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

21-ESH-002

MEMORANDUM FOR DOUGLAS MACINTYRE
ACTING DEPUTY ASSISTANT SECRETARY
OFFICE OF PETROLEUM RESERVES

FROM: PAUL S. OOSTERLING
PROJECT MANAGER
STRATEGIC PETROLEUM RESERVE

SUBJECT: Strategic Petroleum Reserve (SPR) Site Environmental Report for Calendar Year (CY) 2020

The SPR's Site Environmental Report for CY 2020 is submitted for your review and authorization for release.

After authorization for release is received, it will be distributed per the attached list, and an electronic version of the report will be available at:

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

If you have any questions or desire additional information, please contact Stephen Reese, Director, Environmental, Safety and Health Division at Stephen.Reese@spr.doe.gov or Dawn Glapion, Assistant Project Manager for Technical Assurance, at Dawn.Glapion@spr.doe.gov .

Attachment:
Distribution List for CY 2020 Site Environmental Report

REPORT RELEASE AUTHORIZED

Douglas MacIntyre — September 23, 2021

Douglas MacIntyre
Acting Deputy Assistant Secretary
Petroleum Reserves

Date

U.S. DEPARTMENT OF ENERGY

Strategic Petroleum Reserve
Project Management Office
New Orleans, Louisiana

Site Environmental Report

Calendar Year 2020

Cover

Black-bellied Whistling Ducks
Photo credit: Rita Czeck at Bayou Choctaw

Disclaimer

Distribution

The Strategic Petroleum Reserve 2020 Site Environmental Report is a public document that is distributed to various local libraries and local regulators and stakeholders. The report is available to the general public on the internet at https://www.spr.doe.gov/esh/default.html

STRATEGIC PETROLEUM RESERVE

SITE ENVIRONMENTAL REPORT

CALENDAR YEAR 2020

Document No. 0408

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

FLUOR
FEDERAL PETROLEUM OPERATIONS

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QUESTIONNAIRE/READER COMMENT FORM

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

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)

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(Below for originator's use only)

Subject Matter Expert (SME): _____ Date: _____

SME's Response: _____

_____

_____

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Abbreviations and Acronyms	
AFFF	Aqueous Film Forming Foam
ANAB	ANSI-ASQ National Accreditation Board
ANSI	American National Standards Institute
ASER	Annual Site Environmental Report
ASQ	American Society for Quality
bbl	Barrel (1 bbl = 42 gallons)
BC	Bayou Choctaw
BDL	Below Detection Limit
BH	Big Hill
bls	Below Land Surface
BM	Bryan Mound
^{o}C	Degrees Celsius
CAA	Clean Air Act
CAP	Corrective Action Plan
CB	Certification Body
C&D	Construction & Demolition
CESQG	Conditionally Exempt Small Quantity Generator
CLR	Calculated Leak Rate
CO	Carbon Monoxide
COE	United States Army Corps of Engineers
CWA	Clean Water Act
CY	Calendar Year
DBP	Disinfection by-products
DMR	Discharge Monitoring Report
DO	Dissolved Oxygen
DOE	United States Department of Energy
E&P	Exploration and Production
EAC	Environmental Advisory Committee
EMP	Environmental Monitoring Plan
EMS	Environmental Management System
EO	Executive Order
EPA	Environmental Protection Agency
EPCA	Energy Policy and Conservation Act
EPCRA	Emergency Planning and Community Right-to-Know Act
ESA	Endangered Species Act
ES&H	Environmental Safety and Health
ESPC	Energy Savings Performance Contract
FFPO	Fluor Federal Petroleum Operations
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
F&WS	Fish and Wildlife Service
GALCOE	U.S. Army Corps of Engineers, Galveston District
GHG	Greenhouse gas
GIWW	Gulf Coast Intracoastal Waterway
GLO	General Land Office

Abbreviations and Acronyms	
HEMSF	High energy mission specific facilities
ILA	Industrial, Landscaping and Agricultural
ISM	Integrated Safety Management System
ISO	International Organization for Standardization
LA	Louisiana
LDEQ	Louisiana Department of Environmental Quality
LDNR	Louisiana Department of Natural Resources
LDWF	Louisiana Department of Wildlife and Fisheries
LPDES	Louisiana Pollutant Discharge Elimination System
MCL	Maximum Contaminant Levels
MDEQ	Mississippi Department of Environmental Quality
MDLR	Minimum Detectable Leak Rate
mmb	Million Barrels
M&O	Management and Operations
msl	Mean Sea Level
MSGP	Multi-Sector General Permit
MW	Monitoring well
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NIMS	National Incident Management System
NO	New Orleans
NODCOE	U.S. Army Corps of Engineers, New Orleans District
NOV	Notice of violation
NOx	Nitrogen oxide
NPDES	National Pollutant Discharge Elimination System
OCC	Operations Control Center
OFI	Opportunities for Improvement
O&G	Oil and Grease
OPA	Oil Pollution Act of 1990
OSPRA	Oil Spill Prevention and Response Act
OVA	Organic Vapor Analyzer
PCB	Polychlorinated Biphenyl
pH	Negative Logarithm of the Hydrogen Ion Concentration
PHR	Preliminary Hazard Review
PI	Process Improvement
PM_{10}	Particulate Matter (less than 10 microns)
PMCC	Power monitoring control & communication
ppt	Parts per Thousand
PREP	Preparedness for Response Exercise Program
PW	Periphery Well
QA	Quality Assurance
QC	Quality Control
QPL	Qualified Products List
RRC	Railroad Commission of Texas

Abbreviations and Acronyms	
RWIS	Raw Water Intake Structure
SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
SOC	Security Operations Center
SPCC	Spill Prevention Control and Countermeasures
SPR	Strategic Petroleum Reserve
SPRPMO	Strategic Petroleum Reserve Project Management Office
SSP	Site Sustainability Plan
SWPPP	Storm Water Pollution Prevention Plan
TCEQ	Texas Commission on Environmental Quality
TGLO	Texas General Land Office
TOC	Total Organic Carbon
TPWD	Texas Parks and Wildlife Department
TRI	Toxic Chemical Release Inventory
TSCA	Toxic Substance Control Act
TSS	Total Suspended Solids
TX	Texas
UIC	Underground Injection Control
UNO	University of New Orleans
VOC	Volatile Organic Compound
VSQG	Very Small Quantity Generator
WAD	Work Authorization Directive
WH	West Hackberry
YOY	Year on Year

Executive Summary

The U.S. Department of Energy (DOE), Strategic Petroleum Reserve (SPR), Annual Site Environmental Report (ASER) is DOE-wide submittal provided by each DOE Project Office. The ASER outlines by calendar year, site environmental management performance, confirms compliance with environmental statutes, standards and requirements, and highlights significant environmental successes. Additionally, the ASER serves the public by summarizing monitoring data collected to assess SPR impacts on the environment. This report and previous ASERs are found at https://www.spr.doe.gov/esh/default.html.

The SPR Project Management Office (SPRPMO) is in New Orleans, LA. The Project Management Office oversees the operation and maintenance of four crude oil storage facilities in Louisiana and Texas. The primary mission of the SPR is to maintain a constant state of operational readiness to draw down the reserve and supply oil to the country in an emergency as directed by the President of the United States.

Chapters within the ASER provide a more detailed overview of the activities at the SPR, including:

Chapter 1: Introduction
Chapter 2: Compliance Summary
Chapter 3: ISO 14001 Environmental Management System and Sustainability Program
Chapter 4: Environmental Radiological Program Information
Chapter 5: Environmental Permits and Programs
Chapter 6: Site Hydrology, Groundwater Monitoring, and Public Drinking Water Protection
Chapter 7: Quality Assurance

During the CY 2020, the M&O Contractor, Fluor Federal Petroleum Operations (FFPO), coordinated its activities with the SPRPMO, subcontractors, and regulatory agencies to ensure compliance with federal, state, and local requirements along with meeting established environmental and sustainability goals. The narrative of this document illustrates the performance of these achievements. This was achieved while working three quarters of the year remotely due to the COVID-19 virus response.

Major Environmental Achievements at the SPR in 2020 are summarized below:

- Zero (0) Notices of Violation and Zero (0) permit exceedances
- Over 90% of all waste was recycled or repurposed

- Executed Section 404 Permit applications in support of facility life extension construction under strict schedule metrics
- Maintained ISO 14001 Certification

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 (ASER) for the calendar year 2020 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.

1.1 Background Information

The Energy Policy and Conservation Act (EPCA) established the SPR in 1975. The goal of the EPCA is to ensure that the U.S. has 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 draw down 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 there is a temporary oil supply disruption. Also, starting in 2017, the SPR has released crude oil to the marketplace as required by the Bipartisan Budget Act (Sections 403 and 404) and the 21st Century Cures Act.

SPR MISSION

The mission is to maintain a constant state of operational readiness to draw down the reserve and supply oil to the country in an emergency.

The DOE Office of Deputy Assistant Secretary of Petroleum Reserves has overall programmatic responsibility for establishing the SPR objectives. The SPRPMO is responsible for implementing these goals and objectives, including articulating an environmental policy (included as Appendix B) responsive to DOE requirements. The M&O Contractor applies this policy to SPR operations.

The SPR stores emergency crude oil supplies in salt caverns. The caverns were created through solution mining deep within the massive salt deposits that underlie most of the Texas and Louisiana coastline. The utilization of the caverns to store crude oil avoids hazards associated with aboveground storage, offers security and is an economic means of storage.

The U.S. Government selected the Gulf Coast as the location for 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.

In CY 2020, the SPR postponed its planned Energy Security and Infrastructure

Modernization (ESIM) crude oil sale due to unfavorable crude oil market conditions and suppression of price caused by the COVID-19 pandemic. As a result, the SPR, in response to industry needs, implemented the Exchange for Storage (EFS) program to aid U.S. energy producers. The SPR started receiving crude oil deliveries in April 2020 and completed a total of approximately 21 million barrels (MMbbl) into the SPR by June 30, 2020. The return of customer oil from the EFS program started in August 2020, and as of December 31, 2020, has returned approximately 19.5MMbbl to EFS industry partners.

In July 2020, the SPR implemented a Trial Oil Purchase Program to help oil producers struggling from reduced crude oil demand. The program solicited bids to purchase up to 1MMb of sweet crude for storage in the SPR. As a result, The SPR procured approximately 123.9 Mbbl of sweet U.S. produced crude oil, delivered to the Big Hill site.

The DOE and the Government of Australia (GOA) entered into a long-term agreement whereby GOA would store crude oil in caverns at the Big Hill site. The SPR received 1.5 MMbbl of crude oil on behalf of GOA in CY 2020.

1.2 Locations, Facilities and Operations

The SPR utilizes underground salt dome formations to store crude oil. It comprises four facilities located along the Gulf Coast (Bryan Mound, Big Hill, West Hackberry, and Bayou Choctaw), a project management facility in New Orleans, and the Stennis Warehouse facility. Figure 1-1 illustrates the SPR locations. DOE leased the St. James Terminal (located southeast of Bayou Choctaw) to Shell Pipeline in January 1997 and subsequently to ExxonMobil in January 2020. Although the St. James Marine Terminal is not an active SPR storage facility, it continues as SPR property, and this report contains a descriptive narrative about it where applicable. Table 1-1 summarizes information about the four active storage facilities.

Figure 1-1 SPR Locations

Table 1-1 SPR Storage Facilities

	City, State	No. of Caverns	Crude Oil Storage Inventory*
Bayou Choctaw	Plaquemine, LA	6	71 million barrels
Big Hill	Winnie, TX	14	143 million barrels
Bryan Mound	Freeport, TX	20	231 million barrels
West Hackberry	Hackberry, LA	22	193 million barrels

*As of December 31, 2020

1.2.1 Bayou Choctaw

Iberville Parish, LA, serves as the location of the Bayou Choctaw site. This storage facility occupies 356 acres above the Bayou Choctaw salt dome, including off-site satellite brine disposal wells and associated brine piping.

The U.S. Government selected the Bayou Choctaw salt dome as a storage site early in the SPR program because of the potential to convert its existing brine caverns 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 usually is dry and protected from spring flooding by the site's flood control levees and pumps. The forest and swamp provide habitat for a diverse wildlife population, including many bird species, mammals and reptiles, including the American alligator.

1.2.2 Big Hill

Jefferson County, TX serves as the location of the Big Hill site that covers approximately 270 acres above 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 commerce.

Big Hill is the most recently constructed SPR storage facility. Its proximity to commercial marine and pipeline crude oil distribution facilities is

advantageous to the function of the SPR mission. 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.

1.2.3 Bryan Mound

The Bryan Mound site is in Brazoria County, TX and occupies 500 acres above the Bryan Mound salt dome. Off-site facilities include an intake structure that provides raw water for cavern development and fluid movements, brine pipeline for brine disposal, and crude oil pipelines for receiving and distributing oil in commerce.

The U.S. Government selected Bryan Mound as a storage site early in the SPR program because of the potential to convert its existing brine caverns 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 the Texas Gulf Coast region. Brackish marshland dominates the low-lying portions of the site. The coastal prairie has abundant 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.

1.2.4 West Hackberry

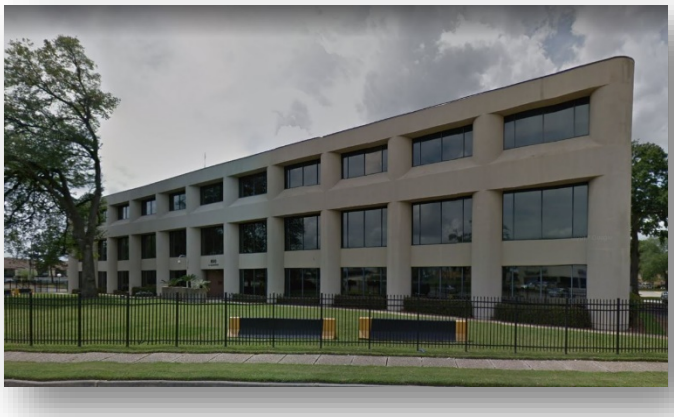
Located in Cameron Parish, LA, the West Hackberry site occupies 565 acres over the West Hackberry salt dome. Off-site facilities include an intake structure that provides raw (brackish) water for cavern development and fluid movements, brine disposal wells with associated brine piping, and crude oil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

The U.S. Government selected West Hackberry as a storage site due to the potential to readily convert its existing brine caverns 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.

1.2.5 New Orleans

The New Orleans, LA metropolitan area, is the location for the SPRPMO. Located in Jefferson Parish, the SPRPMO exists in three adjacent leased office buildings with a nearby leased warehouse. This facility functions as the management headquarters of the SPR. Activities conducted at the New Orleans office complex are predominantly administrative.



1.2.6 Stennis

DOE leased the Stennis Warehouse located in Hancock County, MS from the U.S. Army from 2004 to 2011 and since 2011, from the National Aeronautics and Space Administration (NASA). The warehouse, adjacent concrete aprons and parking lot occupy approximately 3.4 acres within the John C. Stennis Space Center. 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 New Orleans SPRPMO personnel.

1.2.7 St. James Marine Terminal

The St. James Marine Terminal, located along the Mississippi River in St. James Parish, LA, consists of a 173-acre site that includes a central facility and two satellite docks on the west Mississippi River batture. DOE leased this facility to Shell Pipeline from 1997 to December 31, 2019. Effective January 1, 2020, ExxonMobil has entered a 20-year long-term leasing arrangement to use the St. James site.

2 Compliance Summary

COMPLIANCE DURING 2020

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***
- ***Other types of enforcement actions issued at any of the sites***

There were no permit exceedances regarding air, waste, and water.
There were two (2) reportable releases.

2.1 Regulatory Compliance Summary

Operational activity at the SPR is subject to numerous federal and state regulations, Executive Orders (EO), and DOE Orders. A list of applicable environmental standards is provided in Appendix A1, and a list of SPRPMO Environmental Safety and Health (ES&H) Directives is included in Appendix A2. Following these regulations, orders, standards and directives, the SPR successfully operates in an environmentally compliant manner. Table 2-1 summarizes major applicable environmental regulations and orders. It also summarizes how compliance requirements were met during 2020 and (where appropriate) references report sections that contain more detailed information. The principal agencies responsible for enforcing environmental regulations at SPR facilities are:

- Environmental Protection Agency (EPA)
- New Orleans and Galveston Districts of the United States Army Corps of Engineers (NODCOE & GALCOE)
- United States 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)
- Mississippi Department of Environmental Quality (MDEQ)
- John C. Stennis Space Center

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

Table 2-1 Environmental Regulations Applicable to the SPR

Regulation	Compliance Status	Report Section
National Environmental Policy Act (NEPA) — requires federal agencies to follow a prescribed process to anticipate impacts on the environment of proposed major federal actions and alternatives.	All design reviews, engineering change proposals, deviations, waivers, and purchase requisitions were evaluated for NEPA review in 2020. Of these documents, 33 required NEPA categorical exclusion documentation. None of the projects associated with these documents had the potential to adversely affect environmentally or culturally sensitive resources, such as structures of historical, archeological, or architectural significance or any threatened or endangered species or their habitat. Also, no wetlands were adversely impacted because of these actions.	3
EO 11988 — "Floodplain Management," **EO 11990 —** "Protection of Wetlands," NODCOE, GALCOE, LDEQ, and RRC	The SPR ensures compliance with EOs 11988 and 11990 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.	3
EO 13834 — "Efficient Federal Operations." The goal is to maintain Federal Leadership in sustainability and greenhouse gas emission reductions.	Each year the SPR Energy Efficiency and Pollution Prevention Committee oversees the identification, selection, scheduling, budgeting and implementation of projects and activities that support the sustainability program. A Site Sustainability Plan is submitted yearly to DOE by December.	3
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 is demonstrated by following state implementing agency radiation control regulations.	4

Safe Drinking Water Act (SDWA) Louisiana and Texas Underground Injection Control (UIC) programs regulate underground hydrocarbon storage, related brine disposal, and oil field wastes. TCEQ enforces the SDWA in Texas by regulating Public Water Systems for health-based violations to ensure potable water provided is safe to drink.	SPR sites comply with the SDWA through permitting under the Louisiana and Texas UIC programs. The 2020 Annual Report Form OR-1 for underground injection was completed and submitted on schedule to the LDNR. Local public water systems supply drinking water to all storage sites, New Orleans headquarters, and the New Orleans and Stennis warehouses. Potable water systems at Bryan Mound and Big Hill are classified by state regulations as "non-transient, non-community" public water distribution systems. These sites are required to have potable water monitoring programs. The West Hackberry and Bayou Choctaw facilities are not required to have potable water monitoring programs and are recognized as water purchasers only. In 2020, potable water samples were taken monthly at Bryan Mound and Big Hill for coliform monitoring, and weekly samples were collected and analyzed for residual chloramine (disinfectant). Average disinfectant levels were reported to TCEQ on a Disinfectant Level Quarterly Operating Report. Calculated results at both sites did not exceed the regulatory maximum contaminant levels (MCL) for disinfectants. All coliform results were also below the MCL. Potable water is sampled and tested for lead and copper tri-annually at Big Hill and Bryan Mound. In 2020, testing for disinfection by-products (DBP) Trihalomethanes and Haloacetic Acids was conducted through TCEQ at Bryan Mound and Big Hill. Test results for DBPs were below the MCL at both sites. Other potable water parameters monitored for compliance include asbestos, nitrite, and nitrate with varied monitoring schedules. Samples were collected by a TCEQ contractor and tested for nitrate and nitrite at Big Hill and Bryan Mound in 2020. All results were below their MCLs. Groundwater monitoring of the uppermost aquifer at the SPR storage sites is mandated via DOE orders for surveillance assessment and is coordinated through the Environmental Monitoring Plan (EMP). Details of groundwater monitoring are presented in Section 6. Historical groundwater evaluations have indicated shallow groundwater impacts from saltwater at the Bryan Mound and West Hackberry sites. As part of the site's overall groundwater surveillance, the post-closure monitoring near the Bryan Mound brine storage pond is provided through this report to the RRC as requested. The West Hackberry site completed the closure of its brine ponds in 1999 under a corrective action plan (CAP) negotiated with LDNR. Remedial recovery pumping was completed in 2001. Post-closure monitoring for 30 years is currently met by quarterly monitoring, and annual reporting in the ASER shared with LDNR.	5.1, 6

Table 2-1 Environmental Regulations Applicable to the SPR

Regulation	Compliance Status	Report Section
Clean Air Act (CAA) — LDEQ and TCEQ regulate 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 SPR facilities operate in accordance with the provisions of the applicable state air permits. In 2020, the Texas Commission on Environmental Quality (TCEQ) issued a Permit By Rule air permit to construct the Bryan Mound Crude Oil Tank 4 (BMT-4) external floating roof tank. All other existing air permits are current. Annual fugitive monitoring of piping components for volatile organic compound (VOC) leaks was performed at the Louisiana SPR sites in 2020. Biennial fugitive VOC monitoring was performed at the Texas SPR sites in 2020.	5.2
Clean Water Act (CWA) — EPA Region VI, RRC, LDEQ and MDEQ establish standards and issue permits to improve water quality. LDEQ has primary enforcement responsibility for the National Pollutant Discharge Elimination System (NPDES) in Louisiana. EPA and RRC issue NPDES permits in Texas.	SPR sites comply with the CWA through permitting under the NPDES program, following SPCC regulations, and complying with the wetlands' usage program. <u>NPDES</u> In 2020, the Texas state (Rule 8) and federal (NPDES) water discharge permits for the two Texas SPR sites were received. In 2020, the West Hackberry and Bayou Choctaw LPDES permits were due for renewal. No other modifications, changes, or renewals were needed to water discharge permits. <u>Spill Prevention Control and Countermeasure (SPCC)</u> Each SPR storage site and the Stennis warehouse comply with SPCC regulations by following a plan that addresses the prevention and containment of petroleum and hazardous substance spills. SPCC plans are current with Title 40 CFR 112 and corresponding state regulations. <u>Wetlands</u> The SPR sites obtain permits from the COE and Coastal Zone Management representatives of the responsible state agencies whenever projects have a fill, discharge, or dredging occurring in a wetland. Two wetlands permits for Bryan Mound and West Hackberry and one authorization issued for Bayou Choctaw in 2020.	5.3, 5.4
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 usage.	Each SPR site operates in accordance with a Storm Water Pollution Prevention Plan (SWPPP) prepared in accordance with EPA multi-sector general storm water discharge authority for storm water associated with industrial activity and similar Louisiana and Mississippi state requirements, using Pollution Prevention Program principles as the basis for limiting or precluding storm water contamination.	5.5

Table 2-1 Environmental Regulations Applicable to the SPR

Regulation	Compliance Status	Report Section
Resource Conservation and Recovery Act (RCRA) — LDEQ, EPA, and RRC govern the generation, storage, handling, and disposal of hazardous wastes.	SPR facilities continued to operate as Very Small Quantity Generators (VSQG) in 2020. Hazardous wastes are not treated, stored, or disposed of at any SPR sites. Therefore, the sites are not RCRA-permitted. Each SPR site has an EPA generator number used to track the manifesting of hazardous waste for off-site treatment or disposal.	5.5
Toxic Substances Control Act (TSCA) — regulates the manufacture, use, and distribution of all chemicals.	Procedures are in place to prohibit purchasing equipment containing either friable asbestos or polychlorinated biphenyls (PCBs). Small amounts of non-friable asbestos, usually in the form of seals or gaskets, are disposed of 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 containing PCBs.	5.6
Superfund Amendments and Reauthorization Act (SARA) — EPA, LDEQ, LDNR, and TCEQ — SARA Title III specifies many 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.	SARA Title III Tier Two reports, also known as EPCRA Section 312 reports, were prepared and distributed as required by March 1, 2021, to state and local emergency planning committees and local fire departments. The submittal of a TRI Form R (EPCRA Section 313) was required for the Bayou Choctaw, Big Hill, Bryan Mound and West Hackberry sites in 2020 because the SPR introduced crude oil into commerce from the return of exchanged crude oil. The TRI reports were prepared and submitted to EPA as required by July 1, 2021.	5.6

Table 2-1 Environmental Regulations Applicable to the SPR

Regulation	Compliance Status	Report Section
Endangered Species Act — LDWF and TPWD prohibit activities that would jeopardize the existence of an endangered or threatened species or cause an adverse modification to critical habitat.	The F&WS is consulted about the appropriate actions taken regarding threatened and endangered species. The SPR does not perform activities that would jeopardize the existence of endangered or threatened species. Additionally, there are no critical habitats at any of the SPR sites. Consideration of potential impacts to threatened or endangered species at the SPR was included as part of the original conditional coverage through the re-issued MSGP. The MSGP coverage has since been migrated to either the individual or general permits issued to each site.	5.7
EO 13186 — "Responsibilities of Federal Agencies to Protect Migratory Birds" and 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 because of site operations. SPR storage facilities are located on migratory pathways along the Texas and Louisiana Gulf Coast. Many species of waterfowl and songbirds use SPR sites for resting and refueling during spring and fall migration. Environmental awareness of migratory bird issues commences at the site level. Selected fields are not mowed from early fall through spring at Bayou Choctaw, Bryan Mound, Big Hill, and West Hackberry to provide food and shelter for migrating birds and nesting and brooding resident birds. When discovered, nesting areas are flagged (e.g., ground-nesting terns and killdeer); and equipment is designated for limited/restricted use when they harbor bird nests (e.g., by Northern Mockingbird, Mourning Dove, and Loggerhead Shrike).	5.7
National Historic Preservation Act (NHPA) — identifies, evaluates and protects historic properties eligible for listing in the National Register of Historic Places. NHPA is administered by State Historic Preservation Offices.	In 2020 the LE-2 projects were certified by the State Historic Preservation Offices. The certification was done by site; there were a total of 4 projects. Two went to the Texas State Historic Preservation Office, and two went to the Louisiana State Historic Preservation Office. All four certifications indicated that no historic properties are present or affected by the project as proposed. No identified historic properties, archeological sites or other cultural resources are present or affected.	

