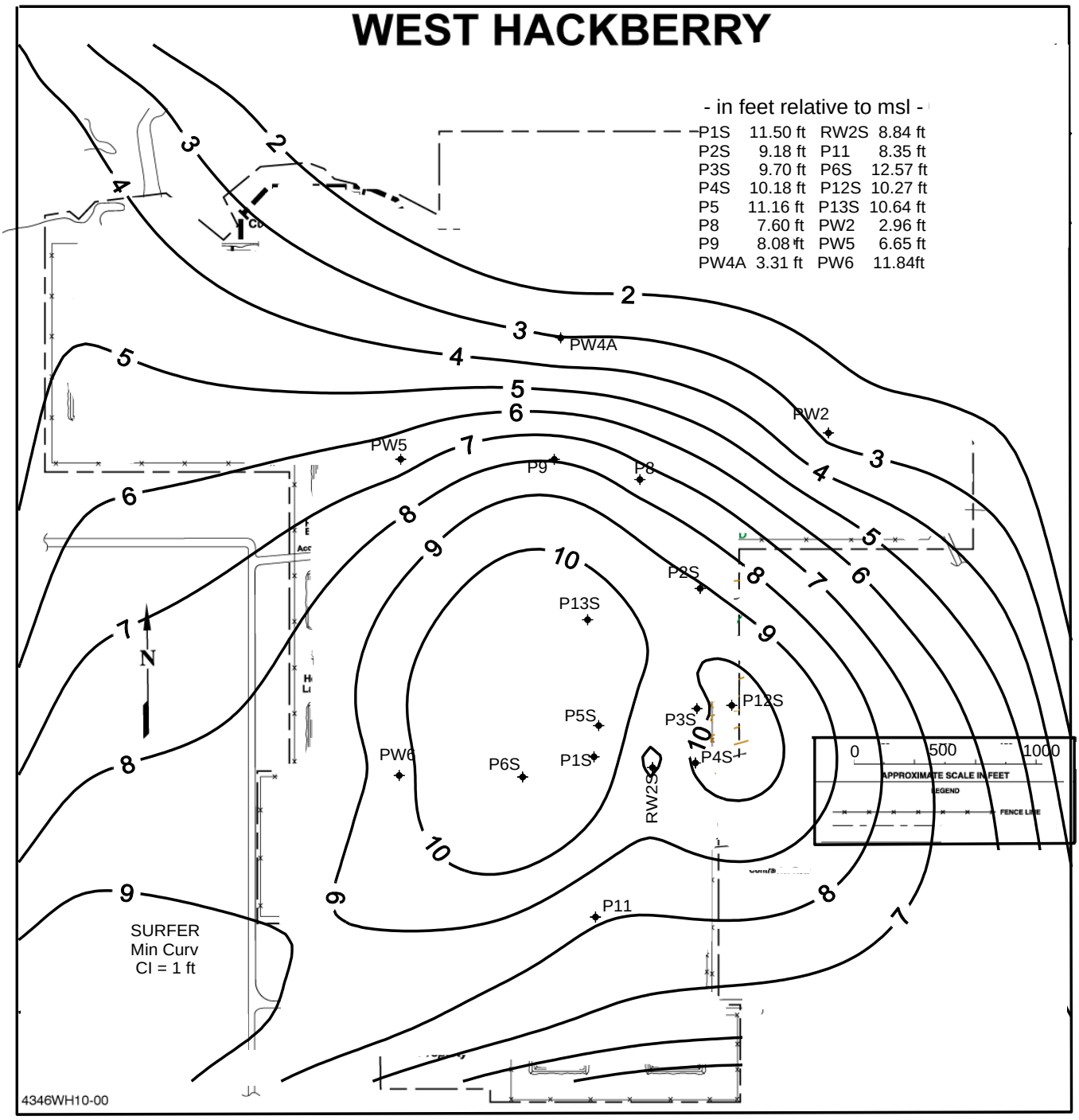


Figure C-12. West Hackberry Shallow Ground Water Zone Contoured Elevations Spring 2014

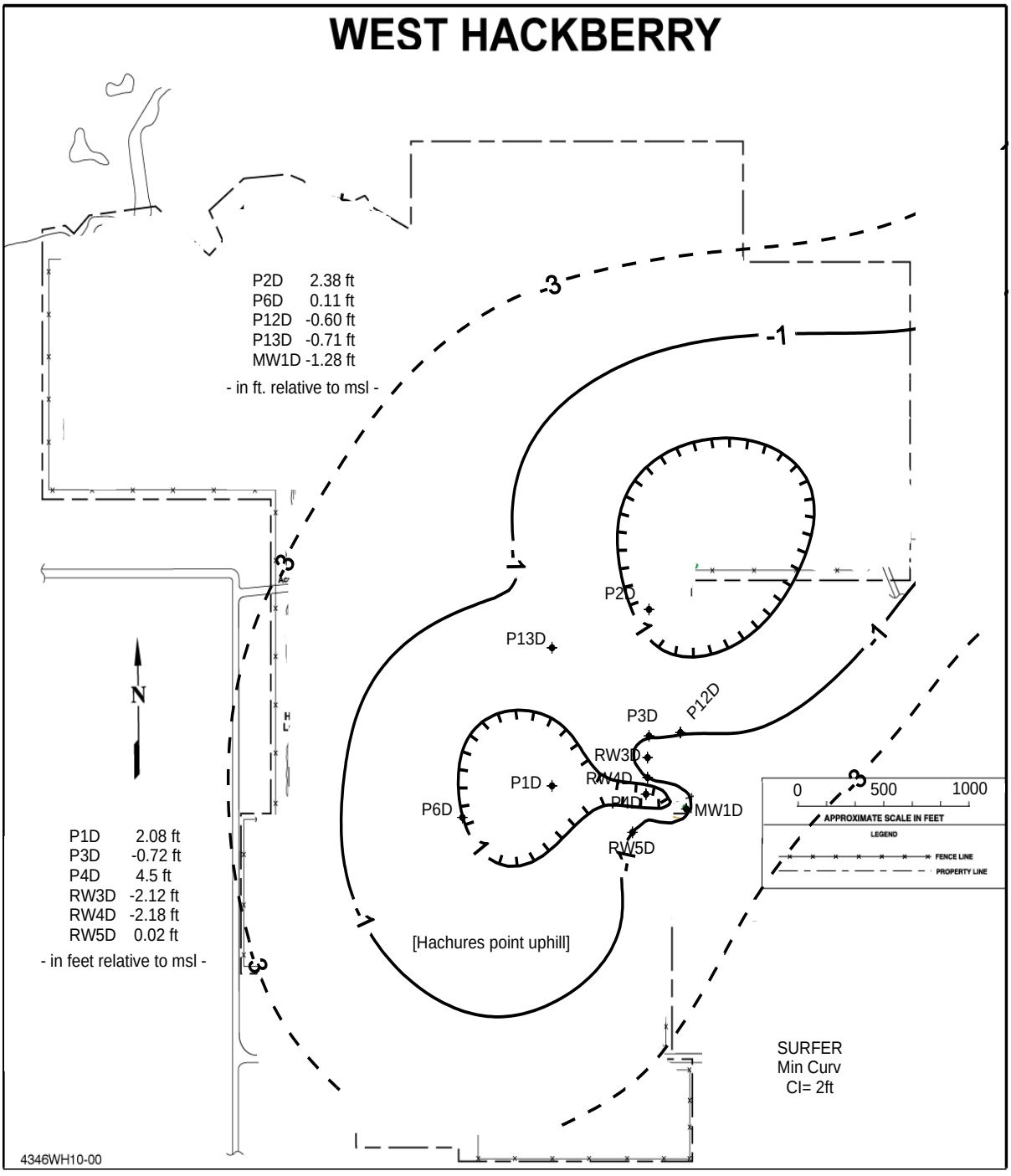


Figure C-13 West Hackberry Deep Ground Water Zone Contoured Elevations Spring 2014