Table 2-1 Environmental Regulations Applicable to the SPR

Regulation	Compliance Status	Report Section
Oil Pollution Act (OPA) of 1990 — OPA and TGLO improved the nation's ability to prevent and respond to oil spills and provided requirements for contingency planning both by government and industry.	SPR emergency programs, planning, and management are guided by the OPA standards for onshore storage facilities, pipelines and marine terminal facilities. Facility Response Plans have been combined with site emergency response procedures according to the EPA "One Plan" scheme and meet or exceed the requirements of OPA 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 OSPRA certifications in accordance with state requirements. The SPR conducts quarterly emergency drills or hands-on training at its sites in accordance with the National Preparedness for Response Exercise Program (PREP). The exercises (announced or unannounced) are conducted at each site annually include the deployment of equipment. Emergency management personnel from New Orleans coordinate these drills and include the participation of public and regulatory agencies. 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. A team of selected New Orleans personnel is available to support extended site emergency operations when needed.	
Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) — LDEQ and TCEQ regulate the manufacture, use, storage and disposal of pesticides and herbicides.	State licensed pesticide applicators apply pesticides and herbicides using only products that have been reviewed and listed on the SPR Qualified Products List (QPL). The SPR uses pesticides and herbicides to control pests in buildings and around work areas and control vegetation on well pads, under pipe racks and along security zone areas. Although pesticide use is necessary, a concerted effort is made to use products safest for the environment and employees through screening of chemicals before purchase.	

2.2 Preventing and Reporting Releases

The SPR oil storage sites are located adjacent to or near marsh, wetlands and water bodies. Protection of the surrounding 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) are made if a release meets reportable criteria. Each SPR site has structures to contain or divert any harmful release that could impact surrounding waterways or land areas. On-site spill control equipment, detailed emergency plans and extensive training are used to ensure that the environment is safeguarded.

Site Emergency Response Procedures address release reporting requirements of the SPR M&O, DOE and appropriate regulatory agencies. Specific reporting procedures depend on the quantity and type of material released, immediate and potential impacts of the spill and spill location (e.g., wetland or water body). Spills of hazardous substances are verbally reported to site management and then to New Orleans M&O and DOE management. Releases are documented using the Operations Control Center (OCC) Non-Routine and Occurrence Report form. The form is completed at the site and then forwarded to the New Orleans OCC. Corrective action/cleanup reports are also submitted unless otherwise directed by the DOE or appropriate regulatory agency.

2.2.1 Reportable Releases

Federal and state regulations require notification to authorities in the event of a release of a reportable quantity of designated materials. Historically, most of the reportable releases at the SPR have resulted from brine and crude oil operational activities. During the calendar year 2020, there were two reportable releases at the SPR.

Figure 2-1 and Table 2-2 provide a five-year summary of reportable releases at the SPR. Due to the number of reportable spills that occurred in CY 2017, the M&O Senior Management initiated communication with site management to focus on preventative measures to reduce the likelihood of reportable releases. Additionally, a work instruction titled SPR Unplanned Release, Estimation, Notification, and Reporting for Non-Emergency Situations was published in 2019 to promote the consistent identification of reportable spills. The FFPO Environmental Department provided training to site personnel who handle oil, brine, and other chemicals to increase awareness. Because of the focus and support, combined with Environmental oversight, project design review input, and usage of the new work instruction, reportable releases have been reduced.

Figure 2-1 SPR Reportable Spills for Calendar Years 2016 – 2020

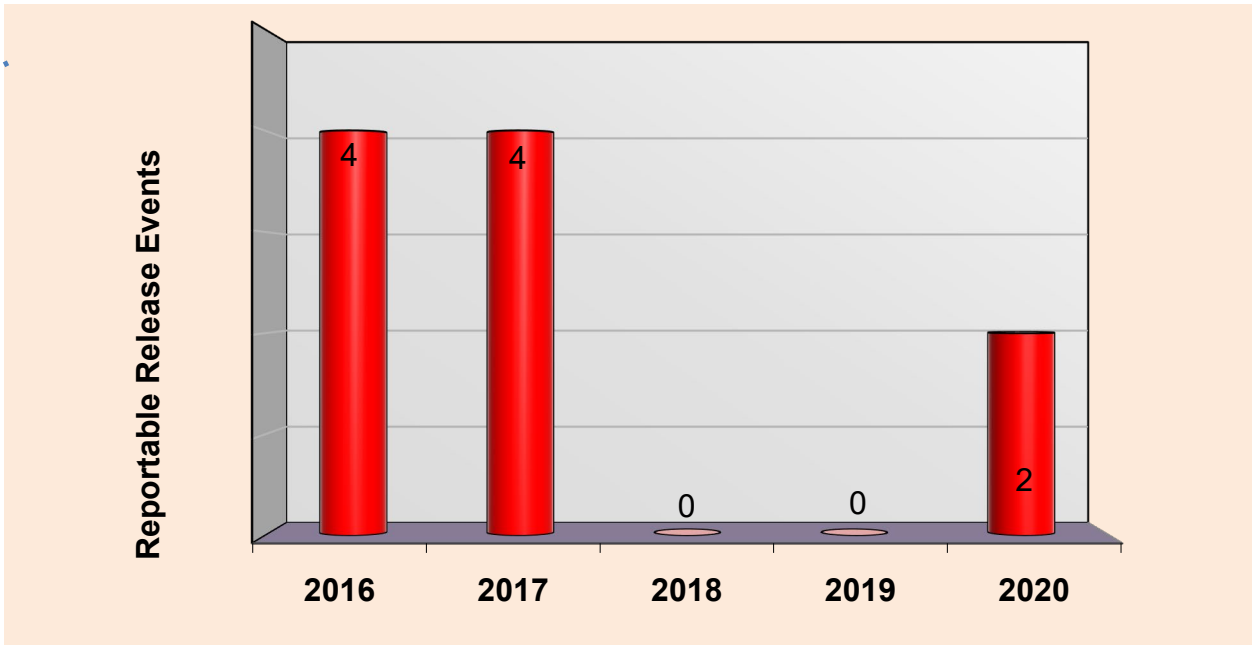


Table 2-2 SPR Reportable Spills 2016-2020

Date	Site	Material	Volume	Summary
03/31/2016	WH	Oil	1 – 2 Cups	While loading equipment on a barge at the site boat launch with a cherry picker, the picker developed a hydraulic oil leak causing approximately two cups of hydraulic oil to spill into Black Lake. Weather conditions rendered the oil nonrecoverable, and the site completed the notification to outside agencies.
07/06/2016	BC	Oil	2 Gallons	While performing maintenance on crude oil header valve 4H000PV57, an estimated two gallons of crude oil was released into the swampy area (wetland) east of the roadway to Cavern 19. Site personnel cleaned the area, and notifications to outside agencies were made per the Bayou Choctaw Site ERP.
08/28/2016	BC	Brine	3 – 4 Barrels	Bayou Choctaw security personnel discovered a brine leak near building 401. Operations personnel confirmed the material was brine and estimated three to four barrels of brine had been released. The site suspended fluid movements, and repairs were completed to stop the leak. Site personnel cleaned the area, and notifications to outside agencies were made.
11/25/2016	WH	Brine	4 – 5 Barrels	While completing a routine inspection of the brine disposal wells, a brine leak from tubing at brine disposal well 2D was discovered. The leak source was stopped, notifications to outside agencies were completed, and the area was cleaned.
09/08/2017	BC	Brine	30 Barrels	A thirty-barrel release of brine resulted from maintenance activities associated with repairing a leaking raw water pipeline valve. When the pipe system was depressurized for maintenance, liquid from the brine pond siphoned back through it and flowed through the leak onto the ground. M&O personnel notified outside agencies as required and initiated clean-up and recovery operations.
10/03/2017	WH	Oil	10 Barrels	A ten-barrel release of crude oil occurred within the secondary containment area of Cavern 115 as the result of leaking blow-out preventers on the work-over rig. The wind caused a crude oil mist over a 900-square foot area outside of the secondary containment. Later, rain caused a sheen originating from the impacted area to form in a drainage area that connects to navigable water (Black Lake). West Hackberry personnel closed the sluice gate upstream of Black Lake and deployed an absorbent boom to stop the flow of the sheen and prevent it from reaching Black Lake. M&O personnel notified outside agencies as required and initiated clean-up and recovery operations.

Table 2-2 SPR Reportable Spills 2016-2020				
10/05/2017	BC	Brine	4 Barrels	A four-barrel release of brine resulted from maintenance activities associated with the brine disposal wells. The subcontractor performing the task did not utilize secondary containment, and during the movement of dewatering tanks, four barrels of brine spilled onto the ground. M&O personnel notified outside agencies as required and initiated clean-up and recovery operations.
10/16/2017	BH	Diesel	8 Ounces	An eight-ounce release of diesel fuel to the GIWW resulted from the leaking day tank located on the RWIS. Due to the elevated storage of the day tank on the RWIS above the GIWW, windy conditions caused the leaking fuel to become airborne and deposit on the water creating a sheen. M&O personnel notified outside agencies as required and initiated clean-up and recovery operations.
03/04/2020	WH	Oil	7 Barrels (5 within containment and 2 outside)	During a routine drill, the wellhead valve at Cavern 110 had been left open unintentionally, and the frac tank overflowed. Five barrels of oil spilled within the containment area. Windy conditions blew two gallons of oil from the top of the tank over the levee and into a ditch. M&O personnel notified outside agencies as required and initiated clean-up and recovery operations.
10/07/2020	BC	Oil	< 1 Gallon	While performing a readiness test of BCP-79 in preparation for Hurricane Delta, site personnel noticed a sheen near the pump discharge in the East/West Canal. M&O personnel notified outside agencies as required and initiated clean-up and recovery operations. The release was contained using an absorbent boom. The U.S. Coast Guard arrived that day to investigate the reported discharge.

2.3 Environmental Concerns

2.3.1 Gassy Oil

When retrieving crude oil from salt dome storage, air emissions may be of concern. During retrieval, methane and ethane gases (non-regulated) that have migrated into the salt cavern are released, stripping regulated pollutants (VOCs) from crude oil into the atmosphere. Also, geothermal processes raise the crude oil temperature and vapor pressure. This elevated vapor pressure may exceed regulatory limits for storage in floating roof tanks, potentially affecting some SPR sites and the receiving commercial terminals (customers).

This environmental issue has been addressed by performing "degassing" operations. In 1995, the SPR commenced degassing processes to separate and remove gas from stored oil and employ heat exchangers to cool oil before transporting it off-site. Gases from degassing operations are recovered and sent to the degas plant incinerator for destruction. Emissions from degassing operations are included in the SPR emission inventories. The degas plant is equipped with a flare to handle upset conditions. Degassing has since been performed at SPR sites on a continuous alternating schedule. Recent history is as follows:

- Big Hill, April 2004 - October 2006
- Bryan Mound, September 2007 - February 2011
- West Hackberry, August 2014 - October 2018

A portable degassing facility is being designed and will be constructed as part of the SPR Life Extension 2 project, with completion expected in 2024. Existing SPR site air permits will be revised to add the emissions from portable degassing operations. The degas plant will initially be installed at Bayou Choctaw but can be relocated to any of the other three SPR sites as needed.

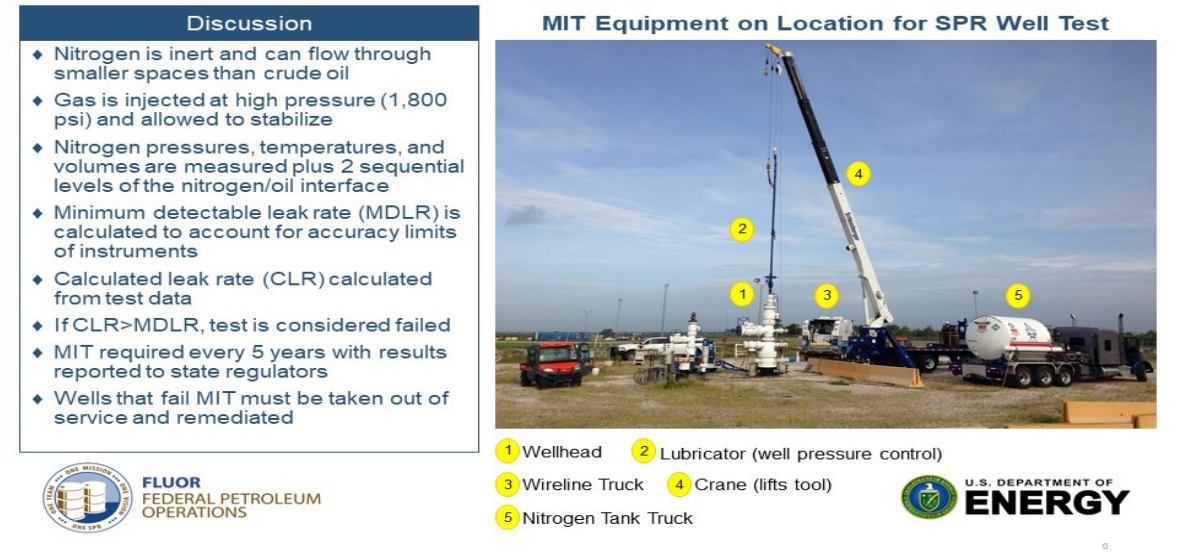
2.3.2 Cavern Integrity

SPR caverns and wells are operated and maintained in accordance with regulatory requirements of the LDNR at LAC Part XVII, Subpart 3, Statewide Order 29-M and the RRC at TAC, Title 16, Part 1, Chapter 3, Rule 3.95, in addition to DOE policies.

To ensure compliance, the SPR conducts a comprehensive monitoring and inspection program, including continuous measurement and recording of fluid pressures in the caverns to keep the caverns within prescribed operating pressure ranges and check for the possible loss of containment. Mechanical integrity tests (refer to Figure 2-2) are performed at least once every five years using pressurized nitrogen gas to test fluid containment. A variety of wireline well logging tools, such as multi-arm calipers in the wells and sonars in the caverns, are used to measure subsurface conditions. On the surface, wellheads are inspected periodically for corrosion and loss of integrity, and each storage site is surveyed for ground subsidence as an indicator of salt dome movement and possible cavern-scale movement. When necessary, diagnostic workovers are performed to remove brine strings from wells to be logged and inspected. Well remediation is performed when a well loses mechanical integrity or shows severe deformation.

During 2020, FFPO completed 14 diagnostic workovers and no well remediations. No violations were issued by either Louisiana or Texas state environmental regulators.

Figure 2-2 Mechanical Integrity Test (MIT)



2.3.3 Contaminants of Emerging Concern

The EPA has identified two "contaminants of emerging concern" that are present at SPR sites. These contaminants, perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA), are part of a larger group of chemicals (per- and polyfluoroalkyl substances) which are generally referred to by their plural acronym, PFAS. PFAS are manufactured chemicals not naturally found in the environment. They are extremely persistent and are sometimes referred to as "forever chemicals." They are known to bioaccumulate in wildlife. These chemicals have many uses. At the SPR, PFAS-containing products are stored for emergency use to extinguish fires fueled by liquid hydrocarbons (e.g., petroleum). These fire-fighting compounds are commonly referred to as aqueous film-forming foam (AFFF).

Manufacturers have developed less persistent formulations of AFFF in response to the USEPA 2010/2015 voluntary PFOA Stewardship Program. Most foam manufacturers have now transitioned to the production of short-chain (C6) AFFF. These modern AFFFs, or "C6 foams," do not contain or break down in the environment to PFOS or PFOA and are currently considered less toxic and have reduced potential to bioaccumulate as compared to long-chain (C8) AFFFs.

In 2019, a decision was made to identify environmentally friendly, short-chain AFFF products to replace long-chain AFFF at the SPR. SPR personnel completed an inventory and confirmed 13,185 gallons of the long-chain AFFF stored at Big Hill and Bryan Mound. M&O personnel researched to find replacement products in May 2019, and the substitution of the short-chain AFFF will occur when new products are needed. During CY 2020, the SPR continued to maintain its inventory of AFFF products. There were no coordinated projects to remove previously identified long-chain PFAS AFFF products due to a shortage of personnel impacts caused by the COVID-19 pandemic.

2.3.4 Pandemic Challenges and Hurricanes

COVID-19 was declared a National Emergency on March 13, 2020. On March 22, 2020, the New Orleans facilities and Houston office were directed to restrict access to personnel considered critical staff using an approval process, while the four SPR field sites were restricted to mission essential personnel only.

Since March 2020, more than 15 separate COVID-19 procedures and guidelines have been published, a telework policy was implemented and strict travel restrictions have been in place. In addition, the SPR has experienced three different surges in cases around all SPR sites and offices in conjunction with a highly active hurricane season that resulted in eight named storms that impacted the SPR.

Hurricanes Laura and Delta severely impacted the West Hackberry facility. Hurricane Laura made landfall early August 27, 2020 as a Category 4 hurricane. An initial assessment of site damage noted large amounts of debris, damaged fences, lightning/power poles, cabling and cable trays, security equipment, multiple building roofs, building water damage, complete destruction of the Spare Parts Warehouse, damaged spare parts, loss of commercial power, and loss of potable water and sewage treatment services.

On October 9, 2020, Hurricane Delta made landfall in southwest Louisiana, causing additional damage to the West Hackberry site. Most of the impact included further damage to areas already impacted by Hurricane Laura.

As of December 31, 2020, the West Hackberry site (including main site, Raw Water Intake Structure and Lake Charles Meter Station) runs on commercial power. It can conduct an emergency drawdown using site equipment within 13 days. Site restoration continues, with all recovery work projected to be complete in 2022.

Due to restricted site access and an active hurricane season, some items/tasks could not be performed. They include:

- Some surface water and a limited amount of groundwater monitoring during CY 2020
- Laboratory audits for the second half of CY 2020
- Environmental Advisory Committee meeting for the third quarter of CY 2020
- Community outreach programs involving physical contact and site visits
- Some SPCC monthly reports.

As of June 15, 2021, restricted access to offices and field sites remains in place.

Despite the COVID-19 pandemic and extreme weather impacts, the SPR maintained compliance with regulatory requirements through continued communication with implementing agencies and closely monitoring the performance of essential compliance-oriented functions. FFPO Environmental personnel collaborated to achieve this success by establishing remote workstations to allow effective program oversight in a virtual environment.

2.3.5 SPR Modernization Program – Life Extension Phase 2 Project

In 2015, the SPR commenced a program involving all four sites to replace or upgrade equipment and facilities approaching or already exceeding their projected 25-year life span. The program included 87 work packages. Packages include (but are not limited to) the following work:

- improvement of site road access,
- replacement of brine disposal line, crude oil pipeline, pigging water pipeline, brine disposal wells, building and equipment instrumentation,
- subsidence and inundation mitigation,
- modifications to pumps and piping,
- routine maintenance, and
- installation or relocation of machinery and equipment.

In CY2020, LE2 efforts continued with design reviews of packages evaluated by the Environmental department for necessary permitting and compliance.

2.4 DOE On-site Appraisals and M&O Organizational Assessments

SPRPMO management appraisal teams and the New Orleans M&O Environmental group conduct visits to SPR sites annually to audit compliance with environmental programs and EMS practices. Assessors are independent of the operating sites and are 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. Issues and programs reviewed in 2020 included chemical and waste management, air and water quality, sustainability, EMS, and pollution prevention. In 2020, there were no environmental findings associated with the DOE On-site Appraisals. The M&O identified four findings during 2020, and corrective action plans were developed and implemented for them. All audit findings are tracked to completion in the SPR's Assessment Tracking System.

2.5 Regulatory and ISO 14001 Registrar Inspections/Visits

There were nine inspections or visits by or on behalf of regulatory agencies and the ISO 14001 certification body to SPR facilities in 2020. These visits are summarized in Table 2-3. The visits are 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 performed in December 2020 and was a remote audit for the postponement of the recertification due to COVID-19. There were zero nonconformances and zero opportunities for improvement identified. The M&O maintains ISO14001 registration.