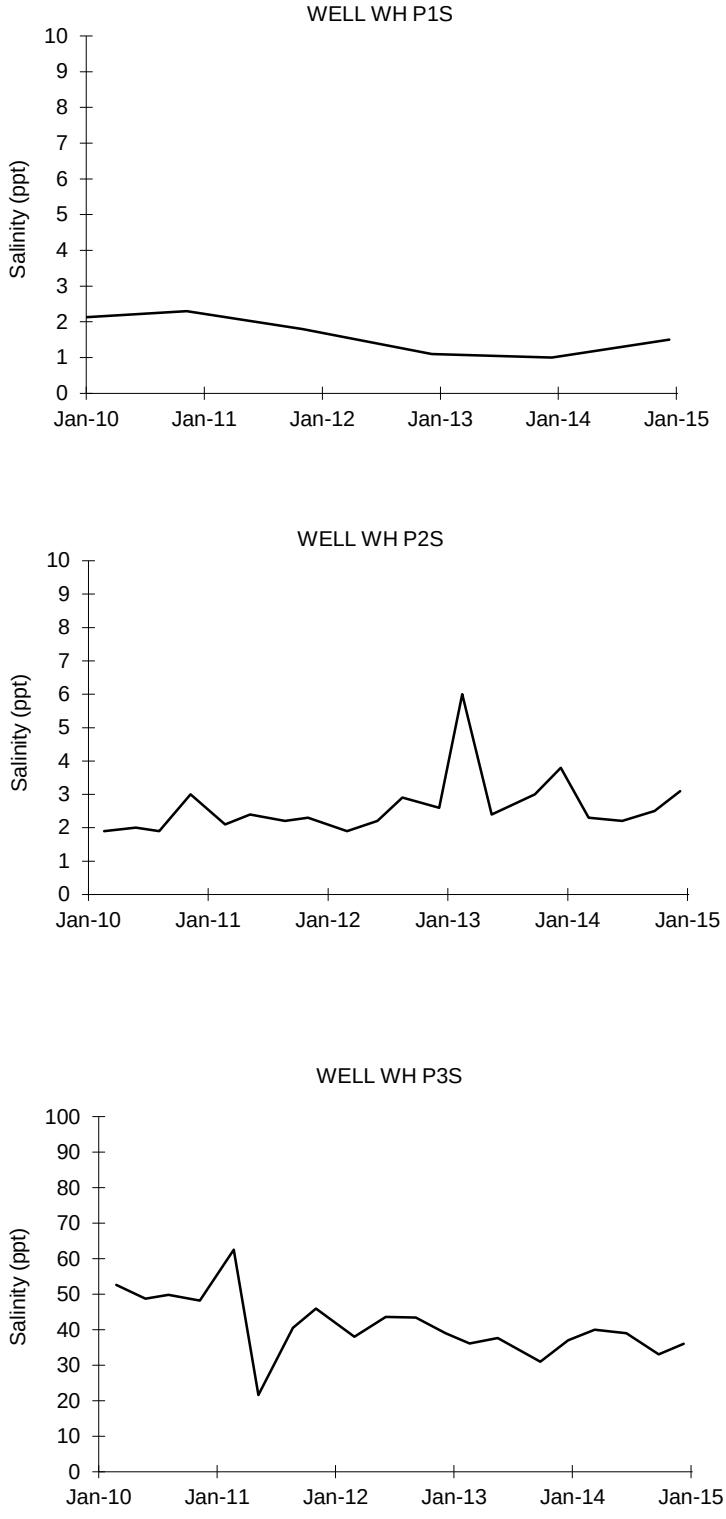


Figure C-14. West Hackberry Ground Water Monitoring Well Salinities

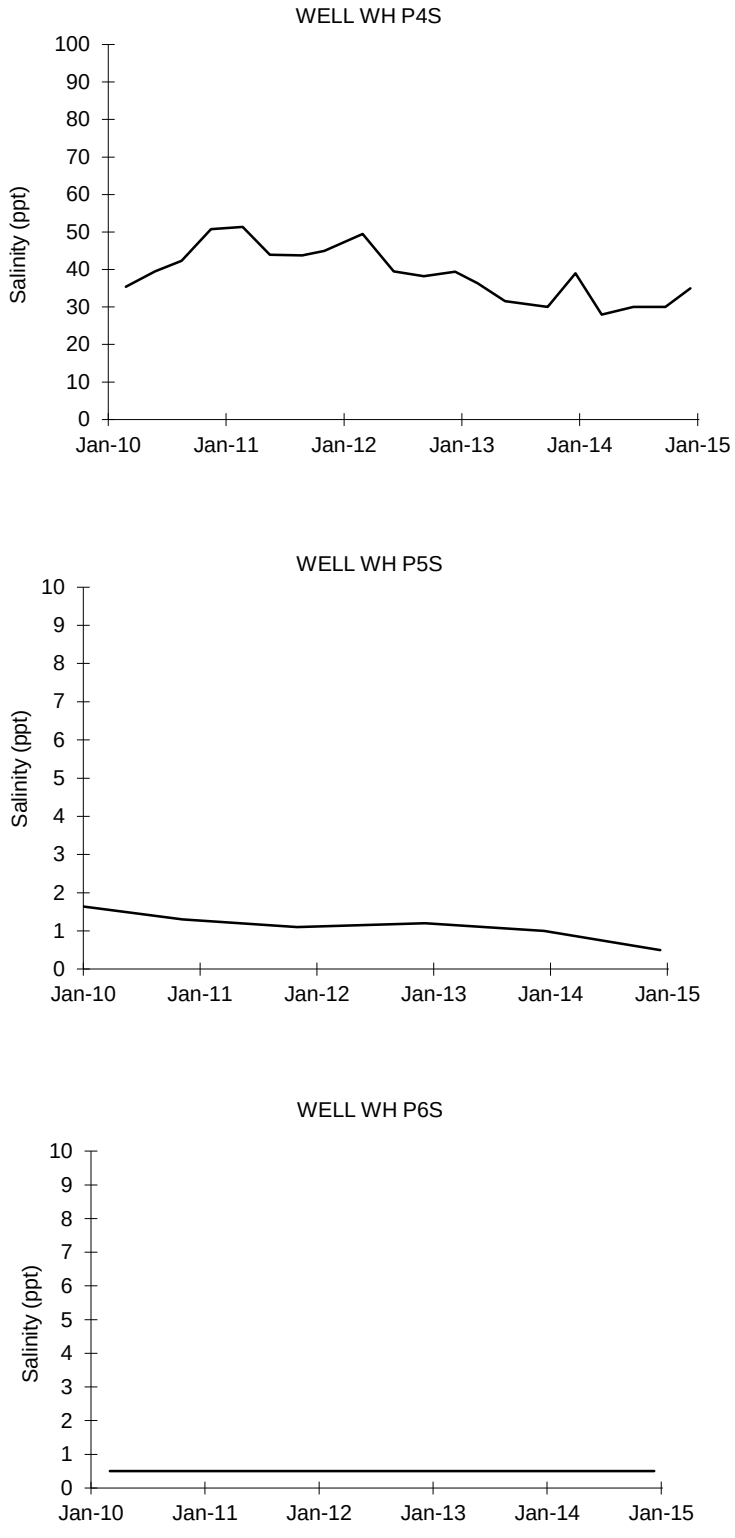
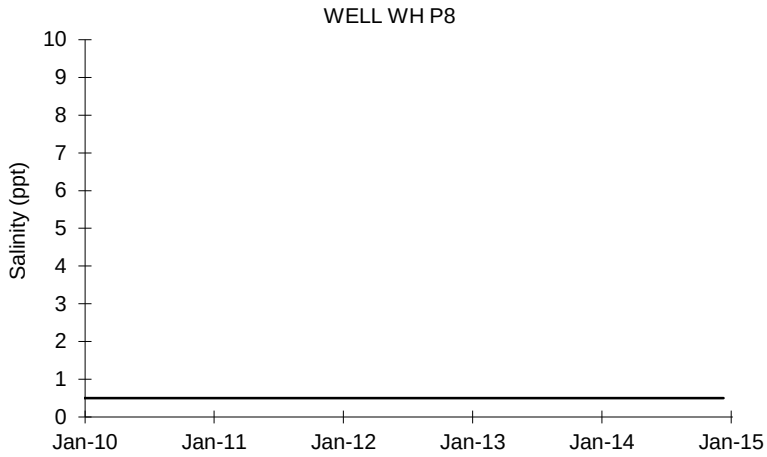
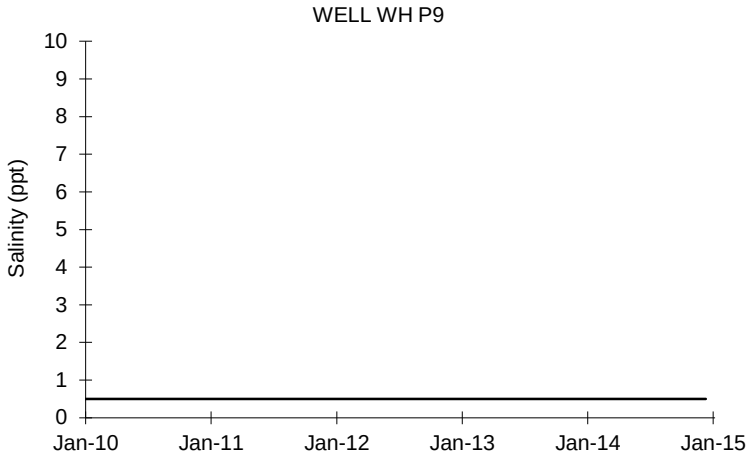


Figure C-14. West Hackberry Ground Water Well Salinities (continued)





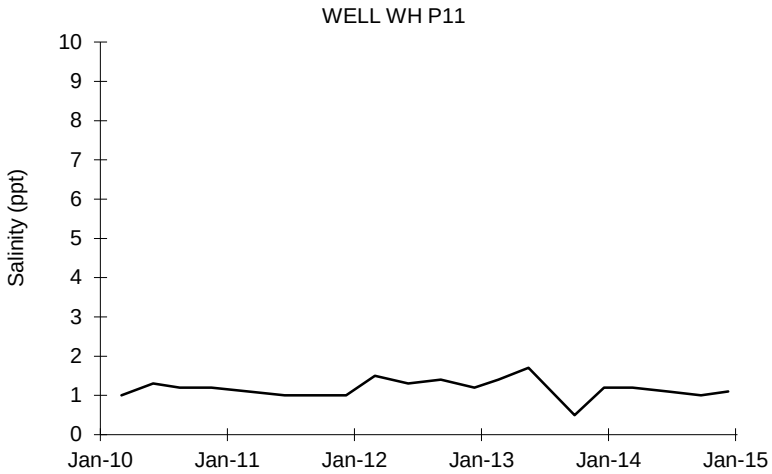


Figure C-14. West Hackberry Ground Water Well Salinities (continued)