Table 2-3 Summary of Regulatory and Third-Party Inspections/Visits in 2020

Site	Organization	Remarks
Bayou Choctaw	United States Coast Guard (USCG)	BC East-West Canal release – no deficiencies noted.
	LDNR	Witness the mechanical integrity pressure testing – no issues.
Big Hill	TGLO	Reviewed the site Emergency Response Plan – site passed.
Bryan Mound	TGLO	Annual oil spill prevention and response audit - site passed.
	TCEQ	Purpose of the visit was to conduct an annual meter inspection under the Watermaster Program at the Bryan Mound site – no deficiencies were noted.
New Orleans	ISO 14001 Certification Body (CB)	Surveillance audit – certification remains in effect.
	LDNR	M&O briefing of LE2 Projects and attended meeting and presentation on BC Cavern 4.
West Hackberry	United States Coast Guard (USCG)	Cavern 110 spill assessment – no deficiencies noted.
	LDNR	Visit to witness the mechanical integrity pressure testing at the brine disposal well (BDW)-2E. No issues noted.

2.6 Community Outreach Programs

SPR sites attempt to be good stewards of the environment and good neighbors. Community outreach programs have been established to promote healthy public relations, and donations have been given to needy SPR site neighbors. The COVID-19 pandemic limited physical interaction with the community, but that did not prevent employees from helping their neighbors. During CY2020, over $100,000 was donated to local nonprofit organizations. Examples are detailed below.

Second Harvest Food Bank

Second Harvest Food Bank fights hunger in South Louisiana by providing food and support to more than 700 community partners and programs across 23 parishes. Second Harvest is always busy serving the community, especially when responding to a disaster.

Krewe of Red Beans

A group of New Orleanians known for the lively parties and parades it plans and executes, the Krewe of Red Beans turned its focus in a new direction: feeding healthcare workers, supporting local restaurants, and employing out-of-work musicians. This unique krewe takes the online donations it receives, buys food from local restaurants, and employs musicians to deliver the food to area hospitals. Its efforts nourish the weary bodies and souls of healthcare workers, provides local restaurants with food orders to prepare, and puts unemployed musicians in the delivery business. The Krewe of Red Beans feeds more than a dozen hospitals in the New Orleans area with approximately 1,000 meals a day.

FFPO Employee Giving Campaign

The 2020 FFPO Employee Giving Campaign contributed **$33,391.25** to the United Way organizations that serve the communities where employees live and work.

Total employee donation	Fluor 25-percent match	Total contribution
$ 26,713	$ 6,678.25	$ 33,391.25

Mardi Gras Throws: Recycling and Donations

Not long after scrambling in the streets for beads, plastic cups, and trinkets, New Orleans employees gave back to their community by donating Mardi Gras treasures to a valuable non-profit organization. New Orleans employees collected and donated 260 pounds of beads and 24 pounds of throws to the ARC of Greater New Orleans (ArcGNO) Mardi Gras Recycle Center. ArcGNO employs individuals with intellectual and developmental disabilities to sort and package Mardi Gras throws for resale. The proceeds from the beads fund the workers' salaries. This Mardi Gras bead recycling program supports a more than 60-year-old nonprofit organization and diverts beads from local landfills.

Big Hill Gives Back

Big Hill delivered donations to two local community organizations:

Court Appointed Special Advocates (CASA) of Southeast Texas – nonprofit service organization that recruits, trains, and supervises a diverse group of community volunteers, appointed by the courts to advocate for abused and neglected children in the pursuit of safe, permanent homes.

Nutrition and Services for Seniors – nonprofit agency dedicated to providing innovative, effective programs that assist older adults in leading quality lives while maintaining dignity and independence.

Backpack and School Supply Donations

In 2020, FFPO donated 215 backpacks to students in the communities where employees live and work.

2.7 Awards

During CY 2020, SPR received the OSHA Region VI "Star of Excellence" award for performance at the West Hackberry site. The Bayou Choctaw, Big Hill, and Bryan Mound sites received "Star Among Stars" awards.

The Stars Program is an award program that involves agencies who have qualified as a Voluntary Protection Program (VPP) site. The Stars Program is a way to encourage continuous improvement among all the VPP sites in Region VI. It awards different levels of stars to those sites that have exceeded performance. The program has three levels:

- A facility with a single-year injury incident rate at least 50 percent below the industry average- "Star Among Stars"
- A facility with a single-year injury incident rate at least 75 percent below the industry average- "Super- Star Among Stars"
- A facility with a single-year injury incident rate at least 90 percent below the industry average- "Star of Excellence"

3 Environmental Management System (EMS) and Sustainability

DOE Order 436.1 requires DOE sites to have an EMS. The EMS must be certified to or in conformance with the ISO 14001 standard. On May 19, 2000, the EMS was first evaluated by an independent certification body 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, 2015 and 2018. The certification in 2018 was to change from ISO 14001:2004 standard to the ISO 14001:2015 standard. Between certification and recertification activities, surveillance audits are conducted by the certification body. This certification is valid through April 18, 2021.

The scope of the EMS is the operation and management of the SPR under the M&O and its personnel and on-site subcontractors. The EMS addresses activities conducted at SPR sites by FFPO and its subcontractors. The SPR sites encompass roughly 1700 acres, 160 buildings or structures, and 170 miles of off-site pipeline (crude oil, fresh/brackish water and brine). Sites are directly supported by approximately 630 M&O contracted and subcontracted full-time personnel. 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.

DOE delegates responsibility and authority for the environmental component of the Integrated Safety Management (ISM) system to the M&O 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 feedback and improvement. The SPR EMS Manual formalizes the environmental portion of ISM and defines the scope of the EMS regarding the elements of the ISO 14001:2015 standard. Although compliance with ISM does not ensure compliance with the ISO 14001:2015 standard, the M&O has tailored the EMS to comply with both standards.

The EMS is implemented to protect the environment and manage SPR environmental obligations safely and effectively. It establishes the necessary organizational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving and maintaining the "SPR Environmental Policy." Conformance of the EMS to the ISO 14001 standard is illustrated through the SPR EMS 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. Table 3-1 is a summary of the EMS objectives and targets with progress. Note, targets are tracked on a fiscal year basis, not a calendar year basis.

Table 3-1 FY 2020 Institutional Objectives and Targets with Performance			
Aspect	**Objective**	**Status 2020**	**Performance**
1) Continual Improvement	Put together a Chemical Inventory Process Improvement (PI) Team to help/improve how the sites conduct their chemical inventory.	In progress	The PI team concluded that a thorough chemical inventory and elimination of excess chemical products would greatly improve accuracy. Efforts to complete these tasks were hindered due to reduced site personnel as a result of the COVID-19 pandemic.
2) Continual Improvement	Make improvements to the: • Contractor Boilerplate • Preliminary Hazard Review (PHR) • Environmental Instruction Manual	In progress	Revisions and enhancements were hindered as a result of the COVID-19 pandemic in CY 2020. During 2021, efforts were resumed and have been coordinated to address needed improvements.
3) Spill, Air Emissions, 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	Meets target – Zero since FY00
4) Spills	Reduce reportable occurrences of releases from operational facilities *Target: No more than six reportable spills/ FY* *Stretch: No more than four reportable spills/ FY*	Two	Meets target and stretch
5) Water	Conduct Monthly Surface Water Samples *Target: 100%* *Missed due to COVID-19: March at BC and April at all sites Missed due to Hurricane Laura: August at BC, BM, and WH	*	Less than target due to COVID-19 and Hurricane Laura
6) Water	Conduct Quarterly Groundwater Samples Target: 100% *1QCY2020 at BC waived due to COVID-19	*	Less than target due to COVID-19

Table 3-1 FY 2020 Institutional Objectives and Targets with Performance			
Aspect	**Objective**	**Status 2020**	**Performance**
7) Water	Ensure Monthly SPCC inspections are being conducted *Target: 100%* *Missed- Big Hill and Bryan Mound for March and April and Bryan Mound May through August Waived due to COVID-19	*	Less than target due to COVID-19
8) Waste	Divert at least 50% Construction and Demolition Debris *SPR-Wide Minimum: 50%*	95%	Above target
9) Waste	Divert at least 50% of Non-Hazardous Solid Waste *SPR-Wide Minimum: 50%*	76%	Above target
10) Waste	Annually verify all facility and transporter contact information on the DRT list, update the list where necessary, and post to the Environmental SharePoint site. The information must also be updated in ESS.	Complete	Complete
11) Air Emissions - (tracked per CY)	Ensure Fugitive Monitoring is being done. **Big Hill and Bryan Mound** – Biennial (every other year) to be done in CY2020 **Bayou Choctaw and West Hackberry** – Annual *Target: 100%* Provide monthly status. Jan: Submit funding PR Feb-April: Obtain security clearances. May: Schedule site visits. June-Aug: -Perform fieldwork. Sep:Review monitoring results. Requirement once /yr, but attempt to do with current FY funding & complete before 10/1 each yr.	Complete-performed Dec 2020	Complete

Table 3-1 FY 2020 Institutional Objectives and Targets with Performance			
Aspect	**Objective**	**Status 2020**	**Performance**
12) Air Emissions	Ensure primary and secondary tank seal inspection notifications (1 mo. prior to the inspection to TCEQ) and reports are being conducted. This is for BH&BM ONLY. BM: BMT-3 BH: BHT-7 **Secondary seal**: Semi-annual (twice a year; usually March and Sep) **Primary seal**: Every five years. BMT-3 6/3/2020 notification made; 7/6 and 7/2020, primary performed BHT-7 3/16/2017 notification made; 4/19/2017 primary performed, due in 2022 *Target: 100%*	Complete	Complete
13) Air Emissions- (tracked per CY)	Assure monthly site air emissions data for all permitted sources are provided monthly. *Target: 100%*	100%	Meets target
14) Spill Fire	Ensure Emergency Preparedness/Response are meeting the requirements for equipment availability, training, and PREP drills/exercises *Minimum: 90%* *Target: 100%* *Minimum: 95% ERT trained/site* *Target: 100% ERT trained/site*	Incomplete due to COVID-19 and Hurricane Laura	Incomplete
15) Water	Permit exceedances on DMR Target: <8 /CY	Zero	100%

EMS Performance Metrics

The following qualitative discussion describes the status of the EMS performance for 2020. The information provided below is excerpted from the SPR's 2020 EMS Compliance Report submitted through Fed Center. The EMS received a "Green" score based on the metrics listed below.

The EMS implementation team annually reviews activities, products, and services. Activities include but are not limited to maintenance, workovers, drawdowns, painting and pipe integrity. Their associated environmental aspects (i.e., possible air impact, fire results, production of waste, etc.) are evaluated. The severity, frequency (likelihood) and rank are determined using the SPR Risk Coding Matrix. Severity rating descriptions range from negligible to marginal, moderate, significant, and severe. Frequency ratings range from very low to very high. Ranks are determined by using the severity and frequency ratings. The Significant Aspect List is provided in Table 3-2. Significant Aspect List rating descriptions range from marginal to moderate, significant, and severe. Frequency (likelihood) ratings range from medium to very high, and risks are determined. The Significant Aspect List also includes an unmitigated severity, likelihood and risk. Review results are documented, and changes are made when deemed necessary. The updated list of environmental aspects is published internally and is available outside DOE if requested.

The EMS has established, measurable environmental objectives. See Table 3-1 for a list of objectives and targets.

In 2020, operational controls associated with identified significant environmental aspects were established, implemented, controlled and maintained in accordance with operating criteria.

In 2020, an environmental compliance audit program was in place. Audits were completed according to schedule, findings were documented, and corrective and preventive actions were recorded and either completed or placed on a schedule for completion. More information about the SPR audit program is in Section 2.4.

The EMS Compliance Report submitted through Fed Center requires reporting by DOE facilities about whether the ten sustainability goals outlined in Executive Order 13834 are applicable and addressed in the EMS of the reporting facility. In 2020, all ten of the sustainability goals were applicable and addressed in the SPR EMS. More information on the sustainability goals is contained in Table 3-3, 2020 Sustainability Goals, Performance, and Planned Actions.

Table 3-2 Significant Aspect-Impact List*									
Aspect	**Activity**	**Impact**	**Unmitigated Severity**	**Unmitigated Likelihood**	**Unmitigated Risk**	**Mitigated Severity**	**Mitigated Likelihood**	**Mitigated Risk**	**Aspect ID (Refer to ES&H Standards List)**
Air Emissions	Maintain site structures and equipment	Air Quality	Moderate	Medium	Medium	Marginal	Medium	Low	1AE
	Workover-crude movement		Significant	High	High	Marginal	Medium	Low	
	**Degas crude		Severe	High	High	Negligible	Very Low	Very Low	
	Drawdown-crude to ships		Significant	High	High	Moderate	High	Medium	
Fire	Respond to upset conditions	Air Quality, Land, Water Quality	Significant	Medium	Medium	Moderate	Medium	Medium	7F
Waste	Sample/Test crude (receipt & storage)	Disposal Impact (Haz or Non-Haz)	Marginal	Very High	Medium	Marginal	Very High	Medium	14W
	Construction activities		Moderate	Very High	High	Marginal	Very High	Medium	
	Painting		Moderate	Medium	Medium	Marginal	Medium	Low	
	Sample/Test (degassing crude)		Marginal	Very High	Medium	Marginal	Very High	Medium	
	Sample/test (workovers and inter-cavern movements)		Marginal	Very Hugh	Medium	Marginal	Very High	Medium	
	Chemical use-Non-QPL		Marginal	Very High	Medium	Marginal	Very High	Medium	
	Maintain site structures		Marginal	Very High	Medium	Marginal	Very High	Medium	
Reportable Spills/ Releases	Workover- crude/brine movement	Water Quality	Significant	Very High	High	Moderate	High	Medium	11SR
	Crude storage tanks (before moving to caverns)		Moderate	Very High	High	Marginal	Very High	Medium	
	Respond to upset conditions	Air Quality, Land, Water Quality	Severe	Medium	High	Significant	Medium	Medium	
	Monitor onsite piping integrity		Moderate	Very High	High	Moderate	High	Medium	
	Monitor offsite pipeline integrity		Moderate	Very High	High	Moderate	High	Medium	
	Cathodic protection survey of crude oil pipelines		Significant	High	High	Moderate	Medium	Medium	
	Drawdown – move crude via piping		Significant	Very High	High	Moderate	High	Medium	

	BOAs (establish/maintain for spill response/ clean up) (failure)		Significant	Very High	High	Moderate	High	Medium	
	Leach caverns with raw water during drawdown	Land and Water Quality	Severe	High	High	Moderate	Medium	Medium	
	Pig pipelines to perform maintenance		Moderate	Very High	High	Marginal	Low	Low	
Natural Resource Preservation	Maintain site structure	Water Quality	Significant	Very High	High	Moderate	High	Medium	9NRP
	Maintain site structures	Wildlife	Significant	Very High	High	Marginal	Low	Low	
	Work in wildlife habitat areas		Moderate	Very High	High	Marginal	Very High	Medium	
Cavern Integrity	Leach caverns with raw water during drawdown	Cavern Integrity	Severe	High	High	Marginal	Medium	Low	16CI
	**Cavern (drill wells)		Severe	High	High	Negligible	Very Low	Very Low	
	Store crude in caverns	Environment	Severe	Low	Medium	Significant	Very Low	Low	
Discharges	Maintain site structures	Water Quality	Significant	Very High	High	Moderate	Low	Low	3D
Energy Use	**Degas crude oil	Energy/Material Consumption	Significant	Very High	High	Negligible	Very Low	Very Low	

*Severity, frequency, and rank were determined using the SPR Risk Coding Matrix (AAA9020.1057).
The risk information provided in this table is based upon requirements in the ISO 14001: 2015 standard and does not directly correlate with the FFPO Enterprise Risk Matrix.

** Degas Plant and Drilling of Cavern Wells were not conducted in FY 2020.

EMS and Mission Effectiveness
Since its inception, the EMS has contributed to the effectiveness of the SPR mission. The EMS has reduced risk to the organizational mission, contributed to an improved fiscal efficiency/cost avoidance, provided greater understanding and recognition of environmental issues at all levels, and improved community relations. Below are specific examples of how the EMS has contributed to mission effectiveness.

- Allows the SPR to operate more efficiently during congressionally mandated oil sales due to strong control of significant environmental aspects.
- Improves the SPR's relationship with neighbors and regulators.
- Saves taxpayer money otherwise spent to correct environmental upsets such as crude oil spills and discharges that exceed permit limitations.
- Provides a management system to ensure compliance with compliance obligations.
- Provides a system to reduce environmental liability and risk.
- Formalizes the environmental portion of the ISM.

EMS Best Practices
In 2020, there were several EMS best practices implemented at the SPR. Every year a strategy is developed with recommendations for reaching the sustainability goals of EO 13834. Based on the strategy developed, DOE chooses which objectives to fund. This process is conducted annually to confirm choices for the following year and provide an opportunity to evaluate new strategies or programs. Quarterly sustainability meetings were held to evaluate progress in achieving EO 13834 goals. Progress is discussed at management review team meetings.

Additional 2020 EMS best practices included:
1. Updated objectives and targets to reflect site-specific data
2. Created an ISO 14001 "Review Guide"
3. Created an OA compliance table
4. Added Significant Impact and Aspects slide to Environmental Trainings

EMS Implementation Challenges
In 2020, there were five EMS implementation challenges identified:
1. Setting appropriate and achievable goals for the SPR in support of overall DOE sustainability goals
2. Ensuring the management system is adhered to and effective at all operating site locations
3. Implementing effective training for site personnel; turnover rate – having to retrain employees
4. Consistent EMS implementation at all four sites
5. Virtual Audits due to COVID-19

3.1 Sustainability

The SPR Sustainability Program was initiated in 2007 with EO 13423, broadened in 2009 with EO 13514, revised with EO 13693 in 2015, and revoked by EO 13834 in May 2018. EO 13834 focuses on resource conservation and pollution prevention of air, water, waste and chemicals. The sustainability program is planned, implemented, monitored, 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 (see Table 3-1.) Other sustainability goals identified and mandated by the executive orders were included in the EMS in 2007, 2009 and 2015. All objectives and corresponding targets are called "performance measures" (see Table 3-3) and are discussed as follows.

Thirty-five performance measures were tracked by the SPR EMS in FY20 (20 sustainability goals/sub-goals and 15 institutional performance measures). 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.

Performance measures are either 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 EO 13834. FY20 was completed and tracked using EO 13834. Implementing instructions for EO 13834 were published in April 2019.

Performance measures are agreed upon for each fiscal year by DOE and the M&O contractor and are 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 of top management.

Refer to Tables 3-1 and 3-3 for a synopsis in meeting performance measures. Institutional performance measures have been monitored and measured annually for more than 12 years. They are based strictly on SPR-specific environmental aspects.

SPR sustainability goals, performance and plans are now reported and tracked by the DOE Sustainability Dashboard (Dashboard). A screenshot of a portion of the Dashboard input window is included in Figure 3-1. Table 3-3 provides an overview of the SPR performance toward meeting the goals. It also provides a summary of planned actions to meet the goals. Sustainability data for the SPR is entered annually into the Dashboard. The Dashboard calculates the SPR performance and displays it in a Comprehensive Scorecard. The Comprehensive Scorecard is used by the Dashboard to populate the table for performance. The Site Sustainability Plan (SSP) is included in the Dashboard. The Dashboard uses the SSP to populate the performance and plans in the table.

Table 3-3 FY 2020 Sustainability Goals, Performance, and Planned Actions			
Prior DOE Goal	**Current Performance Status**	**Planned Actions & Contribution**	**Overall Risk of Non-Attainment**
Energy Management			
30% energy intensity (Btu per gross square foot) reduction in goal-subject buildings by FY 2015 from a FY 2003 baseline and 1.0% Year Over Year (YOY) thereafter.	Crude oil sales and LE2 impacting consumption until smart metering is functional to exempt SPR high energy mission specific facilities (HEMSF) in the future.	Continue to replace fluorescent and sodium bulbs with LEDs and upgrade HVAC systems as necessary.	High Until the SPR can upgrade to the existing power monitoring control and communication (PMCC) and buildings; this goal will be unattainable. (See energy management section.)
EISA Section 432 continuous (4-year cycle) energy and water evaluations.	WH started in FY2020, impacted by Hurricanes Laura and Delta.	Complete WH during FY20 & start the new 4-year cycle in 2021 with BC.	Low
Meter all individual buildings for electricity, natural gas, steam, and water, where cost-effective and appropriate.	We are implementing a project to enhance the metering system to improve data reliability.	Funding dependent- Complete enhancements to the metering system.	Medium – Project is planned to upgrade metering at the SPR. However, uncertain budgetary constraints could delay meeting this objective.
Water Management			
20% potable water intensity (Gal per gross square foot) reduction by FY 2015 from a FY 2007 baseline and 0.5% YOY thereafter.	Crude oil sales and LE 2 impacting current activity.	Crude oil sales will affect use through 2028. Funding dependent- implement rainwater capture systems to replace potable water use in process and fire protection, and upgrades to building appliances using water. The previous DOE goal is unachievable under the current mission.	High – SPR water metering not in place to segregate the process water from the potable use.
Non-potable freshwater consumption (Gal) reduction of industrial, landscaping, and agricultural (ILA). YOY reduction; no set target.	Crude oil sales and LE 2 impacting current activity.	Crude oil sales will affect use through 2028. Previous DOE goal is unachievable under the current mission.	High – ILA water is used to meet the SPR's mission. Due to congressionally mandated oil sales, this goal will be unattainable until late in the 2020s

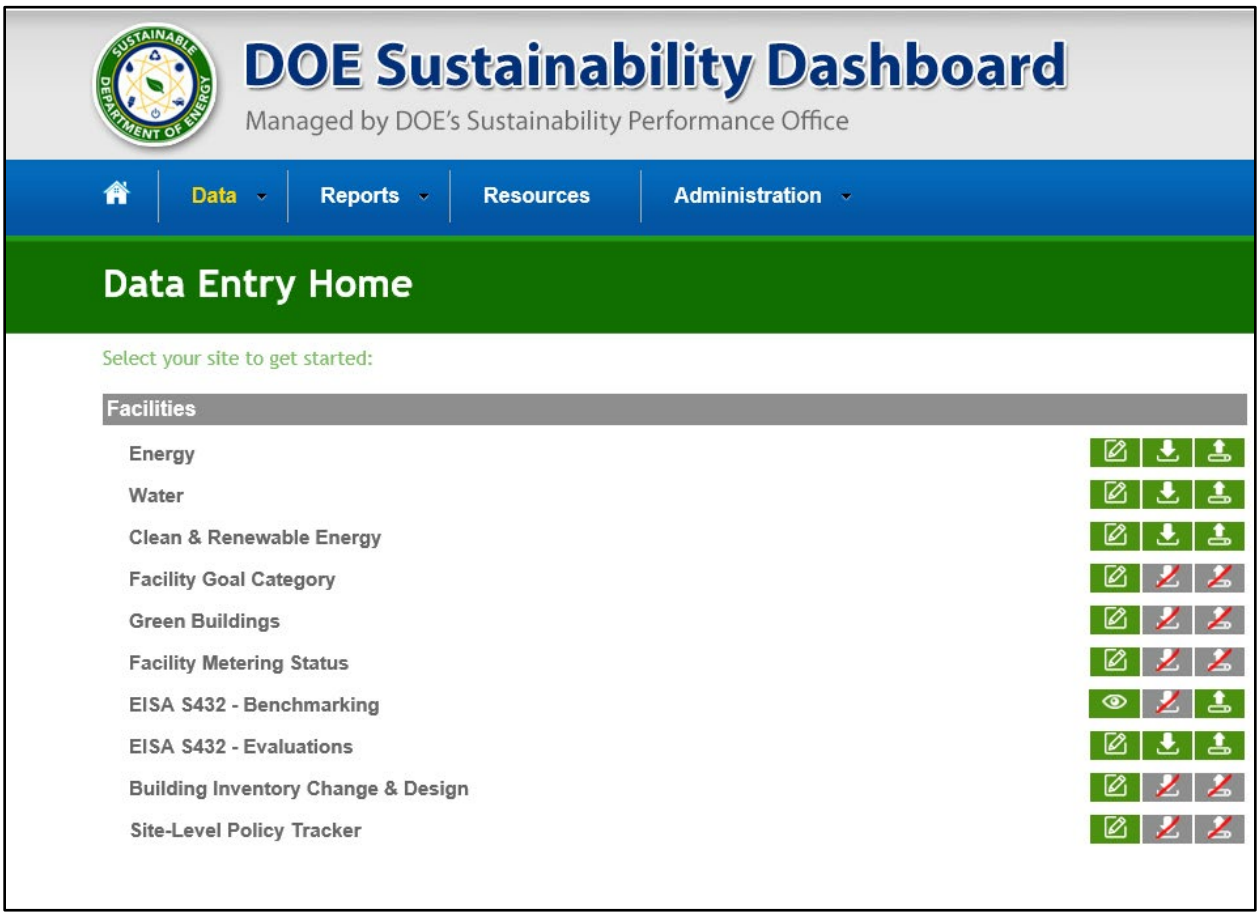
Table 3-3 FY 2020 Sustainability Goals, Performance, and Planned Actions			
Prior DOE Goal	**Current Performance Status**	**Planned Actions & Contribution**	**Overall Risk of Non-Attainment**
Waste Management			
Reduce at least 50% of non-hazardous solid waste, excluding construction and demolition debris, sent to treatment and disposal facilities.	76% Diversion	Continue current successful processes and programs.	Low
Reduce construction and demolition materials and debris sent to treatment and disposal facilities. YOY reduction; no set target.	95% Diversion	Continue current successful processes and programs.	Low
Fleet Management			
20% reduction in annual petroleum consumption by FY 2015 relative to a FY 2005 baseline and 2.0 % YOY thereafter.		Continued effort to acquire more fuel-efficient vehicles and reduce travel. Enforce employee business carpooling and vanpooling in leased vehicle fleet. Continue annual vehicle fleet optimization exercise. Promote video conferencing.	Low
10% increase in annual alternative fuel consumption by FY 2015 relative to a FY 2005 baseline; maintain 10% increase thereafter.		Submitted an AFV waiver for FY 2018. Continued effort to replace conventional light-duty gasoline vehicles will depend upon fueling infrastructure. Infrastructure dependent upon funding.	High – the E85 infrastructure in the gulf coast region is not sufficiently mature to successfully use E85 vehicles.
75% of light-duty vehicle acquisitions must consist of alternative fuel vehicles (AFV).		AFVs will be evaluated if light-duty vehicles are purchased. Currently, 65% of the leased fleet is classified as AFVs (E-85 fuel compatible)- Dependent on funding.	High – the E85 infrastructure o the SPR and off-site in the gulf coast region is not sufficiently mature to successfully use E85 vehicles.

Table 3-3 FY 2020 Sustainability Goals, Performance, and Planned Actions			
Prior DOE Goal	**Current Performance Status**	**Planned Actions & Contribution**	**Overall Risk of Non-Attainment**
Clean & Renewable Energy			
"Renewable Electric Energy" requires that renewable electric energy account for not less than 7.5% of a total agency electric consumption by FY 2013 and each year thereafter.	Purchased 7.5% of consumption in Wind RECs	Continue to purchase RECs as directed, based on statutory requirements and available funding.	Low
Continue to increase non-electric thermal usage. YOY increase; no set target but an indicator in the OMB scorecard.	Nothing active.	Funding dependent- install renewable energy generating equipment.	Not applicable to the SPR
Green Buildings			
At least 15% (by count) of owned existing buildings to be compliant with the *revised* Guiding Principles for Sustainable Buildings by FY 2021, with annual progress thereafter.	Nothing to report	Funding dependent- building upgrades	High – Design Level three criteria for safety concerns preclude the use of energy-efficient windows.
Acquisition & Procurement			
Promote sustainable acquisition and procurement to the maximum extent practicable, ensuring BioPreferred and biobased provisions and clauses are included in all applicable contracts.	100%- Contract actions contain the required language	Continue current successful processes and programs.	Low

Table 3-3 FY 2020 Sustainability Goals, Performance, and Planned Actions			
Prior DOE Goal	**Current Performance Status**	**Planned Actions & Contribution**	**Overall Risk of Non-Attainment**
Measures, Funding & Training			
Site set annual targets for sustainability investment with appropriated funds and/or financed contracts for implementation.	On schedule for completing the current 4-year audit cycle on time.	Continue EISA Section 432 surveys and training personnel for energy management and other programs.	High – Energy savings performance contracts (ESPCs) have been researched for use at the SPR. However, due to the low energy cost in the gulf coast region, ESPCs are not an effective method for saving energy or reducing costs currently.
Electronic Stewardship			
End of Life: 100% of used electronics are reused or recycled using environmentally sound disposition options each year.	100% recycled or donated	Continue current processes and programs- either donate or recycle old electronics.	Low
Data Center Efficiency: Establish a power usage effectiveness target for new and existing data centers; discuss efforts to meet targets.	Evaluated metering data center, determined not feasible or practical.	Continue current life cycle equipment replacement to improve data center performance.	Not applicable

Organizational Resilience			
Discuss overall integration of climate resilience in emergency response, workforce, and operations procedures and protocols.	Resilience strategies being considered and included in project designs on an ongoing basis.	Resiliency strategies and projects will be incorporated into the Sustainability Program to the extent practicable.	Medium – As cost-effective opportunities are identified (See Organizational resilience section)
Multiple Categories			
YOY scope 1 & 2 GHG emissions reduction from a FY 2008 baseline.		Funding dependent- Complete conversion of all lighting to LEDs and purchase and use the most efficient vehicles on site.	High – Because of the Congressionally-mandated oil sales meeting, this goal needs to be deferred until the late 2020s
YOY scope 3 GHG emissions reduction from a FY 2008 baseline.		Continue current processes and programs.	High – Because of Congressionally mandated oil sales and the Life Extension 2 travel requirements meeting this goal needs to be deferred until the late 2020s

Figure 3-1 Dashboard Input Screenshot



4 Environmental Radiological Program Information

Ionizing radiation hazards at the SPR consist of electrically-generated X-rays that are used in laboratory and security scanning equipment or other sealed sources brought on-site for performing radiography and cavern wire-line type logging operations. Procedures are in place to protect personnel from exposure during these operations. The SPR is subject to inspections by the nuclear regulatory agencies (Nuclear Regulatory Commission and National Nuclear Security Administration). Required notices to employees are posted on each X-ray scanning device and entry points to rooms containing this equipment.

4.1 Sealed Sources

Sealed radiation sources are used at the SPR for monitoring activities related to the physical properties of storage caverns and pipeline integrity. Permitting and leak testing of sealed sources are performed by the providing contracted company. There were no site leaks of sealed sources during CY 2020. One sealed source was, however, lost down-line in July 2020. Proper notifications were made.

5 Environmental Permits and Programs

5.1 Environmental Permits

Environmental permits required to construct, operate and maintain the four SPR storage sites are discussed in the following subsections.

The SPRPMO negotiated a 20-year long-term leasing arrangement, effective January 1, 2020, for continued use of the St. James site by ExxonMobil. ExxonMobil retains all responsibility for maintaining necessary permits at St. James concurrent with their operations of that 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 storm water, was approved by the MDEQ instead of operating under a multi-sector general permit. The Certificate of No Exposure to storm water was renewed in October 2019 and is valid for five years. Air emissions from DOE's Stennis Warehouse operations are *de minimus*, requiring no permitting or reporting activity.

5.1.1 Bayou Choctaw Permits

Bayou Choctaw permits are listed in Table 5-1. Individual work permits are received from the Louisiana Underground Injection Control Division of LDNR for each well workover performed. State inspectors periodically visit the site to observe SPR operations. Bayou Choctaw operates under the water and air programs delegated to Louisiana by EPA.

Table 5-1 Bayou Choctaw Environmental Permits

Permit Type	Permit Description	Issuing Agency	Permit Number	Effective Date	Expiration Date
Air	BC Air Emissions	LDEQ	1280-00015-03	6/12/17	6/11/27
Water	LPDES Water Discharge	LDEQ	LAG480540	12/16/20	12/15/25
Water	LPDES MSGP Storm Water Discharge	LDEQ	LAR050000	5/9/16	5/8/21
Water	LPDES Hydrostatic Test Water Discharge	LDEQ	LAG679016	3/23/18	3/22/23
Injection Wells	Letter of financial responsibility to plug and abandon BC injection wells	LDNR	None	1/11/83	Open

Construct & Maintain	Bull Bay 24" brine disposal pipeline	COE	LMNOD-SP (Bull Bay) 3	1/30/79	*
Construct & Maintain	BC brine disposal well pads	COE	LMNOD-SP (Iberville Parish Wetlands) 7	9/26/77	*
Construct & Maintain	BC brine disposal well pads and access roads	COE	LMNOD-SP (Iberville Parish Wetlands) 10	6/12/78	*
Construct & Maintain	Access roads to BC brine disposal well area	COE	LMNOD-SP (Iberville Parish Wetlands) 17	11/6/78	*
Construct & Maintain	Well pad, levees, access road, and equipment - BC Cavern 102	COE	LMNOD-SP (Iberville Parish Wetlands) 31	5/27/80	*
Construct & Maintain	Ring levee, drill site, and equipment – BC Cavern 101	COE	LMNOD-SP (Iberville Parish Wetlands) 102	9/26/77	*
Construct & Maintain	36" petroleum products pipeline under and across Bayou Plaquemine	COE	LMNOD-SP (Bayou Plaquemine)	9/26/77	*
Construct & Maintain	Fill with culverts for parking	COE	WN-20-020-0168	4/2/02	*
Construct & Maintain	Culverts and fill for minor roadway crossings	COE	WT-20-020-2654	8/20/02	*
Construct & Maintain	Security fence with a concrete footing and curbing	COE	WT-20-020-3621	9/17/02	*
Construct & Maintain	Replacement N-S bridge	COE	CT-20-030-1379-0	3/12/03	*
Construct & Maintain	Replacement brine disposal access road bridge	COE	CT-20-030-1501-0	3/28/03	*

Construct & Maintain	Bulkhead and fill for bank stabilization in N-S Canal	COE	CT-20-030-3087-0	7/25/03	*
Construct & Maintain	Refurbished Bailey bridge crossing over Wilbert's Canal	COE	MVN-2004-4453-CT	10/14/04	*
Construct & Maintain	Expanded clear sight security perimeter zone	COE	MVN-2003-2234-CT	2/2/06, 10/4/11	*

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

5.1.2 Big Hill Permits

Big Hill permits are listed in Table 5-2.

In 2020, Big Hill appropriated 399.8 million gallons of water from the Gulf Coast Intracoastal Waterway (GIWW), excluding fire protection water. This action represents five percent of the annual water usage authorized. The certified annual report of water usage was forwarded to the TCEQ as required in 2020.

The M&O contractor is registered with TCEQ as a Public Water System Operations Company (registration #WC0000183) since Big Hill provides sanitary control of their purchased water distribution system on site. The M&O contractor is also registered as a Wastewater Operations Company (registration #OC0000202).

Required annual reporting for 2020 involved the performance of a brine line integrity test sent to Region 6 EPA, raw water usage to TCEQ, Water Conservation Plan implementation reporting to the Texas Water Development Board, and crude oil pipeline system operations renewal (T4C) to the RRC.

Table 5-2 Big Hill Environmental Permits

Permit Type	Permit Description	Issuing Agency	Permit Number	Effective Date	Expiration Date
Air	BH Air Emissions	TCEQ	9256	3/19/18	3/19/28
Air	BH Leaching Emissions	TCEQ	PBR 100485	1/24/12	Open
Air	BH Frac Tank Emissions	TCEQ	PBR 107009	2/20/13	Open
Water	NPDES Water Discharge	EPA	TX0092827	2/1/20	1/31/24

Water	Water Discharge	RRC	UHS-006	11/1/14	9/04/24
Water	Water Use	TCEQ	4045A	11/14/83	Open
Caverns	Operate & Construct & Maintain Big Hill caverns	RRC	02939	11/28/83	Open
Construct & Maintain	RWIS, 48" raw water pipeline, 48" brine disposal pipeline, and 36" crude oil pipeline.	COE	SWGCO-RP 16536 (01,02,03,04,05)	1/11/84	Dredging clause to 12/2008 (Renew dredging clause when needed.)
Construct & Maintain	48" brine pipeline	F&WS	P-7	7/31/86	6/30/36

5.1.3 Bryan Mound Permits

Bryan Mound permits are listed in Table 5-3.

In 2020, TCEQ issued a Permit By Rule air permit to demolish the existing Bryan Mound Crude Oil Tank 4 (BMT-4) internal floating roof tank and for the construction and operation of the new BMT-4 external floating roof tank.

The Bryan Mound site has a permit from TCEQ for the appropriation of state waters for the cavern leaching program, site utility and fire protection systems that are under the jurisdiction of the Brazos River Water Master Program for administration. The permit requires a monthly tally and forecasting communication and an annual tally to be provided to the agency to assess the management fee. In 2020, the site used a total of 338.4 million gallons of water from the Brazos River Diversion Channel, representing 4 percent of the annual water usage authorized.

The M&O contractor is registered with TCEQ as a Public Water System Operations Company (registration #WC0000183) since Bryan Mound provides sanitary control of their purchased water distribution system on site. The M&O contractor is also registered as a Wastewater Operations Company (registration #OC0000202).

Required annual reporting for 2020 included the successful brine line integrity test sent to Region 6 EPA, raw water usage to TCEQ, Water Conservation Plan implementation reporting to the Texas Water Department Board, and crude oil pipeline system operations renewal (T4C) to the RCC.

Table 5-3 Bryan Mound Environmental Permits

Permit Type	Permit Description	Issuing Agency	Permit Number	Effective Date	Expiration Date
Air	BM Air Emissions	TCEQ	6176B	5/31/13	5/31/23
Air	BM Frac Tank Emissions	TCEQ	PBR Regulation	5/13/13	Open
Air	BMT-2 Air Emissions	TCEQ	PBR 142987	10/27/16	Open
Air	BMT-4 Air Emissions	TCEQ	PBR 161866	7/24/20	Open
Air	BM Leaching Emissions	TCEQ	PBR 100484	1/24/12	Open
Water	NPDES Water Discharge	EPA	TX0074012	2/1/20	1/31/24
Water	Water Discharge	RRC	UHS-004	11/1/14	9/04/24
Water	Water Use	TCEQ	5332A	7/20/81	Open
Pipelines	Operate BM Crude Oil Pipelines	RRC	04994	8/1/00	Open
Construct & Maintain	Maintenance dredging of BM Raw Water Intake Structure	COE	SWGCO-RP-12347 (03), SWG-2006-2568	2/22/78	12/31/2028
Construct & Maintain	30” crude oil pipeline to 3 miles SW from Freeport	COE	SWGCO-RP-11666	10/15/77	*
Construct & Maintain	30” crude oil pipeline to 2 miles S from Freeport	COE	SWGCO-RP-12112	7/25/77	*
Construct & Maintain	36” brine disposal pipeline and diffuser	COE	SWGCO-RP-12062 (03)	10/10/78	*
Construct & Maintain	General permit for pipeline crossings by directional drilling in navigable waters	COE	SWGCO-RP-14114 (01)	5/18/85	*
Construct & Maintain	6” PVC potable water line	COE TDH&PT	SWGCO-RP-16177, 82-8475	9/7/82 1/1/83	*
Construct & Maintain	BM cavern pads 101, 102, 103, 111, and 113.	COE	SWGCO-RP-13435 (01)	5/21/79	*
Construct	Boat ramp & dock	COE	SWG-1995-01780	8/20/20	12/31/25

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

5.1.4 West Hackberry Permits

West Hackberry permits are listed in Table 5-4.

Table 5-4 West Hackberry Environmental Permits

Permit Type	Permit Description	Issuing Agency	Permit Number	Effective Date	Expiration Date
Air	WH and Degas Air Emissions	LDEQ	0560-00019-04	2/20/12	2/20/22
Water	LPDES Water Discharge	LDEQ	LA0053031	6/1/16	5/31/21
Water	LPDES MSGP Storm Water Discharge	LDEQ	LAR050000	5/9/16	5/8/21
Water	LPDES Hydrostatic Test Water Discharge	LDEQ	LAG679016	3/23/18	3/22/23
Injection Wells	Letter of financial responsibility to close all WH injection wells	LDNR	None	1/11/83	Open
Injection Wells	Construct and Operate WH wells 117A and 117B	LDNR	971198-9	9/27/83	Open
Construct & Maintain	RWIS and 42” raw water pipeline	COE	LMNOD-SP (LTCS) 26	2/8/79	*
Construct & Maintain	Maintenance dredging for firewater canal and extended boat slip access	COE	LMNOD-SP (Black Lake) 31	10/26/82	*
Construct & Maintain	Erosion control dike and riprap	COE	LMNOD-SP (Black Lake) 43	7/26/84	*
Construct & Maintain	Parallel pipeline. Offshore brine line and diffuser remain inactive.	COE	LMNOD-SP (Gulf of Mexico) 2574	8/11/80	*
Construct & Maintain	36” crude oil pipeline from WH to Texoma/Lake Charles Meter Station	COE	LMNOD-SE (LTCS) 40	5/25/88	*
Construct & Maintain	42” crude oil pipeline	COE	LMNOD-SP (Cameron Parish Wetlands) 162	3/9/78	*

Table 5-4 West Hackberry Environmental Permits

Permit Type	Permit Description	Issuing Agency	Permit Number	Effective Date	Expiration Date
Construct & Maintain	42" crude oil pipeline crossings of waters and waterways in Texas	COE	SWGCO-RP-12342	3/28/78	*
Construct & Maintain	Brine disposal wells, well pads, and brine disposal pipelines (12", 20" and 24")	COE	LMNOD-SP (Cameron Parish Wetlands) 152	3/16/78	*
Construct & Maintain	Well pads, levees, and access roads (Wells 110, 111, 112, 113, 114 and 115)	COE	LMNOD-SP (Cameron Parish Wetlands) 276	2/11/80	*
Construct & Maintain	Repair of exposed 42" crude oil pipeline	COE	WN20-000-3972-0	8/31/00	*
Construct & Maintain	Restored riprap along north perimeter dike adjacent to Cavern 6 and Black Lake	COE	WO-20-020-1136	1/25/02, 2/19/02	*
Construct & Maintain	Deposited fill in fire ditch	COE	WO-20-020-3607	10/23/02	*
Construct & Maintain	Boat ramp modifications and erosion control breakwater in Black Lake along the north side of the site	COE	WW-20-030-3748	10/22/03	*
Construct & Maintain	Maintenance dredging of RWIS	COE	MVN-1997-00068-WW	6/09/15	6/09/20
Construct	Expansion of existing brine disposal well	COE	MVN-2016-01237-WQQ	10/14/20	10/14/25

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

5.2 Air Quality Program

Air quality is maintained at the SPR via compliance with applicable provisions of the Clean Air Act and State Implementation Plans. The SPR sites operate in accordance with the provisions of the applicable state air permits.

The SPR sites are permitted by the LDEQ and TCEQ as minor sources for the following criteria pollutants: non-methane/non-ethane volatile organic compounds (VOC), nitrogen oxides (NOx), sulfur dioxides (SO_2), carbon monoxide (CO) and particulate matter less than 10 microns (PM_{10}). The Bayou Choctaw and West Hackberry air permits also include emission rates for the following hazardous air pollutants: benzene, ethylbenzene, n-hexane, toluene and xylene.

The SPR sites are in attainment areas for all National Ambient Air Quality Standards, except for ozone. The Bryan Mound site is currently in an ozone non-attainment area. The Bayou Choctaw, Big Hill, and West Hackberry sites are in ozone attainment areas.

The SPR ensures compliance with air permit limits by monitoring usage of emergency generators and pumps, volumes of crude oil, brine, diesel, and gasoline in the site tanks, and volume of paint used.

Fugitive monitoring of piping components (valves and pump seals) in crude oil service are inspected for VOC leaks by outside contractors (annually in Louisiana and biennially in Texas) using an organic vapor analyzer (OVA). Flanges are also inspected weekly by site operators in Texas. Annual fugitive monitoring was performed at Bayou Choctaw and West Hackberry in December 2020. Biennial fugitive monitoring was performed at Big Hill and Bryan Mound in December 2020. There were no leaks detected at any of the sites.

The Big Hill and Bryan Mound external floating roof tanks require inspection of the primary seal (every five years) and the secondary seal (semi-annually) for visible tears, holes or cumulative gaps exceeding regulatory limits. The BHT-7 semi-annual secondary seal inspection was performed in December 2020 due to delays caused by COVID-19. TCEQ granted three exemptions for these delays. The BMT-3 semi-annual secondary seal inspections were performed in July and December 2020. The secondary seals on both tanks had no visible holes, tears, or other openings. There were no gaps exceeding 0.5 inches, and the total gap area was less than 1.0 square inch per tank diameter for both tanks for all inspections. The five-year primary seal inspection of BMT-3 was performed in July 2020. The five-year primary seal inspection of BHT-7 is not required until 2022.

Annual air emissions were reported to TCEQ by Bryan Mound and Big Hill in 2020. The Bayou Choctaw and West Hackberry sites did not require reporting because they were below the required emission limit for reporting in Louisiana.

Table 5-5 summarizes of the SPR Site Air Emissions in Tons/Year (Metric Tons/Year) from 2014-2020. SPR emissions complied with permit limits for all seven years, except for the 2015 Bryan Mound VOC emissions due to the roof failure of the BMT-4 crude oil tank.