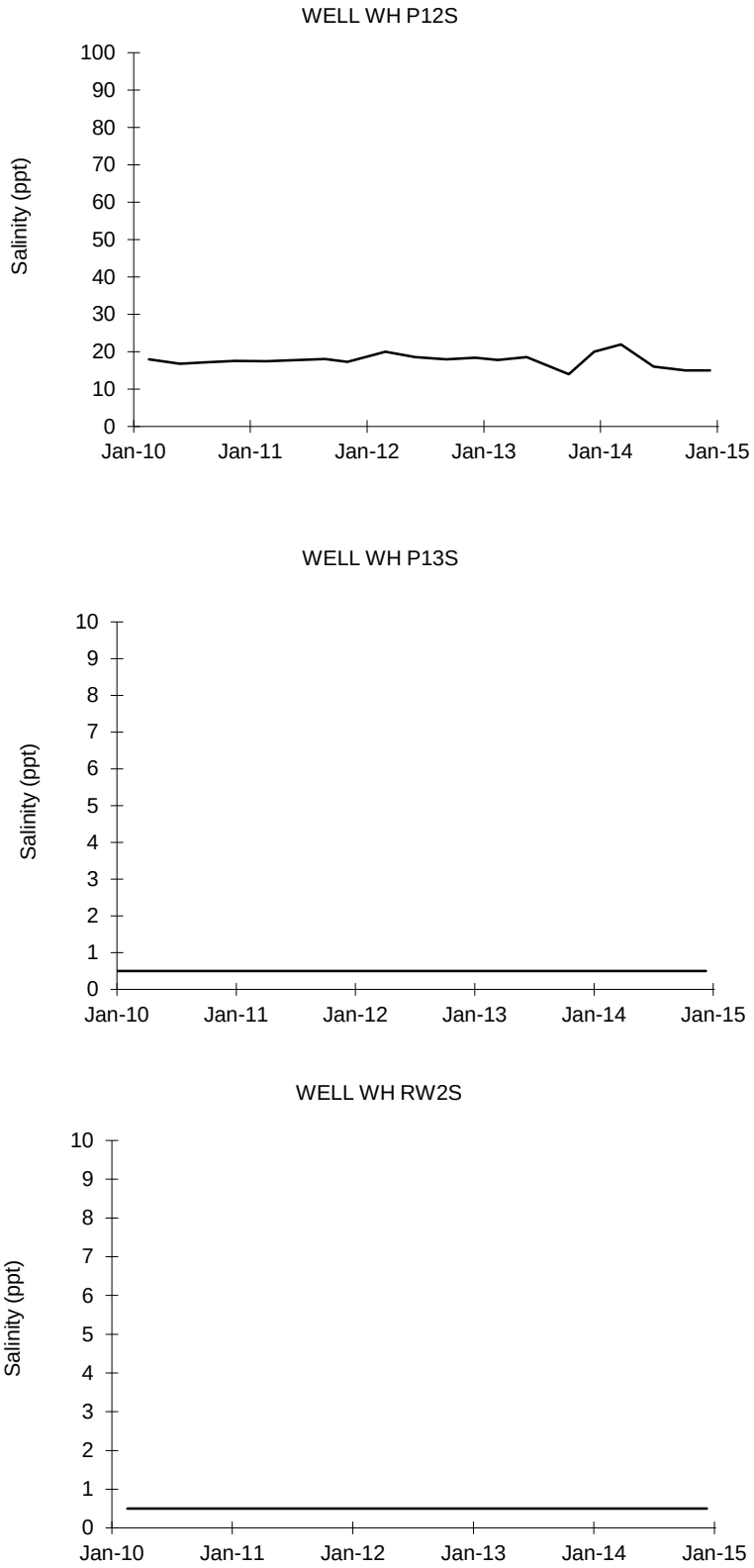


Figure C-14. West Hackberry Ground Water Well Salinities (continued)

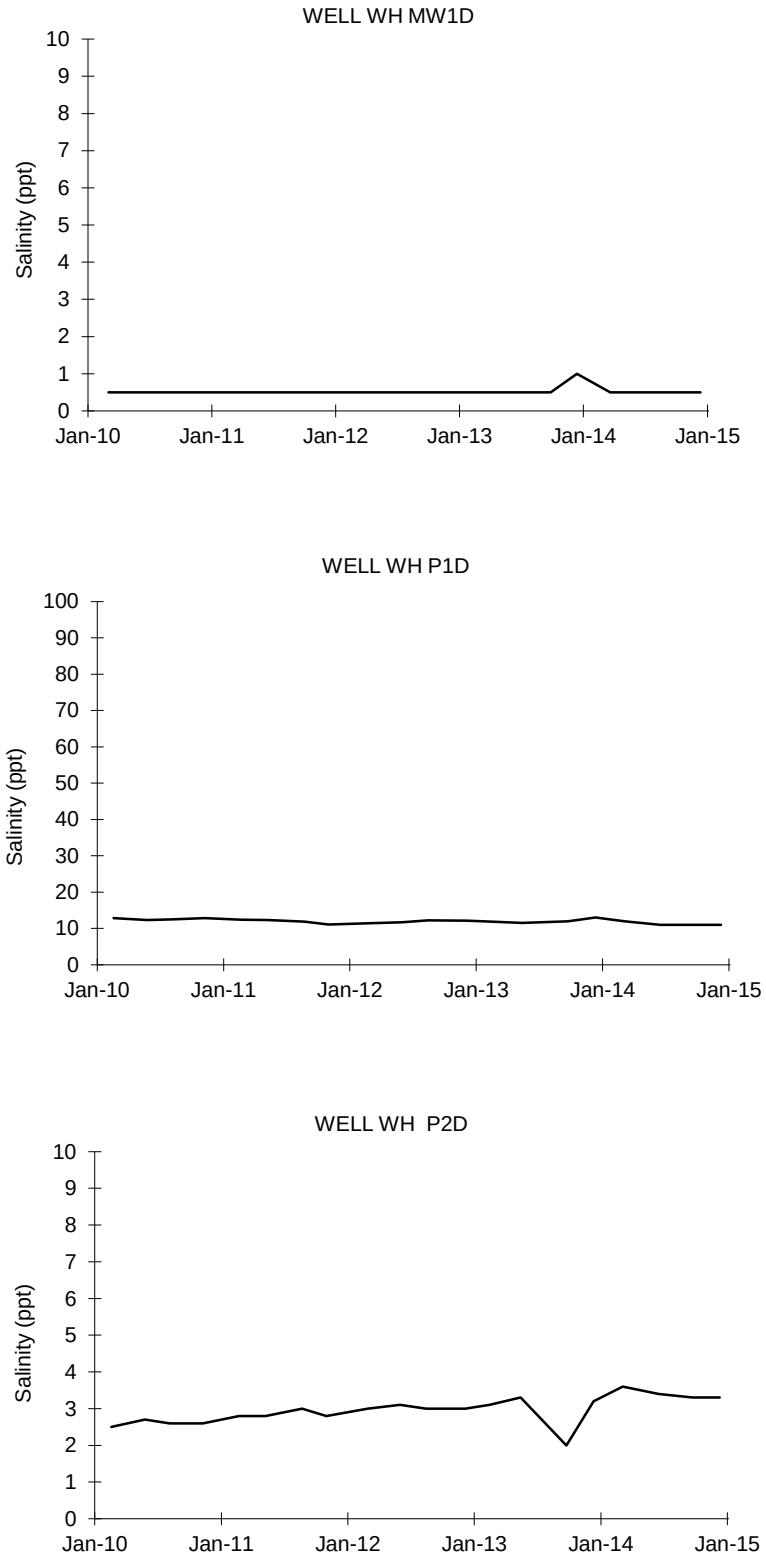
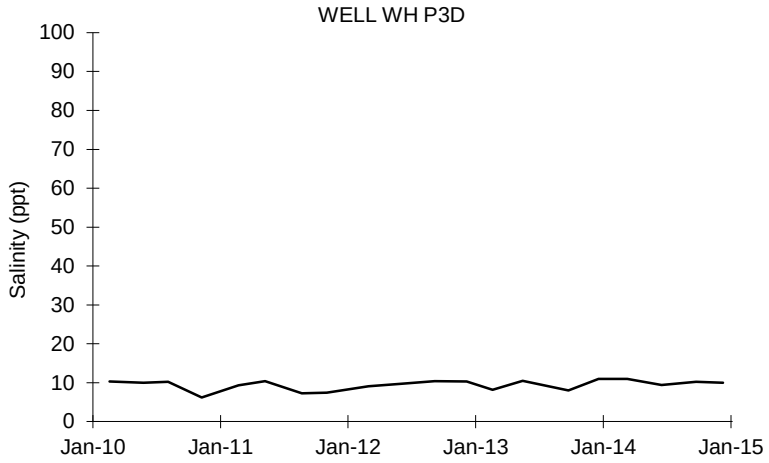
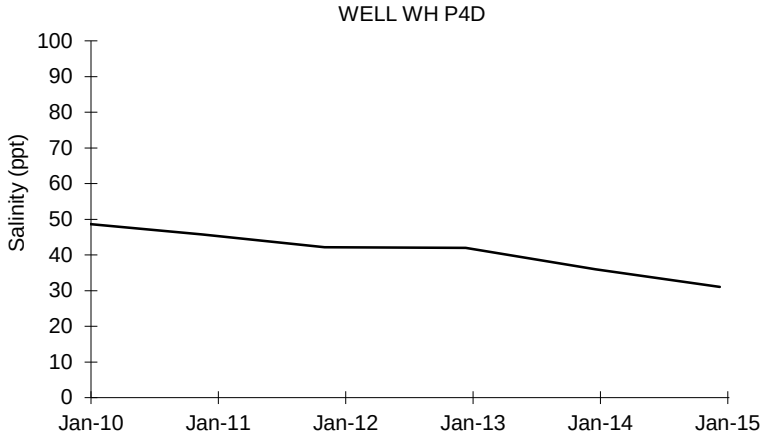