Table 5-5 SPR Site Air Emissions in Tons/Year (Metric Tons/Year)

BC SPR Site	Volatile Organic Compounds	Nitrogen Oxides	Carbon Monoxide	Sulfur Dioxide	Particulates (less than 10 microns)
2014	0.54 (0.49)	0.47 (0.43)	0.10 (0.09)	0.00 (0.00)	0.03 (0.03)
2015	0.37 (0.34)	0.91 (0.83)	0.21 (0.19)	0.00 (0.00)	0.03 (0.03)
2016	0.65 (0.59)	0.21 (0.19)	0.05 (0.05)	0.00 (0.00)	0.01 (0.01)
2017	2.51 (2.28)	0.72 (0.65)	0.16 (0.15)	0.00 (0.00)	0.03 (0.03)
2018	0.56 (0.51)	0.47 (0.43)	0.10 (0.09)	0.00 (0.00)	0.02 (0.02)
2019	0.54 (0.49)	0.69 (0.63)	0.16 (0.15)	0.00 (0.00)	0.03 (0.03)
2020	1.65 (1.50)	0.63 (0.57)	0.14 (0.13)	0.00 (0.00)	0.02 (0.02)
BH SPR Site	**Volatile Organic Compounds**	**Nitrogen Oxides**	**Carbon Monoxide**	**Sulfur Dioxide**	**Particulates (less than 10 microns)**
2014	2.57 (2.33)	0.22 (0.20)	0.05 (0.05)	0.01 (0.01)	0.01 (0.01)
2015	2.56 (2.32)	1.85 (1.68)	0.41 (0.37)	0.06 (0.05)	0.09 (0.08)
2016	2.77 (2.51)	0.42 (0.38)	0.09 (0.08)	0.02 (0.02)	0.02 (0.02)
2017	1.36 (1.23)	1.32 (1.20)	0.30 (0.27)	0.02 (0.02)	0.05 (0.05)
2018	5.96 (5.41)	0.25 (0.23)	0.06 (0.05)	0.01 (0.01)	0.01 (0.01)
2019	1.23 (1.12)	0.55 (0.50)	0.12 (0.11)	0.02 (0.02)	0.03 (0.03)
2020	**10.30** (9.37)	0.34 (0.31)	0.08 (0.07)	0.02 (0.01)	0.02 (0.02)
BM SPR Site	**Volatile Organic Compounds**	**Nitrogen Oxides**	**Carbon Monoxide**	**Sulfur Dioxide**	**Particulates (less than 10 microns)**
2014	4.55 (4.13)	9.56 (8.67)	2.19 (1.99)	0.03 (0.03)	0.29 (0.26)
2015	[3] 54.97 (49.87)	4.00 (3.63)	0.95 (0.86)	0.03 (0.03)	0.13 (0.12)
2016	[4] 15.90 (14.42)	15.94 (14.46)	3.65 (3.31)	0.04 (0.04)	0.48 (0.44)
2017	[4] 16.77 (15.21)	0.63 (0.57)	0.14 (0.13)	0.01 (0.01)	0.03 (0.03)
2018	[2], [4] 20.20 (18.33)	[2] 2.69 (2.44)	[2] 0.62 (0.56)	[2] 0.02 (0.02)	[2] 0.08 (0.07)
2019	[4] 18.00 (16.36)	0.46 (0.42)	0.10 (0.09)	0.01 (0.01)	0.02 (0.02)
2020	**[4] 22.61 (20.55)**	**0.69 (0.63)**	**0.16 (0.14)**	**0.02 (0.02)**	**0.03 (0.03)**
WH SPR Site	**Volatile Organic Compounds**	**Nitrogen Oxides**	**Carbon Monoxide**	**Sulfur Dioxide**	**Particulates (less than 10 microns)**
2014	6.52 (5.91)	2.01 (1.82)	1.93 (1.75)	0.03 (0.03)	0.12 (0.11)
2015	8.69 (7.88)	5.13 (4.65)	5.00 (4.54)	0.02 (0.02)	0.36 (0.33)
2016	7.90 (7.17)	5.96 (5.41)	5.85 (5.31)	0.03 (0.03)	0.42 (0.38)
2017	11.35 (10.30)	5.05 (4.58)	6.08 (5.52)	0.02 (0.02)	0.42 (0.38)
2018	8.91 (8.08)	4.60 (4.17)	4.47 (4.06)	0.02 (0.02)	0.32 (0.29)
2019	9.72 (8.84)	0.47 (0.43)	0.11 (0.10)	0.00 (0.00)	0.01 (0.01)
2020	9.85 (8.96)	[5] 26.96 (24.51)	6.18 (5.62)	0.04 (0.03)	0.79 (0.71)

[1] Footnote deleted.
[2] Includes emergency generator emissions from major maintenance project
[3] Includes BMT-4 tank failure emissions and BMT-3 landing losses
[4] Includes BMT-3 landing losses
[5] Includes emergency generator emissions due to hurricanes

5.3 Water Discharge Effluent Monitoring Program

The water discharge permit-monitoring program fulfills the requirements of the EPA NPDES and corresponding RRC Rule 8 and Louisiana LPDES programs. All SPR point source discharges are conducted in compliance with these federal and state programs.

COMPLIANCE DURING 2020

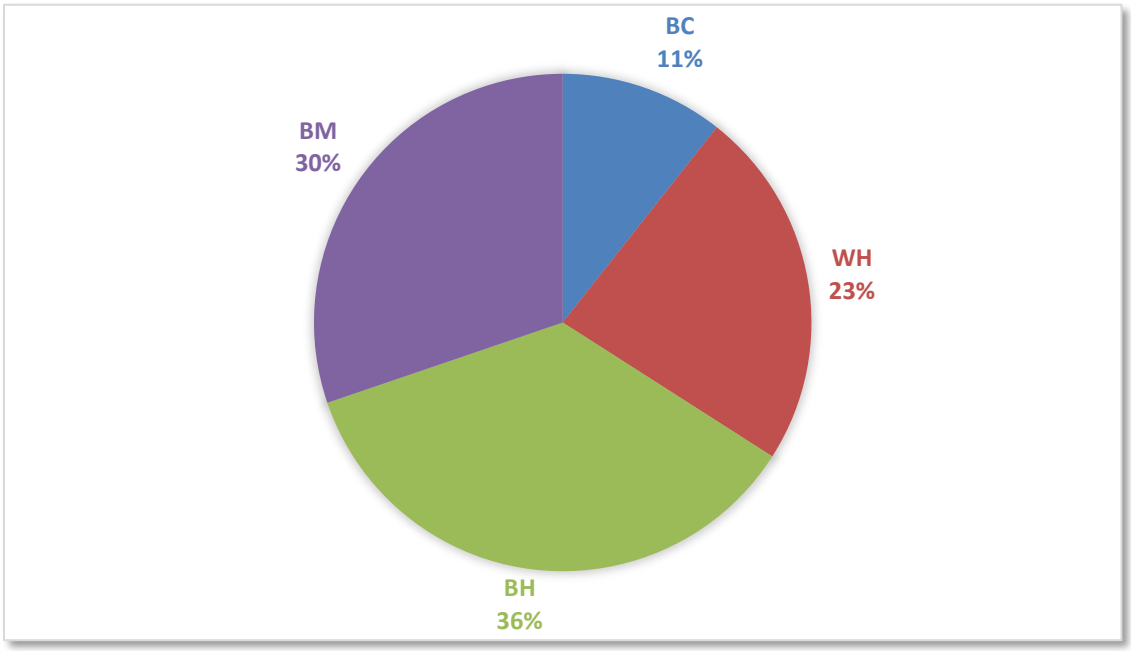
The SPR had zero non-compliance from analyzed discharges for all sites.

SPR personnel regularly conducted point source discharges from all four storage sites in 2020. These discharges are grouped as follows:

1. Brine discharged to the Gulf of Mexico (from Big Hill and Bryan Mound sites)
2. Storm water runoff from tank, well, and pump pads
3. Rinse water from vehicles to permitted outfalls
4. Effluent from packaged sewage treatment plants
5. Hydrostatic test water from piping or tanks

The SPR disposed of 1,119 million m^3 of brine during 2020. Approximately 66 percent of the brine was disposed into the Gulf of Mexico via the Big Hill (36 percent of the total) and Bryan Mound (30 percent of the total) brine disposal pipelines. The remaining 34 percent was disposed in saline aquifers via injection wells at West Hackberry (23 percent of the total) and BC (11 percent of the total).

Figure 5-1 - SPR Brine Disposal 2020



Parameters monitored varied by site and point source discharge. Measurements and compliance rates observed during 2020 specific to each of the storage sites are discussed in the following subsections.

Discharge Monitoring Reports (DMRs) were 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, RRC, and EPA). Should a non-compliance or reportable bypass occur during the reporting period, a root cause and corrective action are included in the corresponding quarterly report.

As a testament to safe operations and commitment to protecting the environment during 2020, the SPR had zero non-compliance from analyzed discharges.

5.3.1 Bayou Choctaw

Table 5-6 includes permitted outfalls, required monitoring parameters, number of permit exceedances, samples collected, compliant samples, and percent of samples in compliance for the Bayou Choctaw outfalls.

Monitoring is related to water discharges regulated under the LDEQ Office of Water Resources LPDES permit. Discharges are from two packaged sewage treatment plants, a vehicle/equipment rinsing station, and storm water runoff from well pads, pump pads and containment areas. The LPDES MSGP provides storm water runoff limitations and monitoring requirements. A LPDES permit also exists for the discharge of hydrostatic test water. There were, however, no hydrostatic test water discharges during 2020.

There were **zero** permit non-compliances during 2020. The site was 100 percent compliant. There were two permit non-compliances in 2015, zero in the following years, and only one total suspended solids (TSS) exceedance in 2019.

Table 5-6 Bayou Choctaw Outfall Sampling Parameters

Permit	Outfall	Parameters	# of Permit Exceed-ances	# of Samples Taken	# of Compliant Samples	Permit Com-pliance	Date(s) Exceeded	Description/ Solution
LAG480540	01A 01B Treated sanitary wastewater	Flow BOD_5 TSS pH Fecal Coliform	0	24	23	100%	N/A	N/A
	002 Exterior vehicle and equipment wash water	Flow COD TSS O&G pH	0	0	0	100%	N/A	N/A
	009 Storm water runoff	Systematic Visual Observation	N/A	N/A	N/A	100%	N/A	N/A
LAG679016	001 Hydrostatic test water	Flow, TSS TSS-NetO&G TOC, Benzene Total BenzeneTotal BTEX Lead, Total pH	N/A	0	N/A	100%	N/A	N/A

5.3.2 Big Hill

Table 5-7 includes permitted outfalls, required monitoring parameters, number of permit exceedances, samples collected, compliant samples, and percent of samples in compliance for the Big Hill outfalls. There were **zero** permit non-compliances during 2020. The site was 100 percent compliant. There have been four permit non-compliances in previous years: 1 in 2015, 2 in 2014, and 1 in 2013.

Table 5-7 Big Hill Outfall Sampling Parameters

Permit	Outfall	Parameters	# of Permit Exceed-ances	# of Samples Taken	# of Compliant Samples	Permit Com-pliance	Date(s) Exceeded	Description/ Solution
TX0092827	001 Brine to the Gulf of Mexico	Flow Exit Velocity Density O&G TDS TSS pH Biomonitoring Integrity Tests	0	146	146	100%	N/A	N/A
	002 Hydroclone Blowdown	Flow pH TSS	N/A	0	N/A	100%	N/A	N/A

	Storm water: 003- 14 cavern pads 005- electrical substation pump 006- Surge Tank area 007- Meter prover & crude oil meter skids 008-RWIS	pH Salinity O&G TOC	0	59	59	100%	N/A	N/A
	004 Treated sanitary wastewater	Flow TSS BOD_5 pH	0	48	48	100%	N/A	N/A
	009 Recirc. water at RWIS	Flow pH	0	92	92	100%	N/A	N/A

Monitoring is related to water discharges regulated under the EPA NPDES permit program and the similar RRC discharge permit program (Rule 8). Discharges are brine to the Gulf of Mexico, hydroclone blow-down into the Intracoastal Waterway, storm water from well pads and pump pads, effluent from the sewage treatment plant, and recirculated raw water at the RWIS. There were no discharges during 2020 from the hydroclone blow-down system.

5.3.3 Bryan Mound

Table 5-8 includes permitted outfalls, required monitoring parameters, number of permit exceedances, samples collected, compliant samples, and percent of samples in compliance for the Bryan Mound outfalls. There were **zero** permit non-compliances during 2020. The site was 100 percent compliant. There have been five permit non-compliances in previous years: one in 2016 and four in 2014.

Monitoring is related to water discharges regulated under the EPA NPDES permit program and the similar RRC discharge permit program (Rule 8). Discharges are brine to the Gulf of Mexico, storm water from well pads and pump pads, effluent from the sewage treatment plant, and recirculated raw water at the RWIS.

Table 5-8 Bryan Mound Outfall Sampling Parameters

Permit	Outfall	Parameters	# of Permit Exceed-ances	# of Samples Taken	# of Compliant Samples	Permit Com-pliance	Date(s) Exceeded	Description/ Solution
TX0074012	001 Brine to the Gulf of Mexico	Flow Exit Velocity Density O&G TDS TSS pH Biomonitoring Integrity Tests	0	156	156	100%	N/A	N/A
	002 Treated sanitary wastewater	Flow pH TSS BOD_5	0	48	48	100%	N/A	N/A
	Storm water: 003- 20 cavern pads & other 004-HPPP 005- Tank farm	pH Salinity O&G TOC	0	24	24	100%	N/A	N/A
	006 Recirculated water at RWIS	Flow pH	0	47	47	100%	N/A	N/A

5.3.4 West Hackberry

Table 5-9 provides permitted outfalls, required monitoring parameters, number of permit exceedances, samples collected, compliant samples, and percent of samples in compliance for the West Hackberry outfalls. There were **zero** permit non-compliances during 2020. The site was 100 percent compliant. There were zero permit non-compliances in the previous five years.

Monitoring is related to water discharges regulated under the LDEQ Office of Water Resources LPDES permit. Discharges are from a packaged sewage treatment plant, a vehicle/equipment rinsing station, non-contact cooling tower blow-down, and storm water runoff from the degasification plant. Although not listed as an outfall, storm water runoff from well pads, pump pads, and containment areas are visually inspected quarterly. The LPDES MSGP provides storm water runoff limitations and monitoring requirements. A LPDES permit also exists for the discharge of hydrostatic test water. There were, however, no hydrostatic test water discharges in 2020. There were no discharges in 2020 from the hydroclone blow-down system.

Table 5-9 West Hackberry Outfall Sampling Parameters

Permit	Outfall	Parameters	# of Permit Exceed-ances	# of Samples Taken	# of Compliant Samples	Permit Com-pliance	Date(s) Exceeded	Description/ Solution
LA0053031	002 Treated sanitary wastewater	Flow BOD_5 TSS pH Fecal Coliform	0	20	20	100%	N/A	N/A
	003 Exterior vehicle and equipment wash water	Flow COD TSS O&G pH	0	36	36	100%	N/A	N/A
	004 Non-contact cooling tower	Flow TOC pH Temperature	N/A	0	N/A	100%	N/A	N/A
	005 Storm water runoff from the degasser unit	Flow TOC O&G pH	0	16	16	100%	N/A	N/A
LAG679016	001 Hydrostatic test water	Flow TSS TSS-Net O&G TOC Benzene Total BTEX Lead, Total pH	N/A	0	N/A	100%	N/A	N/A

5.4 Surface Water Quality Surveillance Monitoring Program

Surface waters at all four SPR sites are scheduled to be sampled monthly for general water quality according to the SPR EMP. Water quality monitoring is conducted to provide early detection of potential surface water quality degradation possibly resulting from SPR operations. It is separate from, and in addition to, the water discharge permit monitoring program.

The parameters monitored are pH, salinity, total organic carbon (TOC), dissolved oxygen (DO), oil and grease (O&G) and temperature.

- pH is a measure of the acidity/alkalinity of water. It ranges from 0 to 14, with 7 being neutral. Excessively high and low pH can be detrimental to water usage.
- Salinity is the measure of all the salts dissolved in water. The average ocean salinity is 35 ppt and the average river water salinity is 0.5 ppt or less.
- TOC is a measure of the total amount of carbon in organic compounds in water and can indicate contamination.

- DO refers to microscopic bubbles of gaseous oxygen (O_2) mixed in water and available to aquatic organisms for respiration. DO can be affected by natural influences such as temperature and salinity. DO concentration decreases as water temperature increases. DO concentration decreases as salinity increases. Thus, salinity and temperature are monitored to correlate with DO results.
- O&G can interfere with biological life in surface waters and create unsightly films.

Maps with locations of the surface water monitoring stations at each site are included in Appendix D, Figures D-1, D-3, D-5, and D-7. The number of surface water monitoring stations varies at each site:

- Bayou Choctaw-7
- Big Hill-5 (Includes Station A that is no longer sampled because it does not hold water and has been backfilled with vegetation over the years.)
- Bryan Mound-10
- West Hackberry-6

Data from 2020 from each site is presented in Appendix D, Tables D-1, D-3, D-5, and D-7. Surface water at all sites exhibited neutral pH, and O&G readings were below the detectable limit of 5 mg/l. These values indicate no oil impacts from SPR activities during any of the 2020 sampling episodes.

Annual averages of parameters measured in the last five years at each site are included in Tables D-2, D-4, D-6, and D-8. Graphical representation of the data is included in Figures D-2, D-4, D-6, and D-8. The parameter results have not fluctuated significantly within the last five years at each site.

The small fluctuations in the data are likely due to non-standardized time of sampling, differing meteorological conditions, and varying seasonal and environmental factors. The overall surface water data at the SPR sites has remained consistent, indicating no evident surface water quality impacts from SPR operations.

5.5 Waste Management and Pollution Prevention Programs

The Waste Management Program is responsible for managing hazardous and non-hazardous waste generated by SPR operations. Site personnel and waste management personnel collaborate to ensure all waste generated at the SPR is accumulated, characterized, and disposed of or recycled in accordance with federal, state and local regulations.

SPR operations, maintenance, and construction activities generate a variety of waste streams. Common wastes and recyclable materials generated at the SPR include:

1. Hazardous waste such as lab waste and crude oil contaminated material with a hazardous characteristic
2. Non-hazardous waste such as office trash and industrial waste without a hazardous waste characteristic or code
3. Recyclable materials such as paper, plastic, batteries, and used oil
4. Construction and demolition (C&D) waste such as scrap metal and concrete
5. Exploration and production (E&P) waste such as brine or crude oil contaminated products without a hazardous waste characteristic

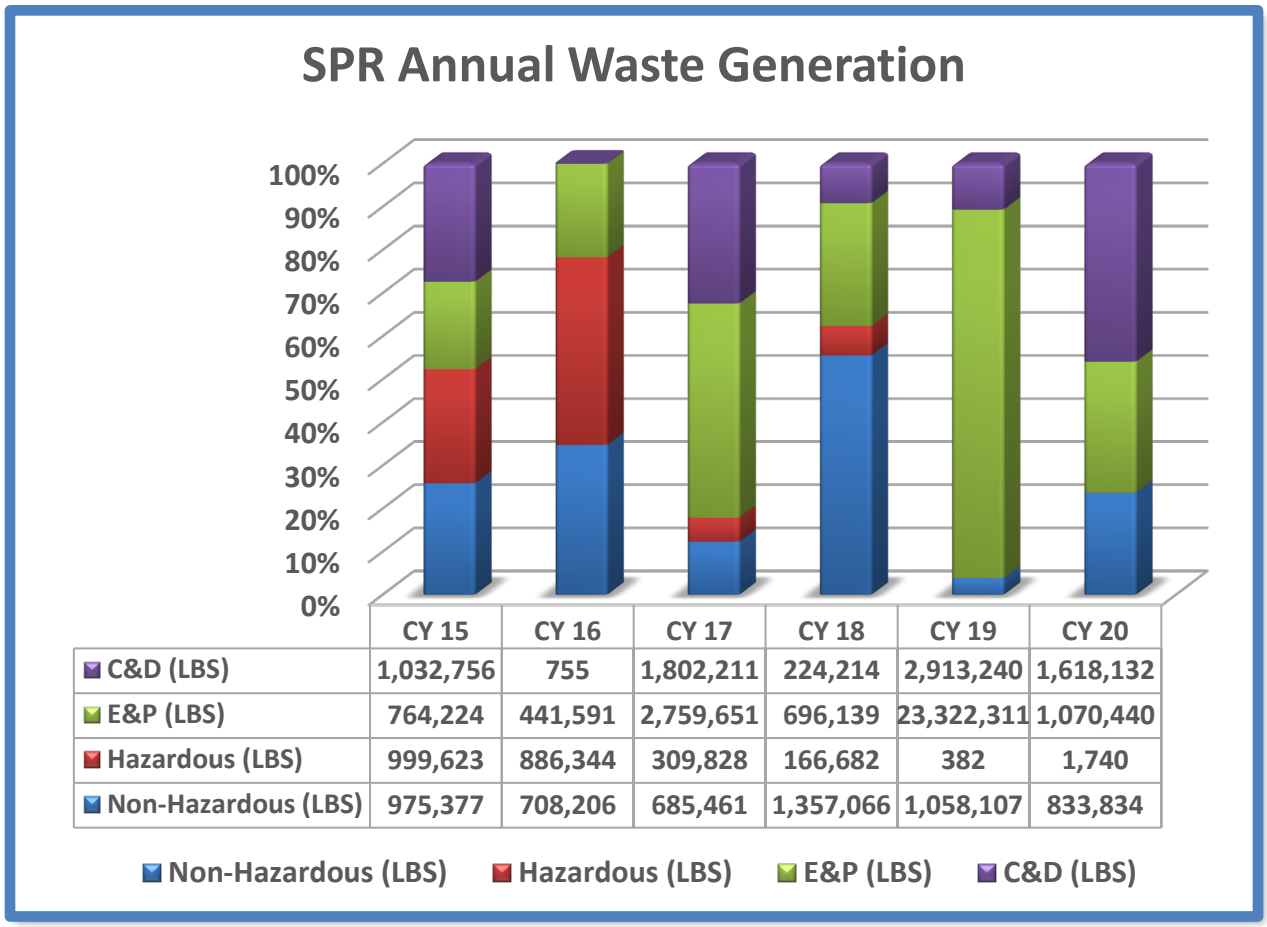
The SPR characterizes all E&P wastes to determine if they exhibit hazardous characteristics. Wastes that exhibit a hazardous characteristic are managed and disposed of as hazardous waste. Non-hazardous wastes generated by the E&P process are disposed of at state-approved E&P disposal facilities.

The quantities of SPR waste categories generated over the past six years are provided in the bottom portion of Figure 5-2, and their percentages are charted in the top portion of the figure. SPR non-hazardous waste generation decreased by 22 percent from CY 2019 to CY 2020. A primary factor contributing to the decrease in the generation is a significant amount of SPR employees began working from home starting in March 2020. The reduction of on-site personnel at SPR facilities caused a reduction in the generation of municipal solid waste, paper, plastic, aluminum, light bulbs, and toner cartridges across the SPR.
The SPR generated 1.6 million pounds of C&D waste in CY 2020. Projects that generated a significant amount of C&D waste in CY 2020 include the demolition of the degas plant at the West Hackberry site and converting the former concrete degas plant footprint at the Bryan Mound site to a gravel laydown yard to be used during LE2 activities.

The SPR decreased E&P waste generation by 22.2 million pounds in CY 2020 when compared to CY 2019. The decrease in E&P waste generation mainly came from Pond 9 closure at the Big Hill site in CY 2019. The SPR excavated impacted solids from Pond 9 and hauled them off-site for disposal.

While hazardous waste generation has significantly decreased over the last six years, a slight increase occurred between 2019 and 2020. The slight increase in hazardous waste generation stemmed from generating crude oil contaminated wash water during the demolition of the degas plant at the West Hackberry site.

Figure 5-2 SPR Annual Waste Generation



	CY 15	CY 16	CY 17	CY 18	CY 19	CY 20
C&D (LBS)	1,032,756	755	1,802,211	224,214	2,913,240	1,618,132
E&P (LBS)	764,224	441,591	2,759,651	696,139	23,322,311	1,070,440
Hazardous (LBS)	999,623	886,344	309,828	166,682	382	1,740
Non-Hazardous (LBS)	975,377	708,206	685,461	1,357,066	1,058,107	833,834

Some of the activities that SPR waste management personnel conducted or supported in 2020 include:

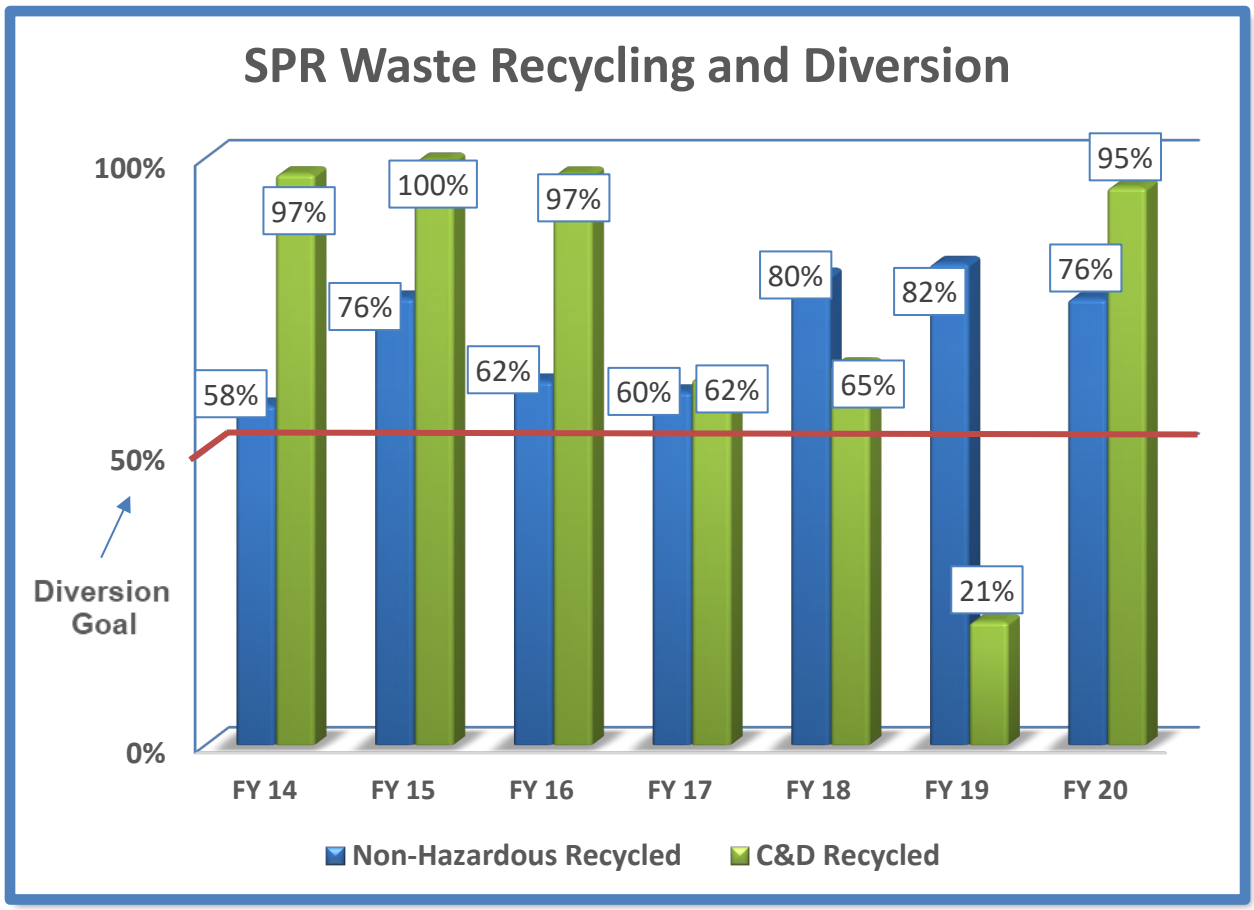
- Coordinated with LE2 Construction personnel to recycle concrete and scrap metal generated during the demolition of the former degas plant at the Bryan Mound site
- Coordinated with Construction personnel to recycle spent blast abrasives generated during the construction of a 220,000-barrel crude oil storage tank (BMT-2) at the Bryan Mound site
- Coordinated with Engineering personnel to dispose of AFFF-impacted water generated during a test of the fire suppression system at the Bayou Choctaw site
- Coordinated with Construction personnel to facilitate Hurricane Laura cleanup activities at the West Hackberry site
- Coordinated with Caverns and Operations personnel to recycle sand generated during the brine disposal well cleanout activities at the West Hackberry site
- Coordinated with Caverns personnel to recycle crude oil-contaminated solids that were generated during the cellar cleanout project conducted at the West Hackberry site

The SPR places a high priority on protecting the environment. Since its creation in 1997, the SPR's Pollution Prevention Program has worked to minimize risks to the environment while supporting the SPR's mission. Waste minimization is a key component of the Pollution Prevention program. Waste minimization is considered in all levels of decision-making at the SPR and is the responsibility of all employees. Planned activities to minimize waste generation include:

- Eliminate product need
- Reduce the amount of product needed and procure only enough to complete the task
- Select appropriate package sizes to prevent excess
- Reuse products until they are completely spent

The SPR exceeded the DOE departmental goals to divert (recycle) 50 percent of non-hazardous waste and 50 percent of C&D waste over the previous seven years, except for C&D waste generated in FY 2019. A combination of SPR employees following the waste minimization planned activities and managing a rigorous recycling program contributed to the SPR exceeding the waste diversion goals. Figure 5-3 shows the percentage of non-hazardous and C&D waste recycled from FY 2014 through FY 2020.

Figure 5-3 SPR Waste Recycling and Diversion



Significant SPR projects that contributed a substantial amount of recyclable material in 2020 included:

- Spent blast media generated during painting activities associated with BMT-2 at the Bryan Mound site
- Brine and crude oil contaminated inert solids generated during brine disposal well cleanout activities at the West Hackberry site
- Concrete and scrap metal generated during the demolition of the former degas plant in association with LE2 early works activities at the Bryan Mound site
- Crude oil contaminated inert solids generated during cellar cleanout activities at the West Hackberry site,
- Scrap metal generated during the demolition of the degas pant at the West Hackberry site
- Scrap metal generated during Hurricane Laura cleanup activities at the West Hackberry site

Materials recycled in 2020 are summarized in Table 5-10.

Table 5-10 SPR Recycled Materials

Category	Recycled (lbs.)	Recycled (kg.)
Aluminum-Plastic Comingled	430	195
Ballasts	399	180
Blast Abrasives	476,380	216,082
Brine and Crude Contaminated Inert Solids (E&P)	598,125	271,304
Capacitors	7	3
Cardboard	17,121	7,765
Concrete (C&D)	435,000	197,312
Crude Oil Absorbent Padding	250	113
Crude Oil Contaminated Inert Solids (E&P)	34,070	15,453
Crude Oil Contaminated Pigging Solids (Hazardous)	924	419
Crude Oil Contaminated Wash water (E&P)	150	68
Crude Oil Contaminated Wash water (Hazardous)	500	226
Lamps (Hazardous)	17	7
Lamps (Non-Hazardous)	324	146
Oil Filters	57	25
Office Paper	51,184	23,216
Plastic	586	265
Scrap Metal	49,530	22,466
Scrap Metal (C&D)	982,942	445,854
Soil Miscellaneous	25,980	11,784
Toner Cartridges	54	24
Used Oil	8,652	3,924

While waste minimization and recycling are key aspects of the SPR's Pollution Prevention program, several other elements are critical to the program's success. The other elements include:

- Toxic substance reduction/substitution
- Resource conservation (water, energy)
- Sustainable acquisition, i.e., affirmative procurement, bio-based products, environmentally preferable products, and energy and water efficient products
- Greenhouse gas reduction

These elements, except for sustainable acquisition, are discussed in other sections of this report as they pertain to either Sustainability (Section 3) or Chemical Management (Section 5.6).

The SPR achieved the 100% affirmative procurement target for FY20. All purchases qualified as recycled products or justified products. There were no unjustified purchases of virgin products in 2020.

Pollution Prevention announcements and suggestions are communicated to SPR personnel through the SPR's newsletter "What's Happening" and routine email distributions, including pertinent local information and helpful web links. These communications are published on the M&O Contractor Environmental webpage, which is available to all SPR employees.

5.6 Chemical Management Program

5.6.1 Qualified Products List and SARA Title III Tier Two Reports

Chemical containing products used at the SPR must be on the Qualified Products List (QPL). The QPL is used to control and limit the quantity of toxic constituents found in chemical products and minimize hazardous waste generated.

Chemicals requested for QPL inclusion are reviewed for potential impacts to the environment, generation of wastes, adherence to the SPR building specifications and green requirements for paints, adhesives and sealants; recycled content in materials; and minimization or exclusion of constituents that contain EPA's 17 High Priority Toxic Chemicals.

SARA Title III Tier Two reports, also known as Emergency Planning and Community Right-to-Know Act (EPCRA) Section 312 reports, were prepared and submitted to state agencies as required by March 1, 2021. The SARA reports were also distributed to appropriate state and local emergency planning committees and local fire departments. Table 5-11 contains a summary of the inventory information that was submitted for 2020.

Table 5-11 2020 SARA Title III Tier Two Summary for the SPR

SPR Site	Chemical Name (Category)	*Inventory Amount (lbs.)	Location on Site
BC	Crude Oil Petroleum	> 1 Billion	Site Tanks, Piping, Underground Caverns
	Diesel Fuel	24,999 – 49,999	Emergency Generator Fuel Tank, Workover Rig
	Diesel Fuel #2	24,999 – 49,999	Property Tank #2
	Gasoline, Including Casing Head	5,000– 9,999	Property Tank 1
	GMA Garnet	1,000 – 4,999	Flammable Storage Building
	Nitric Acid	0 – 99	Environmental Laboratory
	Nitrogen Balance Gas	0 – 99	Control Building
	Red River 90	0 – 499	Warehouse
	Sulfur in Petroleum Crude Oil	0 - 99	Environmental Laboratory
	Xylene	0 – 99	Envir Flam. Cabinet
BH	Asphalt	10,000 – 24,999	Laydown Yard
	Aer-O-Water 3EM 3%	10,000 – 24,000	Operations Buildings 834 and 805
	Chemguard 3% MS AFFF C301	25,000 – 49,999	Operations Buildings 16, 805 and 834
	Crude Oil Petroleum	> 1 Billion	Flammable Storage Building, Site Tanks, Piping, Underground Caverns
	Diesel Fuel	25,000 – 49,999	Operations, BHT-4, 11, and 50, BHSE-196 Trailer, and Property Annex BHT-51
	Gasoline	10,000 – 24,999	BHT-52
	GMA Garnet	10,000 – 24,999	Maintenance Laydown Yard
	Hydrochloric Acid	0 – 99	Environmental Laboratory
	Hydrogen Sulfide	0 – 99	I&C Office
	Nitric Acid	0 – 99	Environmental Laboratory
	Non-Flammable Gas Mixture	0 – 99	I&C Office
	Potassium Chloride	0 – 99	Environmental Laboratory
	Sulfur in Petroleum Crude Oil	0 – 99	Environmental Laboratory
	Sulfuric Acid	0 – 99	Environmental Laboratory
	Xylene	0 – 99	Crude Oil Storage Bldg.

Table 5-11 2020 SARA Title III Tier Two Summary for the SPR

SPR Site	Chemical Name (Category)	*Inventory Amount (lbs.)	Location on Site
BM	1-125 PPM Vol. Hydrogen Sulfide Balance Nitrogen – Cal. Gas	0 – 99	Warehouse
	Bituminous Mastic 50-HT	0 – 99	Building 243
	Chemguard 3% MS AFFF C301	75,000– 99,999	Operations Buildings 206 and 242
	Crude Oil Petroleum	1 Billion	Site Tanks, Piping, Underground Caverns
	Diesel	25,000 – 49,999	Fuel Tank, BMT-20, 29 and 18
	Gasoline	10,000 – 24,999	Fuel Tank and Operations Building 242
	GMA Toughblast	25,000 – 49,999	1008-2
	1PPM H2S Cricket Gas	100 – 499	Buildings 201 and 244
	Hydrochloric Acid	0 – 99	Environmental Lab Chemical Cabinet
	Non-Flammable Gas Mixture 4-1 F/Calibration Gas	0 – 99	Buildings 201 and 244
	Non-Flammable Gas Mixture – 25PPM H2S (58)	0 - 99	Warehouse
	Sealed Lead Acid Battery	100 – 499	Warehouse
	Valve Regulated Lead-Acid Battery	100 – 499	Warehouse
Off-site Pipelines	Crude Oil, Petroleum	50,000,000 – 99,999,999	Pipelines in Calcasieu Parish, La (West Hackberry)
	Crude Oil, Petroleum	10,000,000 – 49,999,999	Pipelines in Cameron Parish, La (West Hackberry)
NO	Diesel Fuel	100 – 999	Tank, Building 850
	Diesel Fuel	1,000 – 4,999	Tank, Building 900
Stennis	Motor Oil 15W 40	25,000 – 49,999	West Wall
WH	Amercoat 68 HS Powder	100 – 999	Flammable Storage Building
	Amerlock 2 Cure	100 – 999	Paint Locker
	Ansulite 3% AFFF	5,000 – 9,999	Operations Foam Storage Building
	Crude Oil Petroleum	> 1 Billion	LCMS Piping, Site Tanks, Piping, Underground Caverns
	Diesel Fuel	5,000 – 9,999	MTC, Fuel Pump Tank
	Diesel Fuel #2	1,000 – 4,999	Workover Rig
	FC-203CF Lightwater Brand AFFF	5,000 – 9,999	Operations Foam Storage Building
	Gasoline	10,000 – 24,999	Fuel Pump Tank, Laydown Yard and HPPP Flammable Cabinet
	GMA Garnet	5,000 – 9,999	MTC, Paint Laydown Yard
	Hydrochloric Acid	0 – 99	Environmental Laboratory
	Mobil DTE Oil BB	1,000 – 4,999	Degas General
	Mobil DTE Oil Heavy	5,000 – 9,999	Degas General
	Nitrogen	5,000 – 9,999	MTC Laydown Yard
	Purple-K	500 – 4,999	Operations Building 305
	Sulfur in Petroleum Crude Oil	0 - 99	Environmental Lab
	Synfilm Air Compressor Oil NGL 48	1,000 – 4,999	Flammable Storage Building
	Sulfuric Acid	0 – 99	Environmental Lab

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

5.6.2 Toxic Chemical Release Inventory (TRI) Form R

SPR sites are required to report under EPCRA Section 313 by submitting the Toxic Chemical Release Inventory (TRI) Form R when reporting thresholds from crude oil placed in commerce are exceeded. Specifically, when crude oil is placed in commerce, it repackages hazardous substances and must be reported. The (TRI) Form R must be submitted by July 1 for the reporting thresholds exceeded during the preceding calendar year. Reporting was required for each SPR storage facility in 2020 because the SPR introduced crude oil into commerce from the 2020 return of exchange crude oil.

5.7 Wildlife Program

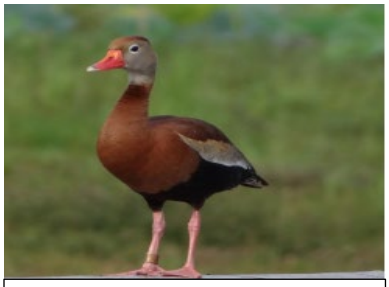
The four SPR storage sites are located on the Central and Mississippi Flyways. The SPR storage sites' coastal locations make them the last resting and feeding stop for migrating birds before they make the arduous trip across the Gulf of Mexico to the wintering areas in Central and South America, and the first stopover when they migrate back to North America in the spring. Without places along the way that provide an adequate food supply to replenish fat reserves, water, and shelter from predators, many of these birds would not survive.

Eastern Meadowlark (Sturnella magna)

Selected habitats at all four sites are not mowed from early fall through spring to provide food, shelter, and nesting areas for migrating and resident birds. West Hackberry and Big Hill have Purple Martin houses to attract the mosquito-eating birds, and Eastern Bluebird nest boxes and Wood Duck nest boxes are installed at Bayou Choctaw. When nests are discovered for ground-nesting birds, such as terns, Black-necked Stilts, Killdeer, and Common Nighthawk, they are flagged until the chicks have fledged. Equipment harboring active bird nests are designated for limited/restricted use.

Per the Memorandum of Understanding between F&WS and DOE, periodic avian inventories are taken at SPR Bayou Choctaw and Big Hill sites and uploaded to the Cornell University Ornithology Laboratory E-bird database. The Cornell University Ornithology Laboratory uses e-bird data to research and monitor population trends and birds' distribution and habitat. In 2020, no inventories were taken after March, as only mission-essential personnel were allowed on the sites.

The SPR's management of habitat for migrating and resident birds is good for the environment and indirectly contributes to the economy of Texas and Louisiana. Hunting and birding activities have a positive economic impact on state economies.



Black-bellied Whistling Duck (Dendrocygna autumnalis)

6 Site Hydrology, Groundwater Monitoring, and Public Drinking Water Protection

Groundwater monitoring is performed at the four SPR storage sites to protect water quality and comply with state and federal regulations and orders. Specifically, DOE Order 5400.1 requires a groundwater surveillance system/program for each SPR site. Groundwater that is or could be impacted by DOE activities is monitored to determine and document the effects of operations on groundwater quality.

Monitoring has been performed at all four sites since the 1980s. Historical records of before and during SPR usage indicate there have been spills/leaks that have or could have impacted the shallow groundwater at each site. Monitoring results have confirmed or disproved impacts and have been included in the ASER.

Significant historical investigations performed include:

- 1991 — *Contamination Assessment Report and Corrective Action Plan for Bryan Mound*: no recovery action was advised for brine contamination due to soil characteristics.
- 1991— *Contamination Assessment Report and Remedial Alternatives Analysis for West Hackberry:* additional recovery wells and brine pond repair or replacement were advised.
- 1992 — Phase I of II, non-invasive survey, *Final Report on Baseline Hydrogeological Screening Surveys, SPR Sites, Louisiana, and Texas*.
- 1996 — Phase II of II, *Multi-Site Hydrogeological Investigation, SPR Sites, Louisiana, and Texas.* (Also referred to as the Verification Well Study in which periphery wells were installed.) A surveillance monitoring system was established after this study and includes a network of wells that encompasses brine pond/storage area and periphery areas.

Monitoring wells are present at each site, and shallow groundwater is analyzed to determine the presence of contaminants that could be indicative of site operations. The first and second (when present) encountered water-bearing strata are monitored at each site. Each SPR site purchases potable water, and groundwater is not utilized as drinking water.

Salinity is measured as an indicator of brine, and the potential presence of hydrocarbons is screened using the TOC test. Other parameters such as pH and temperature are also recorded. Depth to groundwater is collected to determine the groundwater flow direction.

Monitoring is required at West Hackberry in accordance with a monitoring plan agreed to by DOE and LDNR. As agreed, monitoring data is included in each ASER and will be submitted to LDNR. Monitoring is also required at Bryan Mound in accordance with the closure of a brine pond under the direction of the RRC. Monitoring data is included in each ASER and submitted to the RRC. Wells surrounding the former brine storage pond and operating disposal pond systems at Big Hill monitor groundwater as part of permit required leak detection.

Available groundwater salinity data collected at each site for the past five years are included and presented graphically in Appendix C. These data are discussed within each site-specific section.

6.1 Bayou Choctaw

The Plaquemine Aquifer is the primary source of fresh water for the site and surrounding communities. This aquifer occurs at depths of 60 to 600 ft. below land surface (bls). Atchafalaya Clay is present from near ground surface to just above the aquifer. The Bayou Choctaw site purchases its potable water from the Iberville Hwy. 1148 Water District and Louisiana regulations do not require a potable water monitoring program. Bayou Choctaw is recognized as a water purchaser only.

Four monitoring wells (BC MW1 through BC MW4) were installed in 1989/1990 near the brine storage pond (Figure C-1). The site drilled these wells to approximately 30 ft. bls at three of the corners of the pond. One well was drilled farther southeast to monitor the potential impact from the brine storage pond and any other potential nearby shallow contamination sources.

Periphery wells (BC PW1, BCPW2, and BC PW4 through BC PW8) (Figure C-1) were installed in areas identified as possibly being impacted based on results of the 1991 Phase I non-intrusive survey. They are screened to capture the first encountered groundwater and are monitored to enhance the evaluation of groundwater flow direction and outlying salinity movements and variation.

Monitoring activities in 1996 provided evidence that the water in the shallow zone moves in a generally radial direction away from the main site and underlying dome, loosely mimicking the topography. Water levels collected in September 2020 also indicate radial groundwater movement from a high point south of Cavern 15 (Figure C-2).

Groundwater salinity results from samples collected during 2020 showed a slight salinity increase at wells BC PW1, PW2, PW4, PW5, PW6, and PW7 in September 2020. This slight increase is likely due to increased flooding at the site due to heavy rains and storms. There were many storm surges associated the severe weather, which could have caused the slight increase in salinity. Brine impacts are not evident. For perspective, the average five-year salinity values for the BC wells are as follows:

Table 6-1
5-Year Salinity Values in BC Wells

BC Well	Salinity (ppt)
BC MW1	0.9
BC MW2	0.7
BC MW3	2.4
BC MW4	1.5
BC PW1	3.4
BC PW2	1.1
BC PW4	2.3
BC PW5	3.0
BC PW6	4.2
BC PW7	8.6
BC PW8	4.6

BC MW3, at the southeast downgradient corner of the brine pond, historically captured the most saline site groundwater. It now exhibits an essentially stable and decreasing trend. Impacts from a historical 1991 brine piping leak appear to have completely passed this well in an easterly downgradient direction.

BC PW2 is near an area with impacted groundwater from historically impacted surface soil. The salinity values at BC PW2 have shown a steady decrease of salinity to ambient values. All site PW wells indicate decreasing or flat five-year salinity trends.

6.2 Big Hill

The Evangeline and Chicot aquifers provide potable water to the Big Hill area. Near the Big Hill salt dome, the base of the Chicot aquifer is approximately 1,200 feet below mean sea level (msl). However, fresh water is reported to occur in the upper 100 feet of the Chicot aquifer on top of the dome. The town of Winnie, west of Big Hill, uses fresh water from the upper Chicot Aquifer. Beaumont and Port Arthur, north and northeast of the site (as well as most of Jefferson County), draw fresh water from the lower Chicot Aquifer.