Figure C-14. West Hackberry Ground Water Well Salinities (continued)





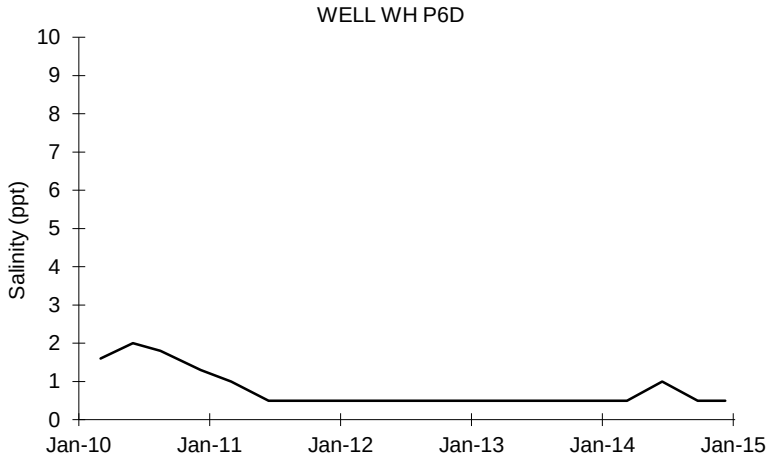


Figure C-14. West Hackberry Ground Water Well Salinities (continued)

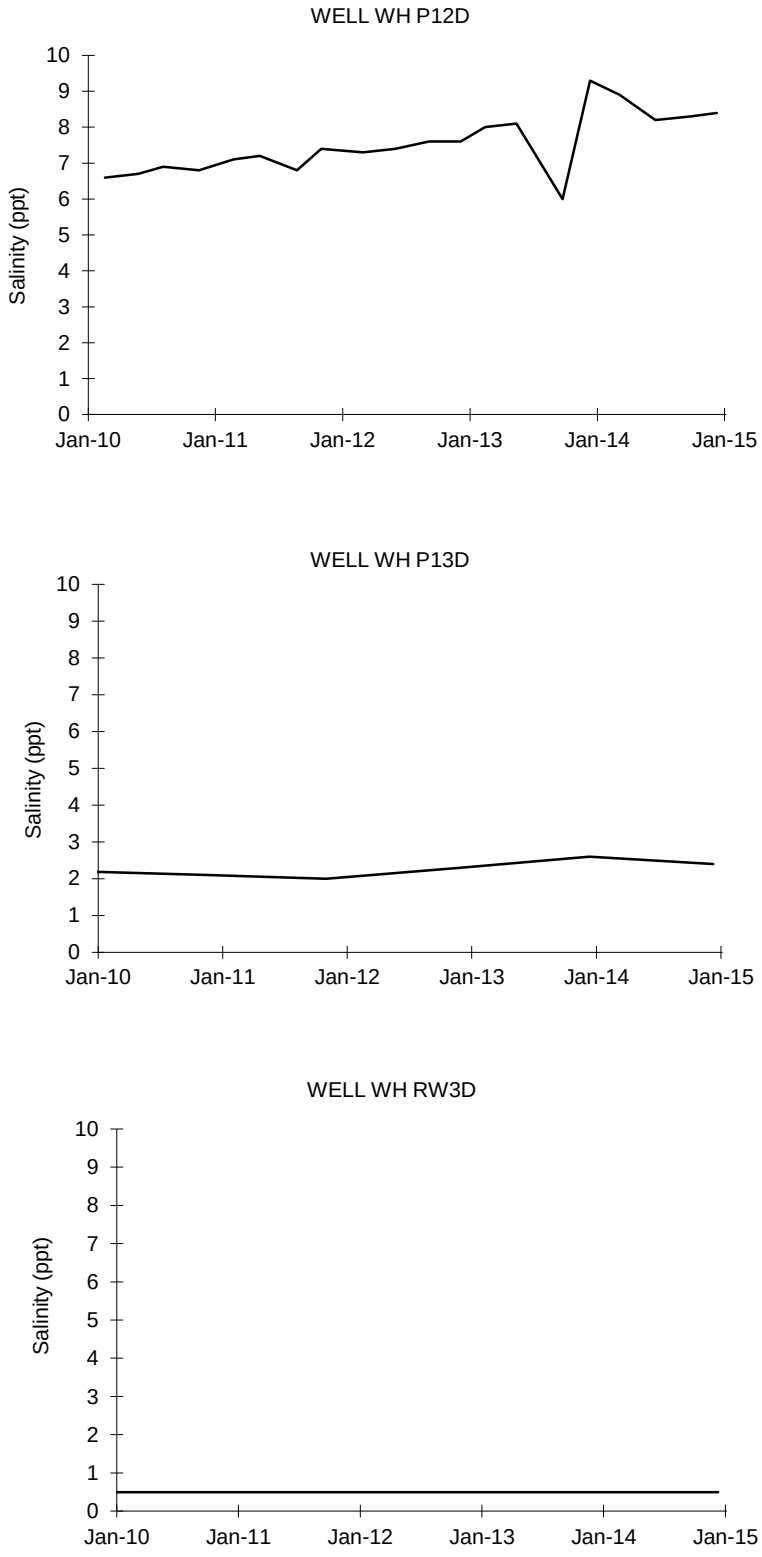
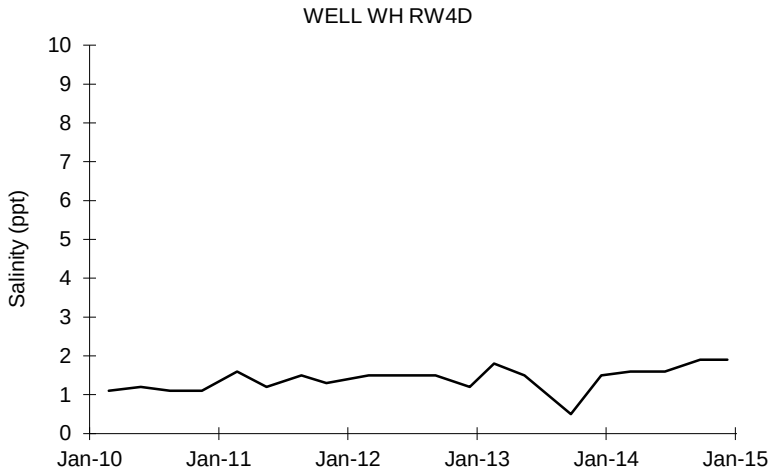
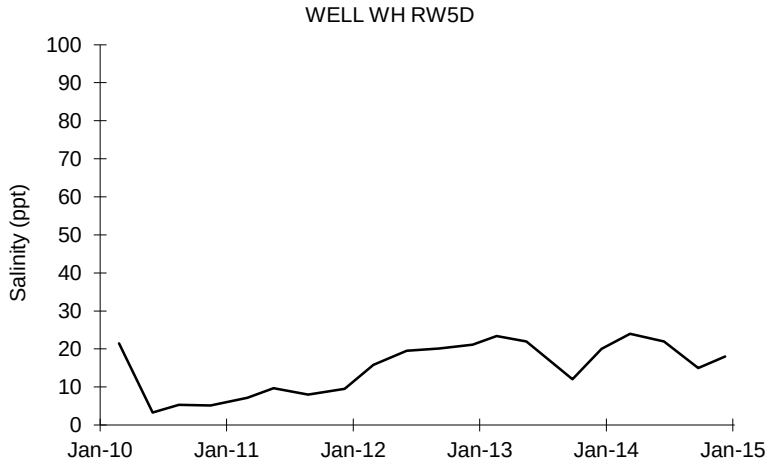


Figure C-14. West Hackberry Ground Water Well Salinities (continued)





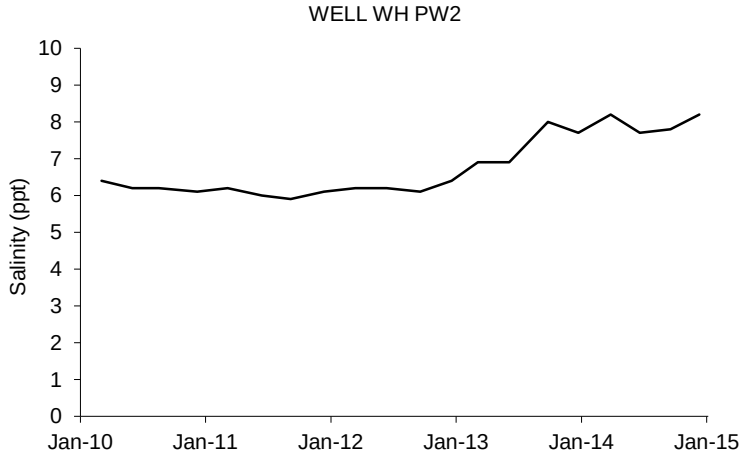


Figure C-14. West Hackberry Ground Water Well Salinities (continued)