The Big Hill site purchases its potable water from the Trinity Bay Conservation District. It is classified by TX regulations as a "non-transient, non-community" public water distribution system and is required to have a potable monitoring program. In 2020, potable water samples were collected monthly for coliform monitoring and weekly for residual chloramine (disinfectant). Average disinfectant levels were reported to TCEQ on a Disinfectant Level Quarterly Operating Report. Calculated results did not exceed the regulatory MCLs for disinfectants. Coliform results were also below their MCL.

Potable water is sampled and tested for lead and copper every three years at BH. In 2020, testing for disinfection byproducts (trihalomethanes and haloacetic acids) was conducted through TCEQ. Results were below their MCLs. Other potable water parameters monitored for compliance include asbestos, nitrite, and nitrate with varied monitoring schedules. A TCEQ contractor tested for nitrate and nitrite in 2020. Results were below their MCLs.

Six monitoring wells (BH MW-1 through BH MW-6) were installed in 1987 around the brine disposal pond (Figure C-4). These wells were screened in the first water-bearing zone, approximately 15 to 20 ft. bls, consisting of silty sands and fine sands. Overlying this zone are near-surface organic silts, clays, and sandy clays. Silty organic clays underlie the zone.

Periphery wells (BH PW1 and BH PW3 through BH PW6) were installed in areas identified as possibly being impacted via the 1991 Phase I non-intrusive survey results. They are screened to capture the first encountered groundwater (Figure C-4).

Monitoring activities in 1996 provided evidence that the water in the shallow zone on the east side of the site flows to the southeast and on the west side flow to the southwest. Water levels collected in May 2020 indicate the same flow directions. The flow directions are generally consistent with surface topography at the Big Hill site (Figure C-5).

Groundwater salinity results from samples collected during 2020 at all wells are BDL (Figure C-6). One-half of the detection limit is recorded as results in Figure C-6. Brine impacts are not evident.

For perspective, the average five-year salinity values for the BH wells are as follows:

Table 6-2
5-Year Salinity Values in BH Wells

BH Well	Salinity (ppt)
BH MW1	0.5
BH MW2	0.5
BH MW3	0.5
BH MW4	0.5
BH MW5	0.7
BH MW6	0.5
BH PW1	0.5
BH PW3	0.5
BH PW4	0.5
BH PW5	0.5

Salinity data collected from wells surrounding the ponds and the verification wells have indicated complete and consistent results showing no groundwater effects.

6.3 Bryan Mound

The Evangeline and Chicot aquifers provide potable water to the Bryan Mound area and are fresh to slightly saline. Fresh water for Brazoria County is obtained from the upper portions of the Chicot aquifer upgradient of the Bryan Mound salt dome.

Bryan Mound purchases its potable water from Freeport Water Utilities. It is classified by Texas regulations as a "non-transient, non-community" public water distribution system and is required to have a potable monitoring program. In 2020, potable water samples were collected monthly for coliform monitoring and weekly for residual chloramine (disinfectant). Average disinfectant levels were reported to TCEQ on a Disinfectant Level Quarterly Operating Report. Calculated results did not exceed the regulatory MCLs for disinfectants.

Potable water is also sampled and tested for lead and copper tri-annually at BM. In 2020, testing for disinfection byproducts (trihalomethanes and haloacetic acids) was conducted through TCEQ. Results were below their MCLs. Other potable water parameters monitored for compliance include asbestos, nitrite, and nitrate with varied monitoring schedules. A TCEQ contractor tested for nitrate and nitrite in 2020. Results were below their MCLs.

Two water-bearing zones underlie the Bryan Mound site. The shallow zone occurs at depths of 8-12 ft. bls and extends to 25-30 ft. bls and averages 15 feet in thickness. The deep zone occurs at depths of 40-50 ft. bls and averages 10 ft. in thickness. The water-bearing zones consist of fine and silty sands and clayey silts. A clay layer approximately 10 to 20 feet thick separates the two

zones. There is not a useable quantity of fresh water in these zones.
Fifteen monitoring wells were installed between 1981 and 1990 in both the shallow (denoted as "S") and deep (denoted as "D") encountered water-bearing zones (Figure C-7). Three wells (BM BP1S, BM BP2S, and BM PZ2S) were removed from service due to casing damage. Five additional shallow wells and one additional deep well (BM PW1 through BM PW5 and BM PW2D) were installed during the 1996 Verification Well Study and were incorporated into the site monitoring network.

Water level data collected in March 2020 indicate the groundwater flow direction for the shallow zone in the northern portion of the site is to the north-northwest. Groundwater flow for the shallow zone in the southern portion of the site exhibits predominately a radial flow from BM PW2-S (Figure C-8). The direction of the ground-water flow in the deep zone is primarily to the north toward Blue Lake (Figure C-9).

Salinity values for 2020 and previous years from the 18 monitored wells (twelve shallow zone and six deep zone) and are included in Figure C-10.

Elevated salinity measured in shallow monitor wells since their installation (BM PZ1S, BM MW1S, and former BM BP1S) has speculatively been associated with the large SPR brine storage pond. The large brine pond (with a Hypalon® (chlorosulfonated polyethylene) membrane) was initially constructed in 1978 and subsequently enlarged (height added) with the installation of a new Hypalon® liner and a concrete weight coat in 1982. It was removed from service in September 1998 and closed in early Spring 1999. The salinity measurements observed to the northeast (BM PW4) and east (BM MW1S and D of the closed pond area) could result from seepage occurring from before the 1982 renovations of the pond or its subsequent closure, or also from operations preceding SPR ownership.

Brine effects are not evident in the northwest and southern portions of the site. Shallow zone wells BM MW3 and BM MW4S and deep well BM MW4D (west of the former brine pond) have historically remained stable in the 5 to 15 ppt range. Wells in the southern portion of the site are consistently below 50 ppt.

In 2020, the site's monitoring wells were only sampled in the first and second quarters.
For perspective, the average five-year for salinity for most of the Bryan Mound wells are depicted in the table below:

Table 6-3
5-Year Salinity Values in BM Wells

BM Well	Salinity (ppt)
BM BP1D	6.4
BM MW1D	161.3
BM MW1S	79.2
BM MW2D	56.2
BM MW2S	10.5
BM MW3	7.4
BM MW4D	4.7

BM MW4S	9.7
BM MW5	46.7
BM PW1	25.7 (3-Year Average)
BM PW2D	19.1
BM PW2S	7.6
BM PW3	59.2 (3-Year Average)
BM PW4	115.8 (3-Year Average)
BM PW5	47.5 (2-Year Average)
BM PZ1D	22.3
BM PZ1S	47.4
BM PZ3	22.7 (3-Year Average)

6.4 West Hackberry

The Chicot Aquifer provides potable water to the West Hackberry area. Much of the groundwater 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 near the coast, south of Lake Charles. The fresh/saline water interface is approximately 700 ft. bls. The West Hackberry purchases its potable water from the Cameron Parish Waterworks. Louisiana regulations do not require a potable water monitoring program, and West Hackberry is recognized as a water purchaser only.

Two water-bearing zones underlie the West Hackberry site. The shallow zone occurs at depths of 6-13 ft. bls, is 3- 12 ft. thick, and consists of fine and silty sands. The deep zone occurs at depths of 40-50 ft. bls, averages 10 ft. thick and consists of silty sand with increasing amounts of fines (silt and clay) to the west and north of the former brine pond area. A clay layer approximately 10 to 20 feet separates the two zones.

The 1991 *Contamination Assessment Report and Remedial Alternatives Analysis* identified the former brine pond as a source of groundwater 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. The brine pond construction activity implemented per the state approved brine pond-decommissioning plan was concluded in November 1999.

Eleven monitoring wells and fifteen former recovery wells have been installed on the West Hackberry site in five phases from 1988-1990. These wells were used to either monitor or control brine movement beneath the brine pond system. The 1996 Verification Well Study added seven periphery wells (PW) screened in the shallow zone. The surveillance monitoring network is shown in Figure C-11. It consists of wells screened in the shallow zone (denoted as “S”) and deep zone (denoted as “D”).

Water level data collected during June 2020 were used to determine groundwater flow directions in the shallow and deep water-bearing zones. Results are shown in Figures C-12 and C-13, respectively. Water in the shallow zone flows in a radial direction from a site high at WH PW6 (near Cavern 105 in the southwestern portion of the site). Water in the deep zone exhibits radial

flow from most monitored wells, with the northwest portion monitored flowing toward the northwest (to Black Lake) and the southern portion flowing to the southeast.

Salinity data gathered over the past five years at all wells is depicted in Figure C-14. Four of the seven wells initially installed for the 1996 Verification Well Study were retained for additional water level measurement around the periphery of the main site.

Certain wells are analyzed for salinity only once per year per the 2002 site-wide monitoring proposal approved by LDNR in early 2004, with the remainder analyzed quarterly.

The five-year salinity average for the WH wells are depicted in the table below:

Table 6-4
5-Year Salinity Values in West Hackberry Wells

WH Well	Salinity (ppt)
WH MW1D	1.3
WH P11	0.9
WH P12D	9.9
WH P12S	10.9
WH P13D	3.1
WH P13S	0.5
WH P1D	9.5
WH P1S	1.2
WH P2D	4.0
WH P2S	2.2
WH P3D	8.4
WH P3S	25.9
WH P4D	16.7
WH P4S	19.5
WH P5S	0.6
WH P6D	1.5
WH P6S	0.5
WH P8	0.5
WH P9	0.5
WH PW2	8.8
WH PW4S	3.4
WH PW5	0.5
WH PW6	0.5
WH RW2S	0.6
WH RW3D	0.5
WH RW4D	3.1
WH RW5D	11.8

With the passage of years, the slug of impacted shallow water from the seepage of the former brine pond has dissipated. The brine pond source has been removed. The slug has changed

shape, is smaller, and has moved towards the east while elongating northerly. In 2020, shallow impacted wells (WH P3S, WH P4S, and WH P12S) exhibited lessening or consistent salinity values.

The groundwater salinity levels at West Hackberry continue to improve and exhibit long-term gradual lessening trends. The improvement commenced shortly after the pond system was shut off in early 1999 for pond closure construction and resumed when recovery pumping ended in Spring 2001.

Wells west and south of the former brine pond system (shallow and deep) do not exhibit salinity impacts.

7 Quality Assurance (QA)

The primary policy, requirements, and responsibilities for ensuring Quality Assurance (QA) is performed at US DOE facilities are provided in:

- DOE Order 414.1D, Admin Chg 1, "Quality Assurance" (5-8-2013)
- 10 CFR 830, Subpart A, "Quality Assurance Requirements"

DOE Order 414.1D specifies ten criteria of a quality program:

1. Management/Program
2. Management/Personnel Training and Qualification
3. Management/Quality Improvement
4. Management/Documents and Records
5. Performance/Work Processes Performance
6. Performance/Standards for Design and Verification
7. Performance/Procurement Requirements
8. Performance/Inspection & Acceptance Testing
9. Assessment/Management Assessment
10. Assessment/Independent Assessment

FFPO follows a "Management and Operations Contractor, Quality Assurance Procedure" (AS15700.15) that incorporates the above ten criteria. QA is performed to provide confidence in the results of effluent monitoring and environmental surveillance programs conducted at the SPR sites. Data of high quality is necessary to make appropriate assessments and decisions based on those data. Effluent is monitored at each SPR site in accordance with state and federal discharge permits and environmental surveillance is performed via surface water and groundwater sampling at each site. Results are used to identify the presence or absence of SPR impacts on the surrounding media.

The SPR sites undergo biannual internal audits, as well as inspections by outside federal and state agencies. Every January and July, site laboratories (performing both environmental and crude oil sampling) are internally audited using a laboratory checklist. Audits performed in 2020 at each site are included in Appendix E. Due to COVID-19 restrictions that reduced site personnel, July 2020 audits were not performed. Regarding environmental samples, all audit results were acceptable.

7.1 Field Quality Control

Effluent and surveillance monitoring activities are performed in accordance with procedures in the M&O Contractor Laboratory Programs and Procedures Manual (MSI7000.133), the Environmental Monitoring Plan (ASL5400.57), 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.

7.2 Data Management

SPR and contractor laboratories generate data. All data generated by SPR laboratories are recorded and maintained in 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. This data is compiled, supports SPR assessments, and is utilized in various reports.

7.3 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 using solvent or standard and method blanks, check standards instrumental methods, final calibration blanks, and final calibration verification standards with each analytical batch to verify quality control. Additionally, replicate and spiked samples are analyzed at a 10 percent frequency to determine precision and accuracy, respectively.

Analytical methodology is based on the procedures listed in Table 7-1. Sufficient quality assurance analyses were performed in 2020 to verify the continuing high quality of SPR laboratory data.

Table 7-1 SPR Wastewater Analytical Methodology

Parameter	Method	Source*	Description
Biochemical Oxygen Demand	5210(B) 405.1	SMEWW EPA-1	5 Day, 20 ºC 5 Day, 20 ºC
Chemical Oxygen Demand	D1252-88(B) 410.4 5220(D)	ASTM EPA-1 SMEWW	Micro Spectrophotometric Proc. Colorimetric, Manual Closed Reflux, Colorimetric
Fecal Coliform	Part III-C-2 9222(D)	EPA-2 SMEWW	Direct Membrane Filter Method Membrane Filter Procedure
Residual Chlorine	4500-C1(G) 330.5 8021	SMEWW EPA-1 Hach	DPD Colorimetric Spectrophotometric, DPD DPD Method

Table 7-1 SPR Wastewater Analytical Methodology

Parameter	Method	Source*	Description
Oil & Grease (Total, Recoverable)	1664 Rev. A; 1664 Rev. B	EPA-1	Gravimetric, Separatory Funnel Extraction
Oil & Grease (Partition, Gravimetric)	5520-(B)	SMEWW	Gravimetric, Separatory Funnel Extraction
Total Organic Carbon	415.1 D4839-88 5310(C) D2579(A) 5310(B)	EPA-1 ASTM SMEWW ASTM SMEWW	Combustion or Oxidation Persulfate – UV Oxidation, IR Persulfate – UV Oxidation, IR Combustion – IR Combustion – IR
Dissolved Oxygen	D888-87(D) 360.1 360.2 4500-O(C) 4500-O(G)	ASTM EPA-1 EPA-1 SMEWW SMEWW	Membrane Electrode Membrane Electrode Modified Winkler Method Winkler Method with Azide Modification Membrane Electrode
Hydrogen Ion conc. (pH)	D1293-84(A&B) 150.1 4500-H^+(B)	ASTM EPA-1 SMEWW	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 SMEWW	Gravimetric, Dried at 103-105°C Gravimetric, Dried at 103-105°C
Salinity	D4542-85 (Sect. 7) 2520(B) 2510 (C)	ASTM SMEWW (16th Ed.) SMEWW (16th Ed.)	Refractometric Electrical Conductivity Density Method
Biomonitoring	1006.0 1007.0	EPA-3 EPA-3	*Menidia beryllina* 7-day survival *Mysidopsis bahia* 7-day survival

*Source:

SMEWW= American Public Health Association, et al., Standard Methods for the Examination of Water and Wastewater, most recent edition.
EPA-1 = U.S. Environmental Protection Agency, Methods for Chemical Analysis of Water and Wastes, Document No. EPA - 600/4-79-020.
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.

7.4 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, SPR personnel from the respective laboratory, M&O Contractor Quality Assurance, Operations and Maintenance and Environmental review laboratory procurement documents.

Only subcontractor laboratory service vendors that are state accredited under the National Environmental Laboratory Accreditation Program are approved for use on the SPR.

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- Emergency Response Procedures. All sites: BCI5500.3, Bayou Choctaw; BHI5500.4, Big Hill; BMI5500.5, Bryan Mound, WHI5500.9, West Hackberry, AAA9020.159 New Orleans and AAA9020.160 Stennis.
- ISO 14001 Environmental Management Systems Manual. ASI5400.55.
- Laboratory Programs and Procedures Manual, MSI7000.133.
- Pollution Prevention Plan, ASL5400.41.
- Spill Prevention Control and Countermeasures Plans. All sites: BCL5400.16, Bayou Choctaw; BHL5400.21, Big Hill; BML5400.17, Bryan Mound; WHL5400.20, West Hackberry.
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- Finding of No Significant Impact for Environmental Assessment of Oil Degasification at Four Strategic Petroleum Reserve Facilities in Texas and Louisiana. September 1994. U.S. Department of Energy.

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- Methods for Chemical Analysis of Water and Wastes EPA-600/4-79-020. Cincinnati, Ohio: Office of Research and Development.

Appendix A

Appendix A1 — Environmental Standards List

Appendix A2 — Strategic Petroleum Reserve Project Management Office Environmental Safety and Health Directives

Appendix A1 – Environmental Standards List

DESCRIPTION	STANDARD
National Environmental Policy Act Implementing Procedures	10 CFR 1021
Compliance with Flood Plain/Wetlands Environmental Review	10 CFR 1022
Occupational Radiation Protection - Applicable and Enforceable Portions	10 CFR 835
Storage, treatment, and disposal of nondefense toxic and hazardous materials	10 USC 2692
Boiler and Pressure Vessels - Degas Project Only	120 IAC
(Aviation) Operating Requirements: Domestic, Flag, and Supplemental Operations	14 CFR 121
(Aviation) Certifications and Operations	14 CFR 125
(Aviation) Certification and Operations of Scheduled Air Carriers with Helicopters	14 CFR 127
(Aviation) Rotorcraft External Load Operations	14 CFR 133
(Aviation) Operating Requirements: Commuter and On-Demand Operations	14 CFR 135
(Aviation) Agricultural Aircraft Operations	14 CFR 137
(Aviation) Certification and Operation: Land Airport Serving Certain Air Carriers	14 CFR 139
(Aviation) Repair Stations	14 CFR 145
(Aviation) Objects Affecting Navigable Airspace	14 CFR 77
(Aviation) Notification and Reporting - Accidents and Incidents	14 CFR 830
(Aviation) General Operating and Flight Rules	14 CFR 91
Oil and Gas Division	16 TAC 1.3
Environmental Recycling	16 TAC 1.4
Standards for Management of Hazardous Oil and Gas Waste	16 TAC 3.98
Fish and Wildlife Coordination Act	16 U.S.C. §§ 661-666c
Bald and Golden Eagle Protection Acts	16 U.S.C. §§ 668-668d
Migratory Bird Treaty Act	16 U.S.C. §§ 703-711
Endangered Species Act	16 USC Parts 1531-1544
Radiation Control	25 TAC 1.289
Commerce in Explosives (ATF)	27 CFR 55
Imminent Danger	29 CFR 1903.13
Posting of Notice: Availability of the Act, Regulations, and Applicable Standards	29 CFR 1903.2
Recordkeeping and Reporting Occupational Injuries and Illnesses	29 CFR 1904
General (1 through 8)	29 CFR 1910 SUBPART A
Adoption and Extension of Established Federal Standards (11 through 19)	29 CFR 1910 SUBPART B
Walking-Working Surfaces (21 through 30)	29 CFR 1910 SUBPART D
Means of Egress (35 through 38)	29 CFR 1910 SUBPART E
Powered Platforms, Manlifts, and Vehicle Mounted Work Platforms (66 through 68)	29 CFR 1910 SUBPART F
Occupational Health and Environmental Control (94 through 98)	29 CFR 1910 SUBPART G
Hazardous Materials (101 through 126)	29 CFR 1910 SUBPART H

DESCRIPTION	STANDARD
Personal Protective Equipment (132 through 139)	29 CFR 1910 SUBPART I
General Environmental Controls (141 through 147)	29 CFR 1910 SUBPART J
Medical and First Aid (151)	29 CFR 1910 SUBPART K
Fire Protection (155 through 165)	29 CFR 1910 SUBPART L
Compressed Gas and Compressed Air Equipment (169)	29 CFR 1910 SUBPART M
Materials Handling and Storage (176-179, 181, 183-184)	29 CFR 1910 SUBPART N
Machinery and Machine Guarding (211 through 213, 215, 219)	29 CFR 1910 SUBPART O
Hand/Portable Powered Tools and Other Handheld Equipment (241 through 244)	29 CFR 1910 SUBPART P
Welding, Cutting, and Brazing (251 through 255)	29 CFR 1910 SUBPART Q
Special Industries (269) Power generation, Transmission	29 CFR 1910 SUBPART R
Special Industries (268) Telecommunications	29 CFR 1910 SUBPART R
Electrical (301 through 306, 331–335, 399)	29 CFR 1910 SUBPART S
Commercial Diving Operations (401 through 402, 410, 420-427, 430, 440-441)	29 CFR 1910 SUBPART T
Toxic and Hazardous Substances (1000 through 1450 except 1029, 1043, 1045, 1047, 1050-1051)	29 CFR 1910 SUBPART Z
Designations for General Industry Standards Incorporated into Body of Construction Standards	29 CFR 1926 APP. A
General (1 through 5)	29 CFR 1926 SUBPART A
General Interpretations (10 through 16)	29 CFR 1926 SUBPART B
General Safety and Health Provisions (20 through 35)	29 CFR 1926 SUBPART C
Occupational Health and Environmental Controls (50 through 66)	29 CFR 1926 SUBPART D
Personal Protection and Life Saving Equipment (95 through 107)	29 CFR 1926 SUBPART E
Fire Protection and Prevention (150 through 159)	29 CFR 1926 SUBPART F
Signs, Signals, and Barricades (200 through 203)	29 CFR 1926 SUBPART G
Materials Handling, Storage, Use, and Disposal (250 through 252)	29 CFR 1926 SUBPART H
Tools - Hand and Power (300 through 307)	29 CFR 1926 SUBPART I
Welding and Cutting (350 through 354)	29 CFR 1926 SUBPART J
Electrical (400 through 408, 416-417, 431-432, 441, 449)	29 CFR 1926 SUBPART K

DESCRIPTION	STANDARD
Scaffolds (450 through 454)	29 CFR 1926 SUBPART L
Fall Protection (500 through 503)	29 CFR 1926 SUBPART M
Cranes, Derricks, Hoists, Elevators, and Conveyors (550 through 555)	29 CFR 1926 SUBPART N
Motor Vehicles, Mechanized Equipment, and Marine Operations (600 through 606)	29 CFR 1926 SUBPART O
Excavations (650 through 652)	29 CFR 1926 SUBPART P
Concrete and Masonry Construction (700 through 706)	29 CFR 1926 SUBPART Q
Steel Erection (750 through 752)	29 CFR 1926 SUBPART R
Demolition (850 through 860)	29 CFR 1926 SUBPART T
Blasting and the Use of Explosives (900 through 914)	29 CFR 1926 SUBPART U
Power Transmission and Distribution (950 through 960)	29 CFR 1926 SUBPART V
Rollover Protective Structures; Overhead Protection (1000 through 1003)	29 CFR 1926 SUBPART W
Stairways and Ladders (1050 through 1060)	29 CFR 1926 SUBPART X
Diving (1071 through 1092)	29 CFR 1926 SUBPART Y
Toxic and Hazardous Substances (1100 through 1152 except 1129, 1145, 1147)	29 CFR 1926 SUBPART Z
Hazardous Materials Information Development, Preparedness and Response Act	30 LA RS 2361-2380 and 33 LAC V.101 and 191 SARA Title III
DELETED General Provisions - Document Filing Procedures	30 TAC 1.1.10 DELETED
General Air Quality Rules	30 TAC 1.101
Permits by Rule	30 TAC 1.106
Control of Air Pollution from Visible Emissions and Particulate Matter	30 TAC 1.111
Control of Air Pollution from Sulfur Compounds	30 TAC 1.112
Control of Air Pollution from Hazardous Air Pollutants	30 TAC 1.113
DELETED Control of Air Pollution from Motor Vehicles	30 TAC 1.114 DELETED
Control of Air Pollution from Volatile Organic Compounds	30 TAC 1.115
Control of Air Pollution by Permits for New Construction or Modification	30 TAC 1.116
Control of Air Pollution from Nitrogen Compounds	30 TAC 1.117
Control of Air Pollution Episodes	30 TAC 1.118
DELETED Federal Operating Permits Program	30 TAC 1.122 DELETED
Electronic Reporting	30 TAC 1.19.3
DELETED - July 2014 Environmental Testing Laboratory Accreditation and Certification	30 TAC 1.25 - DELETED
Water Quality Certification	30 TAC 1.279