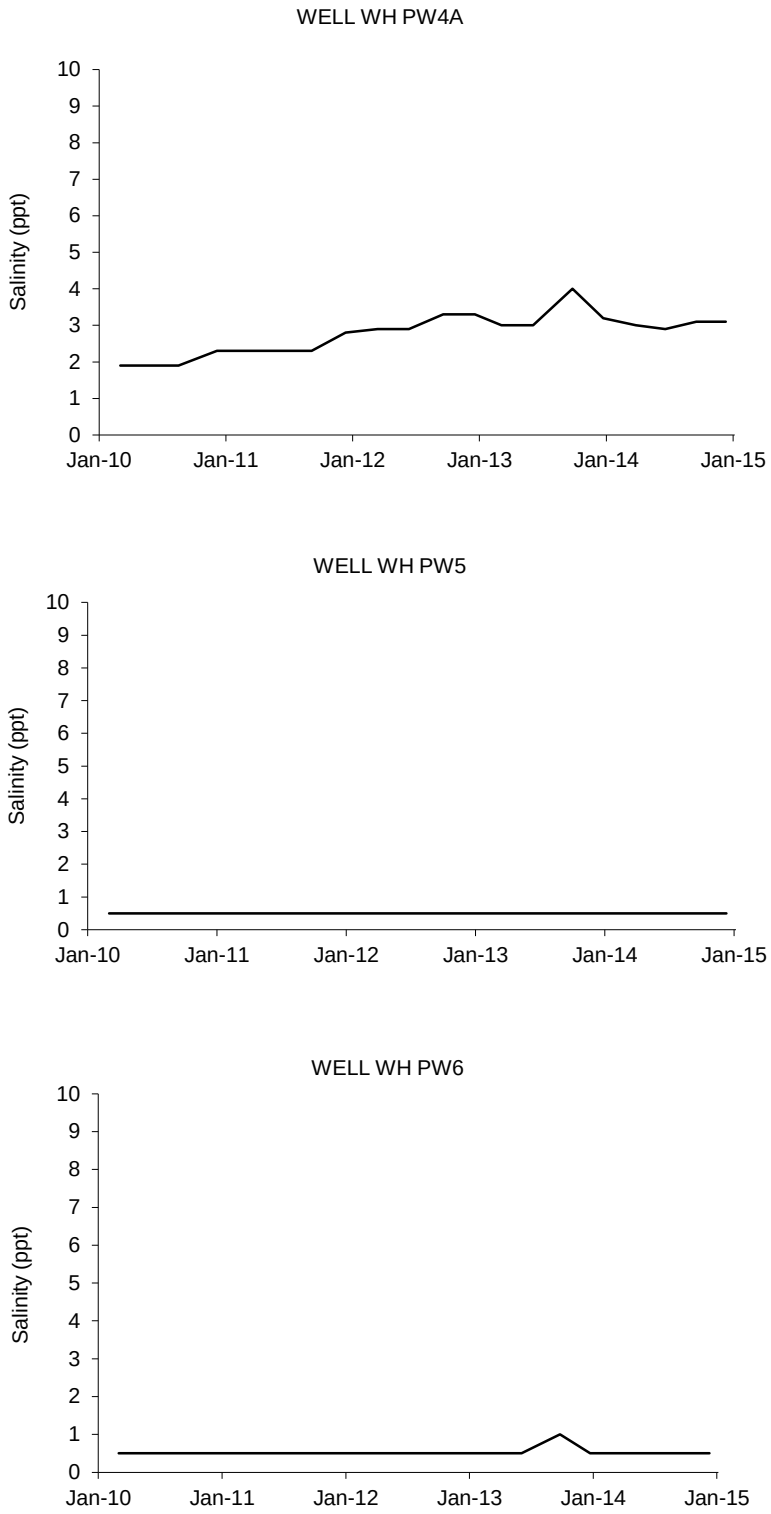
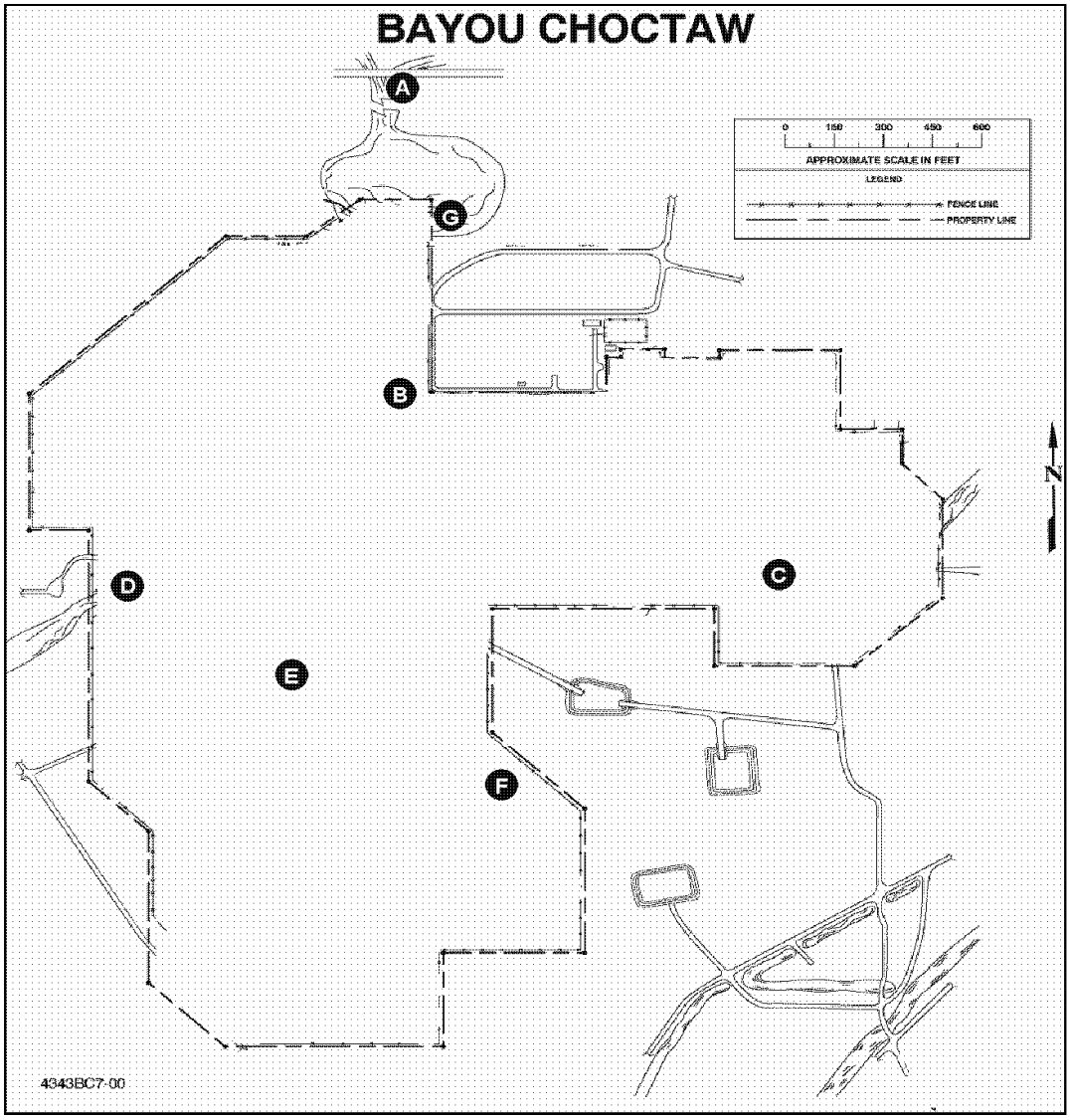


Figure C-14. West Hackberry Ground Water Well Salinities (continued)

Appendix D

SURFACE WATER QUALITY SURVEILLANCE MONITORING

DURING 2014



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 D-1. Bayou Choctaw Environmental Monitoring Stations

6.5.1.1.1 Table D-1. 2014 Data Summary for Bayou Choctaw Monitoring Stations

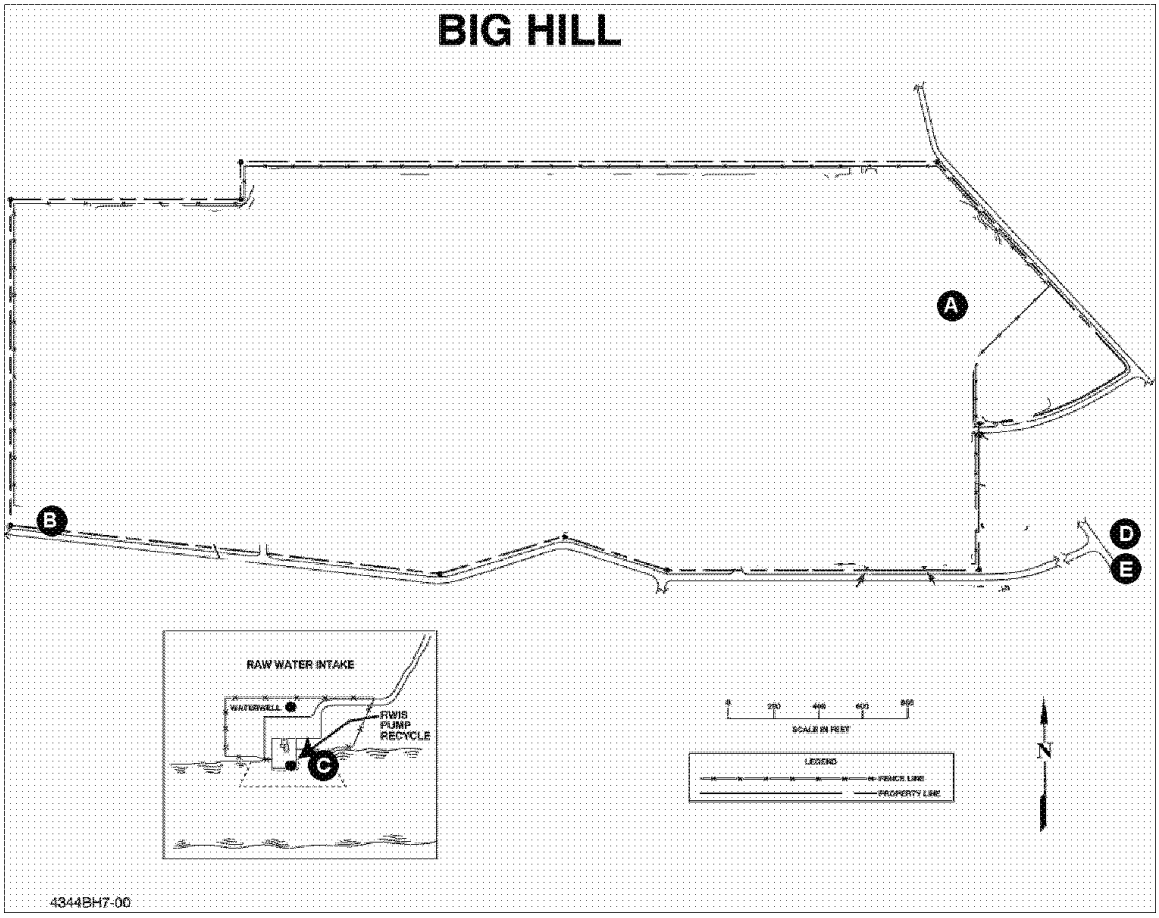
Station	Statistical Parameters	Dissolved Oxygen (mg/L)	Oil & Grease (mg/L)	pH (s.u.)	Salinity (ppt)	Temperature (°C)	Total Organic Carbon (mg/L)
A	Sample Size	11	3	11	11	11	11
	Number of BDL	0	3	NV	11	NV	0
	Maximum	4.6	2.5	7.6	0.5	27.8	34.6
	Minimum	2.0	2.5	7.1	0.5	6.4	1.7
	Mean	2.9	2.5	NV	0.5	18.5	10.8
	Median	3.1	2.5	7.4	0.5	19.3	5.8
	Standard Deviation	0.8	0.0	NV	0.0	7.6	11.8
	Coefficient of Variation	27.6	0.0	NV	0.0	41.1	109.3
B	Sample Size	11	3	11	11	11	11
	Number of BDL	0	2	NV	10	NV	0
	Maximum	4.8	6.0	7.5	1.0	26.8	33.4
	Minimum	1.1	2.5	7.0	0.5	5.8	2.4
	Mean	3.4	3.7	NV	0.5	20.8	9.9
	Median	4.1	2.5	7.3	0.5	19.7	7.0
	Standard Deviation	1.2	2.0	NV	0.2	13.1	10.2
	Coefficient of Variation	35.3	54.1	NV	40.0	63.0	103.0
C	Sample Size	11	3	11	11	11	11
	Number of BDL	0	3	NV	11	NV	0
	Maximum	5.1	2.5	8.1	0.5	26.7	22.2
	Minimum	0.9	2.5	7.0	0.5	6.0	2.1
	Mean	2.8	2.5	NV	0.5	18.4	9.7
	Median	3.0	2.5	7.2	0.5	19.7	8.4
	Standard Deviation	1.2	0.0	NV	0.0	7.5	6.5
	Coefficient of Variation	42.9	0.0	NV	0.0	40.8	67.0
D	Sample Size	11	3	11	11	11	11
	Number of BDL	0	3	NV	11	NV	0
	Maximum	3.8	2.5	8.0	0.5	27.3	35.1
	Minimum	1.1	2.5	7.0	0.5	2.9	2.4
	Mean	2.6	2.5	NV	0.5	18.1	9.9
	Median	2.8	2.5	7.4	0.5	19.4	6.8
	Standard Deviation	0.7	0.0	NV	0.0	8.2	9.6
	Coefficient of Variation	26.9	0.0	NV	0.0	45.3	97.0
E	Sample Size	11	3	11	11	11	11
	Number of BDL	0	2	NV	11	NV	0
	Maximum	4.3	6.0	8.4	0.5	27.6	41.3
	Minimum	0.9	2.5	7.0	0.5	6.2	4.6
	Mean	2.4	3.7	NV	0.5	18.6	12.2
	Median	2.1	2.5	7.3	0.5	20.2	6.4
	Standard Deviation	1.4	2.0	NV	0.0	7.5	12.3
	Coefficient of Variation	58.3	54.1	NV	0.0	40.3	100.8

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

Table D-1. 2014 Data Summary for Bayou Choctaw Monitoring Stations (continued)

Station	Statistical Parameters	Dissolved Oxygen (mg/L)	Oil & Grease (mg/L)	pH (s.u.)	Salinity (ppt)	Temperature (°C)	Total Organic Carbon (mg/L)
F	Sample Size	11	3	11	11	11	11
	Number of BDL	0	3	NV	10	NV	0
	Maximum	5.0	2.5	8.3	2.5	27.3	33.7
	Minimum	0.5	2.5	7.1	0.5	6.1	1.2
	Mean	2.0	2.5	NV	0.7	18.6	10.3
	Median	1.1	2.5	7.4	0.5	20.1	6.9
	Standard Deviation	1.6	0.0	NV	0.6	7.6	9.2
	Coefficient of Variation	80.0	0.0	NV	85.7	40.9	89.3
G	Sample Size	11	3	11	11	11	11
	Number of BDL	0	3	NV	11	NV	0
	Maximum	6.1	2.5	8.2	0.5	27.2	34.9
	Minimum	3.5	2.5	7.1	0.5	6.0	3.3
	Mean	4.7	2.5	NV	0.5	18.0	10.3
	Median	4.6	2.5	7.7	0.5	19.6	7.5
	Standard Deviation	0.8	0.0	NV	0.0	7.9	9.0
	Coefficient of Variation	17.0	0.0	NV	0.0	43.9	87.4

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



Water Quality Monitoring Stations

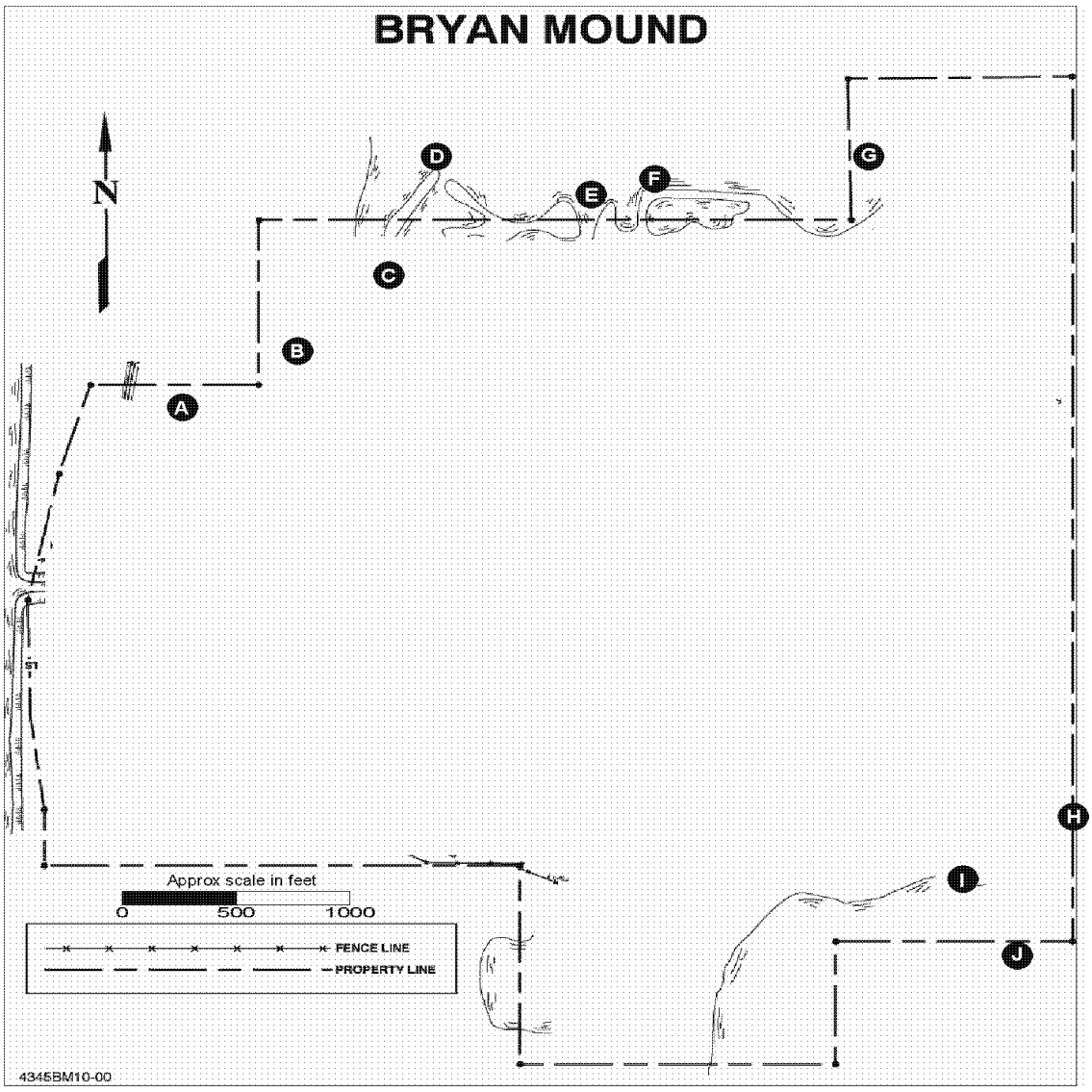
A Pond receiving effluent from site sewage treatment plant (STP)
B Wilbur Road ditch – southwest of site
C RWIS at Intracoastal Waterway
D Pipkin Reservoir – (1.8 Miles from map location)
E Gator Hole – (3.1 Miles from map location)

Figure D-2. Big Hill Environmental Monitoring Stations

Table D-2. 2014 Data Summary for Big Hill Monitoring Stations

Station	Statistical Parameters	Dissolved Oxygen (mg/L)	Oil & Grease (mg/L)	pH (s.u.)	Salinity (ppt)	Temperature (°C)	Total Organic Carbon (mg/L)
A	Sample Size	0	0	1	0	1	0
	Number of BDL	ND	ND	NV	ND	NV	ND
	Maximum	ND	ND	6.0	ND	6.0	ND
	Minimum	ND	ND	6.0	ND	6.0	ND
	Mean	ND	ND	6.0	ND	6.0	ND
	Median	ND	ND	6.0	ND	6.0	ND
	Standard Deviation	ND	ND	NV	ND	NV	ND
	Coefficient of Variation	ND	ND	NV	ND	NV	ND
B	Sample Size	12	4	12	12	12	12
	Number of BDL	1	4	NV	9	NV	0
	Maximum	11.1	2.5	7.6	6.0	28.0	25.8
	Minimum	0.1	2.5	6.8	0.5	14.0	7.4
	Mean	6.1	2.5	NV	1.4	21.3	13.4
	Median	6.1	2.5	7.2	0.5	21.5	11.4
	Standard Deviation	3.9	0.0	NV	1.8	5.3	5.7
	Coefficient of Variation	63.9	0.0	NV	128.6	24.9	42.5
C	Sample Size	12	4	12	12	12	12
	Number of BDL	0	4	NV	1	NV	0
	Maximum	12.3	2.5	7.8	16.0	29.0	11.8
	Minimum	3.9	2.5	7.1	0.5	15.0	6.0
	Mean	7.2	2.5	NV	9.2	22.2	8.1
	Median	7.0	2.5	7.5	8.0	21.0	7.5
	Standard Deviation	2.2	0.0	NV	4.7	5.6	1.7
	Coefficient of Variation	30.6	0.0	NV	51.1	25.2	21.0
D	Sample Size	12	4	12	12	12	12
	Number of BDL	1	4	NV	9	NV	0
	Maximum	11.6	2.5	7.9	2.0	27.0	26.8
	Minimum	0.1	2.5	6.8	0.5	15.0	12.4
	Mean	5.8	2.5	NV	0.9	21.5	18.1
	Median	5.9	2.5	7.2	0.5	21.5	17.2
	Standard Deviation	3.5	0.0	NV	0.7	4.5	3.8
	Coefficient of Variation	60.3	0.0	NV	77.8	20.9	21.0
E	Sample Size	12	4	12	12	12	12
	Number of BDL	1	3	NV	4	NV	0
	Maximum	11.4	13.3	7.9	8.0	28.0	31.8
	Minimum	0.1	2.5	6.2	0.5	16.0	9.5
	Mean	6.1	5.2	NV	2.5	22.0	19.6
	Median	7.0	2.5	7.1	2.0	21.0	19.9
	Standard Deviation	3.8	5.4	NV	2.7	4.7	6.4
	Coefficient of Variation	62.3	103.8	NV	108.0	21.4	32.7

Note: BDL = Number of samples that were below the detectable limit.
ND = No data, unable to obtain samples for testing
NV = Not a valid number or statistically meaningful.



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 D-3. Bryan Mound Environmental Monitoring Stations

6.5.1.1.2 Table D-3. 2014 Data Summary for Bryan Mound Monitoring Stations

Station	Statistical Parameters	Dissolved Oxygen (mg/L)	Oil & Grease (mg/L)	pH (s.u.)	Salinity (ppt)	Temperature (°C)	Total Organic Carbon (mg/L)
A	Sample Size	12	3	12	11	12	12
	Number of BDL	0	3	NV	1	NV	0
	Maximum	13.5	2.5	8.3	13.3	29.2	46.1
	Minimum	4.1	2.5	6.8	0.5	14.5	12.7
	Mean	7.4	2.5	NV	9.8	21.6	33.8
	Median	5.9	2.5	7.3	10.9	19.8	34.9
	Standard Deviation	3.2	0.0	NV	3.7	6.1	8.6
	Coefficient of Variation	43.2	0.0	NV	37.8	28.2	25.4
B	Sample Size	12	3	12	12	12	11
	Number of BDL	0	3	NV	1	NV	0
	Maximum	13.0	2.5	8.2	13.3	29.5	46.9
	Minimum	3.6	2.5	6.9	0.5	14.5	25.3
	Mean	7.7	2.5	NV	10.1	21.5	35.6
	Median	7.0	2.5	7.4	11.2	19.7	37.2
	Standard Deviation	2.9	0.0	NV	3.6	6.1	5.8
	Coefficient of Variation	37.7	0.0	NV	35.6	28.4	16.3
C	Sample Size	12	3	12	12	12	12
	Number of BDL	0	3	NV	1	NV	0
	Maximum	13.8	2.5	8.2	13.3	30.0	45.6
	Minimum	3.8	2.5	6.8	0.5	14.5	25.8
	Mean	7.8	2.5	NV	10.1	21.6	34.9
	Median	6.6	2.5	7.8	11.3	19.7	34.2
	Standard Deviation	3.2	0.0	NV	3.6	6.2	5.0
	Coefficient of Variation	41.0	0.0	NV	35.6	28.7	14.3
D	Sample Size	11	3	12	12	12	12
	Number of BDL	0	3	NV	1	NV	0
	Maximum	13.5	2.5	8.4	13.5	30.6	46.2
	Minimum	3.7	2.5	6.9	0.5	14.5	27.4
	Mean	8.1	2.5	NV	10.0	21.7	35.1
	Median	7.7	2.5	7.7	11.1	20.0	35.3
	Standard Deviation	3.1	0.0	NV	3.6	6.2	4.8
	Coefficient of Variation	38.3	0.0	NV	36.0	28.6	13.7
E	Sample Size	12	3	12	12	12	12
	Number of BDL	0	3	NV	0	NV	0
	Maximum	13.8	2.5	8.2	13.8	30.7	43.6
	Minimum	3.6	2.5	6.9	0.5	14.5	26.2
	Mean	7.9	2.5	NV	10.1	21.8	34.8
	Median	6.8	2.5	7.9	11.1	20.0	35.7
	Standard Deviation	3.4	0.0	NV	3.7	6.3	4.6
	Coefficient of Variation	43.0	0.0	NV	36.6	28.9	13.2

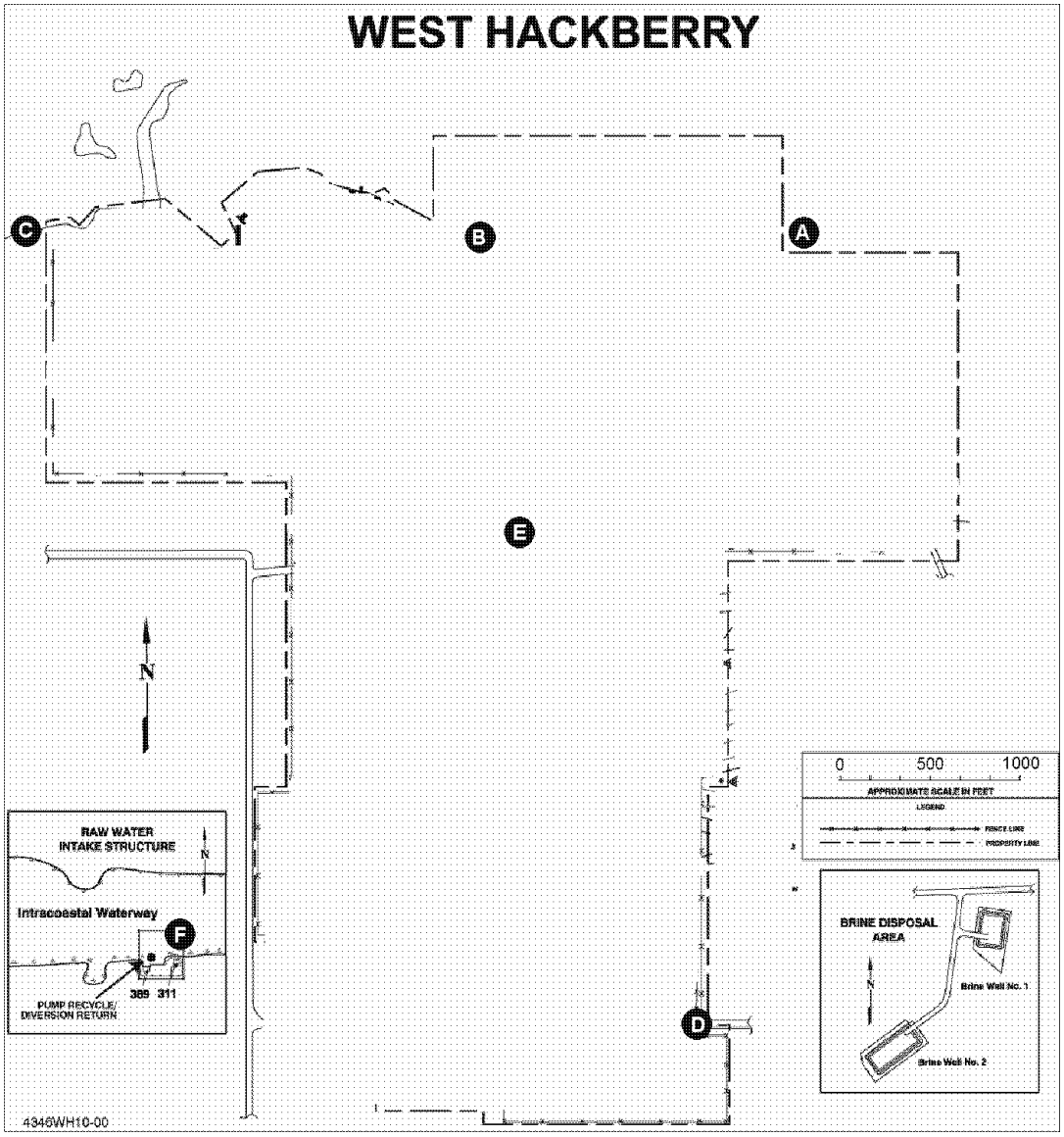
6.5.1.1.3

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

Table D-3. 2014 Data Summary for Bryan Mound Monitoring Stations (continued)

Station	Statistical Parameters	Dissolved Oxygen (mg/L)	Oil & Grease (mg/L)	pH (s.u.)	Salinity (ppt)	Temperature (°C)	Total Organic Carbon (mg/L)
F	Sample Size	12	3	12	12	12	12
	Number of BDL	0	3	NV	1	NV	0
	Maximum	13.4	2.5	8.3	13.8	30.8	42.5
	Minimum	3.3	2.5	6.8	0.5	14.4	26.3
	Mean	7.9	2.5	NV	10.1	21.7	35.1
	Median	7.9	2.5	7.4	11.1	19.6	36.1
	Standard Deviation	3.2	0.0	NV	3.7	6.3	4.2
	Coefficient of Variation	40.5	0.0	NV	36.6	29.0	12.0
G	Sample Size	12	3	12	12	12	12
	Number of BDL	0	3	NV	1	NV	0
	Maximum	14.6	2.5	8.4	34.9	30.8	42.6
	Minimum	3.6	2.5	6.7	0.5	14.4	25.6
	Mean	7.9	2.5	7.7	11.8	21.8	34.4
	Median	7.2	2.5	8.0	11.1	19.8	34.7
	Standard Deviation	3.4	0.0	NV	8.1	6.3	4.4
	Coefficient of Variation	43.0	0.0	NV	68.6	28.9	12.8
H	Sample Size	9	3	10	10	10	10
	Number of BDL	0	3	NV	1	NV	0
	Maximum	9.9	2.5	8.0	38.6	30.5	21.9
	Minimum	5.9	2.5	6.5	0.5	14.3	9.7
	Mean	7.3	2.5	NV	21.5	23.5	16.6
	Median	7.0	2.5	7.4	20.6	22.9	16.8
	Standard Deviation	1.4	0.0	NV	10.3	6.2	3.6
	Coefficient of Variation	19.2	0.0	NV	47.9	26.4	21.7
I	Sample Size	10	3	10	10	10	10
	Number of BDL	0	3	NV	1	NV	0
	Maximum	10.1	2.5	8.0	38.6	30.4	21.7
	Minimum	4.9	2.5	6.5	0.5	14.3	8.5
	Mean	7.4	2.5	NV	21.5	23.4	15.6
	Median	7.1	2.5	7.6	20.6	23.0	15.5
	Standard Deviation	1.7	0.0	NV	10.3	6.1	4.1
	Coefficient of Variation	23.0	0.0	NV	47.9	26.1	26.3
J	Sample Size	10	3	10	10	10	10
	Number of BDL	0	3	NV	1	NV	0
	Maximum	9.7	2.5	8.0	38.6	30.4	20.4
	Minimum	4.6	2.5	6.6	0.5	14.2	8.4
	Mean	7.4	2.5	NV	21.5	23.4	15.2
	Median	7.4	2.5	7.5	20.6	23.0	14.8
	Standard Deviation	1.7	0.0	NV	10.3	6.1	3.7
	Coefficient of Variation	23.0	0.0	NV	47.9	26.1	24.3

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



Water Quality Monitoring Stations

A Black Lake
B Black Lake
C Black Lake
D Southeast drainage ditch
E High-pressure pump pad
F Raw water intake structure (Intracoastal Waterway)

Figure D-4. West Hackberry Environmental Monitoring Stations

Table D-4. 2014 Data Summary for West Hackberry Monitoring Stations

Station	Statistical Parameters	Dissolved Oxygen (mg/L)	Oil & Grease (mg/L)	pH (s.u.)	Salinity (ppt)	Temperature (°C)	Total Organic Carbon (mg/L)
A	Sample Size	12	4	12	12	12	12
	Number of BDL	0	4	NV	0	NV	0
	Maximum	12.6	2.5	8.5	21.0	34.0	9.4
	Minimum	5.0	2.5	7.4	8.0	6.0	4.9
	Mean	8.2	2.5	NV	13.5	22.3	7.1
	Median	7.9	2.5	7.7	13.0	24.0	7.3
	Standard Deviation	2.2	0.0	NV	3.6	8.3	1.2
	Coefficient of Variation	26.8	0.0	NV	26.7	37.2	16.9
B	Sample Size	12	4	12	12	12	12
	Number of BDL	0	4	NV	0	NV	0
	Maximum	13.4	2.5	8.0	17.0	34.0	8.4
	Minimum	5.6	2.5	7.3	7.9	5.0	5.7
	Mean	8.4	2.5	NV	13.1	22.3	7.2
	Median	7.6	2.5	7.7	13.0	24.0	7.3
	Standard Deviation	2.3	0.0	NV	2.7	8.6	0.8
	Coefficient of Variation	27.4	0.0	NV	20.6	38.6	11.1
C	Sample Size	12	4	12	12	12	12
	Number of BDL	0	4	NV	0	NV	0
	Maximum	13.5	2.5	8.1	17.0	34.0	8.4
	Minimum	5.4	2.5	7.2	8.0	5.0	5.9
	Mean	8.4	2.5	NV	12.7	22.3	7.2
	Median	8.0	2.5	7.7	13.0	24.0	7.3
	Standard Deviation	2.4	0.0	NV	2.7	8.6	0.8
	Coefficient of Variation	28.6	0.0	NV	21.3	38.6	11.1
D	Sample Size	12	4	12	12	12	12
	Number of BDL	0	3	NV	12	NV	0
	Maximum	13.1	114.0	8.8	0.5	32.0	12.9
	Minimum	2.5	2.5	6.9	0.5	11.0	3.2
	Mean	8.6	30.4	NV	0.5	21.9	7.1
	Median	9.6	2.5	7.9	0.5	24.5	7.2
	Standard Deviation	2.9	55.8	NV	0.0	6.8	2.6
	Coefficient of Variation	33.7	183.6	NV	0.0	31.1	36.6

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

Table D-4. 2014 Data Summary for West Hackberry Monitoring Stations (continued)

Station	Statistical Parameters	Dissolved Oxygen (mg/L)	Oil & Grease (mg/L)	pH (s.u.)	Salinity (ppt)	Temperature (°C)	Total Organic Carbon (mg/L)
E	Sample Size	12	4	12	12	12	12
	Number of BDL	0	4	NV	11	NV	0
	Maximum	13.2	2.5	8.4	1.4	32.0	5.6
	Minimum	3.9	2.5	7.2	0.5	10.0	3.4
	Mean	7.5	2.5	NV	0.6	22.0	4.6
	Median	7.2	2.5	8.0	0.5	25.0	4.5
	Standard Deviation	2.7	0.0	NV	0.3	7.0	0.7
	Coefficient of Variation	36.0	0.0	NV	50.0	31.8	15.2
F	Sample Size	12	4	12	12	12	12
	Number of BDL	0	4	NV	0	NV	0
	Maximum	11.9	2.5	7.7	14.0	32.0	10.8
	Minimum	5.0	2.5	6.8	1.4	8.0	6.0
	Mean	7.4	2.5	NV	8.3	22.5	8.0
	Median	6.6	2.5	7.5	7.8	24.0	7.9
	Standard Deviation	2.1	0.0	NV	4.4	7.8	1.6
	Coefficient of Variation	28.4	0.0	NV	53.0	34.7	20.0

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

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