DESCRIPTION	STANDARD
Applications Processing	30 TAC 1.281
Public Drinking Water	30 TAC 1.290
Water Rights, Procedural	30 TAC 1.295
Water Rights, Substantive	30 TAC 1.297
Occupational Licenses and Registrations	30 TAC 1.30
Surface Water Quality Standards	30 TAC 1.307
Sludge Use, Disposal, and Transportation	30 TAC 1.312
Used Oil	30 TAC 1.324
Spill Prevention and Control	30 TAC 1.327
Waste Minimization and Recycling	30 TAC 1.328
Municipal Solid Waste	30 TAC 1.330
Underground and Aboveground Storage Tanks	30 TAC 1.334
Industrial Solid Waste and Municipal Hazardous Waste	30 TAC 1.335
Radioactive Substance Rules	30 TAC 1.336
Groundwater Protection Recommendation Letters and Fees	30 TAC 1.339
Regulatory Flexibility	30 TAC 1.90
MOU between TCEQ and RRC	30 TAC 7.117
Planning Division	31 TAC 1.15
Oil Spill Prevention and Response	31 TAC 1.19
Natural Resource Damage Assessment	31 TAC 1.20
Oil Spill Prevention and Response Hearings Procedures	31 TAC 1.21
Fisheries	31 TAC II.57
Wildlife	31 TAC II.65
Resource Protection	31 TAC II.69
Coastal Management Program	31 TAC XVI.501
Coastal Management Program Boundary	31 TAC XVI.503
Coastal Management Program	31 TAC XVI.504
Council Procedures for State Consistency with Coastal Management Program Goals and Policies	31 TAC XVI.505
Council Procedures for Federal Consistency with Coastal Management Program Goals and Priorities	31 TAC XVI.506
Certain vehicles must stop at all railroad grade crossings (Explosives)	32 LA RS 173.1
Permission for operation; crossing railroad grade crossings; markings	32 LA RS 251 Subpart J. Vehicles Transporting Explosives or Inflammables
Equipment and inspection (Explosives)	32 LA RS 252
Handling Class I (Explosive) Materials or Other Dangerous Cargo	33 CFR 126
Control of Pollution by Oil and Hazardous Substances, Discharged Removed	33 CFR 153
Facilities Transferring Oil or Hazardous Material in Bulk	33 CFR 154
Oil and Hazardous Material Transfer Operations	33 CFR 156
Reception Facilities for Oil, Noxious Liquid Substances, and Garbage (MARPOL)	33 CFR 158

DESCRIPTION	STANDARD
Permits for Structures or Work in or Affecting Navigable Waters of the U.S.	33 CFR 322
Permits for Discharges of Dredged or Fill Material into Waters of the U.S.	33 CFR 323
Process of Department of Army Permits	33 CFR 325
Enforcement	33 CFR 326
Definition of Waters of the United States	33 CFR 328
Definition of Navigable Waters of the United States	33 CFR 329
Nationwide Permits	33 CFR 330
Compensatory Mitigation for Losses of Aquatic Resources	33 CFR 332
Markings of Structures, Sunken Vessels and Other Obstructions	33 CFR 64
Private Aid to Navigation	33 CFR 66
Aids to Navigation on Artificial Islands and Fixed Structures	33 CFR 67
Risk Evaluation/Corrective Action Program	33 LAC I.13
Groundwater Fees	33 LAC I.14
Permit Review	33 LAC I.15
Departmental Administrative Procedures	33 LAC I.3
Notification Regulations and Procedures for Unauthorized Discharges	33 LAC I.39
Policy and Intent	33 LAC I.45
Program Requirements	33 LAC I.47
Organization and Personnel Requirements	33 LAC I.49
On-site Inspection/Evaluation	33 LAC I.51
Quality System Requirements	33 LAC I.53
Sample Protocol/Sample Integrity	33 LAC I.55
Maintenance of Accreditation	33 LAC I.57
Emergency Response Regulations	33 LAC I.69
General Provisions	33 LAC III.1
Control of Emissions of Smoke	33 LAC III.11
Emission Standards for Particulate Matter	33 LAC III.13
Conformity	33 LAC III.14
Emission Standards for Sulfur Dioxide	33 LAC III.15
Rules and Regulations for the Fee System of the Air Quality Control Programs	33 LAC III.2
Control of Emission of Organic Compounds	33 LAC III.21
Odor Regulations	33 LAC III.29
Standards of Performance for New Stationary Sources	33 LAC III.30
Permit Procedures	33 LAC III.5
DELETED Comprehensive Toxic Air Pollutant Emission Control Program	33 LAC III.51 DELETED
DELETED Area Sources of Toxic Air Pollutants	33 LAC III.53 DELETED
Prevention of Air Pollution Emergency Episodes	33 LAC III.56
DELETED Chemical Accident Prevention and Minimization of Consequences	33 LAC III.59 DELETED
Ambient Air Quality	33 LAC III.7

DESCRIPTION	STANDARD
General Regulations on Control of Emissions and Emission Standards	33 LAC III.9
General Provisions	33 LAC IX.1
Surface Water Quality Standards	33 LAC IX.11
Louisiana Water Pollution Control Fee System Regulation	33 LAC IX.13
Water Quality Certification Procedures	33 LAC IX.15
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
State of Louisiana Stream Control Commission	33 LAC IX.19
The LPDES Program Definitions and General Program Requirements	33 LAC IX.23
Permit Application and Special LPDES Program Requirements	33 LAC IX.25
LPDES Permit Conditions	33 LAC IX.27
Transfer, Modification, Revocation and Reissuance, and Termination of LPDES Permits	33 LAC IX.29
Permits	33 LAC IX.3
General LPDES Program Requirements	33 LAC IX.31
Specific Decision-making Procedures Applicable to LPDES Permits	33 LAC IX.33
Enforcement	33 LAC IX.5
Effluent Standards	33 LAC IX.7
Spill Prevention and Control	33 LAC IX.9
General Provisions and Definitions	33 LAC V.1
Generators	33 LAC V.10
Manifest, Import and Export Requirements	33 LAC V.11
Transporters	33 LAC V.13
Treatment, Storage and Disposal Facilities	33 LAC V.15
Containment Buildings	33 LAC V.18
Tanks	33 LAC V.19
Containers	33 LAC V.21
Prohibitions on Land Disposal	33 LAC V.22
Corrective Action Management Units and Temporary Units	33 LAC V.26
Transportation of Hazardous Liquids by Pipeline	33 LAC V.30
Financial Requirements	33 LAC V.37
Universal Wastes	33 LAC V.38
Used Oil	33 LAC V.40
Recyclable Materials	33 LAC V.41
Lists of Hazardous Wastes	33 LAC V.49
Fee Schedules	33 LAC V.51
General Provisions and Definitions (solid waste regulations)	33 LAC VII.1
Solid Waste Beneficial Use and Soil Reuse	33 LAC VII.11
Recycling and Waste Reduction Rules	33 LAC VII.103
Waste Tires	33 LAC VII.105
Scope and Mandatory Provisions of the Program	33 LAC VII.3

DESCRIPTION	STANDARD
Solid Waste Management System	33 LAC VII.5
Solid Waste Standards	33 LAC VII.7
Enforcement	33 LAC VII.9
Program Applicability and Definitions	33 LAC XI.1
Enforcement	33 LAC XI.15
Registration Requirements, Standards and Fee Schedule	33 LAC XI.3
General Operating Requirements	33 LAC XI.5
Methods Release Detection and Release Reporting, Investigation, Confirmation and Response	33 LAC XI.7
Out of Service UST Systems and Closure	33 LAC XI.9
General Provisions	33 LAC XV.1
Notices, Instructions, and Reports to Workers; Inspections	33 LAC XV.10
Regulation and Licensing of Naturally Occurring Radioactive Material (NORM)	33 LAC XV.14
Transportation of Radioactive Material	33 LAC XV.15
Licensing and Radiation Safety Requirements for Irradiators	33 LAC XV.17
Registration of Radiation Machines and Facilities	33 LAC XV.2
Radiation Safety Requirements for Wireline Service Operations and Subsurface Tracer Studies	33 LAC XV.20
Fee Schedule	33 LAC XV.25
Licensing of Radioactive Material	33 LAC XV.3
Standards for Protection Against Radiation	33 LAC XV.4
Radiation Safety Requirements for Industrial Radiographic Operations	33 LAC XV.5
Radiation Safety Requirements for Analytical X-Ray Equipment	33 LAC XV.8
Advisory Council on Historical Preservation	36 CFR 800
Pesticides	4 TAC I.7
Asbestos	40 CFR 763
Criteria for State, Local, and Regional Oil Removal Contingency Plans	40 CFR 109
Discharge of Oil	40 CFR 110
Oil Pollution Prevention	40 CFR 112
Designation of Hazardous Substances	40 CFR 116
Determination of Reportable Quantities for Hazardous Substances	40 CFR 117
State Certification of Activities Requiring a Federal License or Permit	40 CFR 121
EPA Administrated Permit Programs: The National Pollutant Discharge Elimination System	40 CFR 122
Procedures for Decision Making	40 CFR 124
Criteria and Standards for NPDES	40 CFR 125
Toxic Pollutant Effluent Standards	40 CFR 129
Water Quality Planning and Management, Water Quality Standards	40 CFR 131
Secondary Treatment Regulation	40 CFR 133
Guidelines Establishing Test Procedures for the Analysis of Pollutants	40 CFR 136
National Primary Drinking Water Regulations	40 CFR 141
National Primary Drinking Water Regulations Implementation	40 CFR 142

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National Secondary Drinking Water Regulations	40 CFR 143
Underground Injection Control Program	40 CFR 144
Underground Injection Control Program: Criteria and Standards	40 CFR 146
State Underground Injection Control Programs	40 CFR 147
Sole Source Aquifers	40 CFR 149
NEPA Purpose, Policy and Mandate	40 CFR 1500
NEPA and Agency Planning	40 CFR 1501
NEPA Environmental Impact Statement	40 CFR 1502
NEPA Commenting	40 CFR 1503
NEPA Pre-decision Referrals to the Council of Proposed Federal Actions Determined to be Environmentally Unsatisfactory	40 CFR 1504
NEPA and Agency Decision Making	40 CFR 1505
Other Requirements of NEPA	40 CFR 1506
NEPA Agency Compliance	40 CFR 1507
NEPA Terminology and Index	40 CFR 1508
Freedom of Information Act Procedures	40 CFR 1515
Privacy Act Implementation	40 CFR 1516
Pesticide Registration and Classification Procedures	40 CFR 152
Labeling Requirements for Pesticides and Devices	40 CFR 156
Reporting of Accidental Releases	40 CFR 1604
Worker Protection Standards (Pesticides)	40 CFR 170
Certification of Pesticide Applicators	40 CFR 171
General	40 CFR 220
Section 404 (b) (1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material	40 CFR 230
Guidelines for Storage and Collection of Residential, Commercial, and Institutional Solid Wastes	40 CFR 243
Comprehensive Procurement Guideline for Products Containing Recovered Materials	40 CFR 247
Hazardous Waste Management System: General	40 CFR 260
Identification and Listing of Hazardous Waste	40 CFR 261
Standards Applicable to Generators of Hazardous Wastes	40 CFR 262
Standards applicable to transporters of hazardous wastes	40 CFR 263
Standards for Owners and Operators of Hazardous Waste, Treatment, Storage, and Disposal Facilities	40 CFR 264
Standards for Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities	40 CFR 266
Land Disposal Restrictions	40 CFR 268
Requirements for Authorization of State Hazardous Waste Programs	40 CFR 271
Approved State Hazardous Waste Management Programs	40 CFR 272
Standard for Universal Waste Management	40 CFR 273
Standards for Management of Used Oil	40 CFR 279
Technical Standards and Corrective Action Requirements for Owners and Operators of UST	40 CFR 280

DESCRIPTION	STANDARD
Approved Underground Storage Tank Programs	40 CFR 282
National Oil and Hazardous Substances Pollution Contingency Plans	40 CFR 300
Designation of Reportable Quantities and Notification	40 CFR 302
Emergency Planning and Notification	40 CFR 355
Hazardous Chemical Reporting: Community Right-to-Know	40 CFR 370
Toxic Chemical Release Reporting: Community Right-to-Know	40 CFR 372
Reporting Hazardous Substance Activity When Selling or Transferring Federal Real Property	40 CFR 373
General Provisions	40 CFR 401
General Pretreatment Regulations for Existing and New Sources of Pollution	40 CFR 403
Approval & Promulgation of Implementation Plans	40 CFR 52
Ambient Air Monitoring	40 CFR 53
Standards of Performance for New Stationary Sources	40 CFR 60
Determination of Emissions from Volatile Compounds Leaks	40 CFR 60, Appendix A, Method 21
DELETED National Emission Standards for Hazardous Air Pollutants	40 CFR 61 DELETED
National Emission Standards for Hazardous Air Pollutant for Source Categories	40 CFR 63
Assessment and Collection of Noncompliance Penalties	40 CFR 66
State Operating Permit Programs	40 CFR 70
General	40 CFR 700
PCB Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions	40 CFR 761
Regulations of Fuels and Fuel Additives	40 CFR 80
EPA Regulations Designating Areas for Air Quality Planning	40 CFR 81
Protection of Stratospheric Ozone	40 CFR 82
Confiscation and disposal of explosives	40 LA RS 1472.11
Unlawful storage of explosives	40 LA RS 1472.12
Abandonment of explosives	40 LA RS 1472.13
Careless use of explosives	40 LA RS 1472.18
Reckless use of explosives	40 LA RS 1472.19
License; manufacturer-distributor, dealer, user, or blaster of explosives	40 LA RS 1472.3
Possession without license prohibited; exceptions (Explosives)	40 LA RS 1472.4
Reports of losses or thefts; illegal use or illegal possession (Explosives)	40 LA RS 1472.7
Energy Policy Act of 2005	42 USC 15801
Energy Conservation Reauthorization 1998	42 USC 6201 et seq.
Energy Policy and Conservation Act 1975 and 1994	42 USC 6291-6309
RCRA and Affirmative Procurement	42 USC 6962
National Environmental Policy	42 USC Chapter 55
Air Pollution Prevention and Control	42 USC Chapter 85
National Energy Policy Act of 1992	42 USC Chapter 91
Coastal Management	43 LAC I.7
Water Resources Management	43 LAC VI

DESCRIPTION	STANDARD
Underwater Obstructions	43 LAC XI.3
Pipeline Safety	43 LAC XI.5
General Provisions (Statewide Order 29-B)	43 LAC XIX.1
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
Pollution Control (Class II Injection/Disposal Well Regulations)	43 LAC XIX.4
Off-Site Storage, Treatment and/or Disposal of Exploration and Production Waste Generated from Drilling and Production of Oil and Gas Wells	43 LAC XIX.5
Fees	43 LAC XIX.7
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Class I, III, IV, and V Injection Wells (Statewide Order 29-N-1)	43 LAC XVII.1
Hydrocarbon Storage Wells in Salt Dome Cavities (Statewide Order 29-M)	43 LAC XVII.3
Certification (Water and Wastewater Operator Certification)	48 LAC V.73
Drinking Water Program	48 LAC V.77
Oil Spill Prevention and Response Plans	49 CFR 130
General Information, Regulations, and Definitions	49 CFR 171
Hazardous Material Tables, Hazardous Materials Communications Requirements and Emergency Response Information Requirements	49 CFR 172
Shippers - General Requirements for Shipments and Packaging	49 CFR 173
Carriage by Public Highway	49 CFR 177
DOT Response Plans for Onshore Pipelines	49 CFR 194
Transportation of Hazardous Liquids by Pipeline	49 CFR 195
Drug and Alcohol Testing	49 CFR 199
Commercial Driver's License Standards; Requirements and Penalties	49 CFR 383
Endangered and Threatened Wildlife and Plants and Migratory Bird Permits	50 CFR 10, 13, 17, 21, 22
General Provisions	50 CFR 450
Disposal of Birds or Quadrupeds Becoming a Nuisance	56 LA RS 112
US Department of Agriculture Federal Bio-based Products Preferred Procurement Program	7 CFR 3201-3202
Pesticide	7 LAC XXIII
Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)	7 USC 136
Farm Security and Rural Investment Act (FSRIA) of 2002, Section 9002	7 USC 8102
Control of Nuisance Wild Quadrupeds	76 LAC V.1.25
Nuisance Wildlife Control Operator Program	76 LAC V.1.27
Stennis Warehouse Spill Prevention, Control, and Countermeasures Plan	AAA 4010.10
Property Management Manual	AAA 7003.7
Threshold Limit Values for Chemical Substances - Current Year & Applicable Substances	ACGIH TLV
Area Contingency Plan for Lake Charles	ACP USCG
Area Contingency Plan for Port Arthur	ACP USCG
Area Contingency Plan for New Orleans	ACP USCG

DESCRIPTION	STANDARD
Area Contingency Plan for Galveston	ACP USCG
Area Contingency Plan for EPA Region 6	ACP-EPA
Hazardous Materials Management Education Program Observations and Recommendations: Environmental Mgmt., Hazardous Waste Minimization, and Pollution Prevention for the SPR Operations	AIHMM
OBSOLETE- July 2014 Drill and Exercise Program Plan	AL 5500.11-OBSOLETE
Standard Methods for the Examination of Water and Wastewater	American Public Health Assoc.
OSHA Referenced Standards	ANSI Standards
Environmental Management Systems Specification with Guidance for Use	ANSI/ISO 14001:2004
Compilation of Air Pollutant Emission Factors	AP-42
Permit Regulations for the Construction and/or Operation of Air Emissions Equipment (Mississippi)	APC-S-2
Amer. Petroleum Institute - Recommended Practices and Guides	API
API Standard 653 for Tank Inspection, Repair, Alteration, and Reconstruction	API - Standard
Environmental Effects of Army Actions	AR 200-2
OBSOLETE - July 2014 Conduct of Training for the SPR M&O Contractor	ASI 3400.1 - OBSOLETE
Integrated Logistics Support Procedures	ASI 4000.10
SPR Plant Maintenance System	ASI 4330.16
Environmental Instructions Manual	ASI 5400.15
Conduct of Operations at the SPR	ASI 5480.19
Accident Prevention Manual	ASI 5480.22
Quality Assurance Instructions	ASI 5700.15
Design Review Procedure	ASI 6430.15
Configuration Management	ASL 4700.1
SPR Environmental Monitoring Plan	ASL 5400.57
Fire Protection Manual	ASL 5480.18
Emergency Readiness Assurance Plan	ASL 5500.10
Emergency Response Team Organization and Training Plan	ASL 5500.25
Emergency Management Plan and Implementing Procedures	ASL 5500.58
Drawdown Management Plan	ASL 6400.18
Cavern Inventory and Integrity Control Plan	ASL 6400.30
Drawdown Readiness Program Plan	ASL 7000.397
OSHA Referenced Standards	ASME Standards
Environmental Policy	ASP 5400.2
DELETED - July 2014 SPR Crosstalk Information Exchange Program	ASR 7000.2 - DELETED
Readiness Review Board	ASR 7000.7
Membership in BRAMA	BC BRAMA
Membership in Greater Baton Rouge Industry Alliance	BC Greater BR Industry Alliance
Membership in Iberville CAER	BC Iberville CAER

DESCRIPTION	STANDARD
Membership in the Iberville LEPC	BC Iberville LEPC
Membership in West Baton Rouge LEPC	BC West Baton Rouge LEPC
Bayou Choctaw Emergency Response Procedures	BCI 5500.3
Bayou Choctaw Spill Prevention, Control, and Countermeasures Plan	BCL 5400.16
Safety Agreement with NEWPARK	BH & NEWPARK
Membership in the LEPC	BH LEPC
Membership in the Local Law Enforcement Agency for BH	BH LLEA
Membership in Sabine-Neches Chiefs Mutual Aid	BH Sabine-Neches Chiefs Mutual Aid
Big Hill Emergency Response Procedures	BHI 5500.4
Big Hill Spill Prevention, Control, and Countermeasures Plan	BHL 5400.21
Membership in the BMAT for BM	BM BMAT
Membership in the Brazosport CAER	BM CAER
Membership in the LEPC	BM LEPC
Membership in the Local Law Enforcement Agency at BM	BM LLEA
Agreement between BM and VDD on restrictions to working on Hurricane Levees near BM	BM VDD
Bryan Mound Emergency Response Procedures	BMI 5500.5
Bryan Mound Spill Prevention, Control, and Countermeasures Plan	BML 5400.17
Seminar on Site Characterization for Subsurface Remediations	CERI-89-224
Fire Prevention and Protection; Emergency Services and Communication; and Hazardous Materials	Chapter 13 Jefferson Parish Code of Ordinances
County Regulation of Matters Relating to Explosives and Weapons Subchapter A. Explosives	Chapter 235 TX Statutes, Local Government, Title 7
Operation and Movement of Vehicles (Explosives)	Chapter 545 TX Statutes, Transportation, Title 7
Vehicle Equipment (Explosives)	Chapter 547 TX Statutes, Transportation, Title 7
Hoisting and Rigging Handbook	DOE HDBK, 1090-9
DOE Waste Minimization reporting Requirements, Nov. 1994	DOE Guideline
Waste Minimization Reporting System (Wmin) User's Guide	DOE Handbook
Pollution Prevention Handbook	DOE Handbook
Guidance for the Preparation of the Waste Minimization and Pollution Prevention Awareness Plan, Dec 1993	DOE Handbook
EPA's Interim Final Guidance to Hazardous Waste Generators on the Elements of a Waste Minimization Program	DOE Memorandum
For all applicable DOE Orders See Contract No. DE-FE0011020 Applicable Standards List	DOE Orders
Pollution Prevention Program Plan	DOE S-0118
Paint Repair of Exterior Metal Surfaces	DOE Standard Spec. 17900
Management of Polychlorinated Biphenyls (PCBs)	DOE/EH-0350
Performance Objectives and Criteria for Conducting DOE Environmental Audits	DOE/EH-0358

DESCRIPTION	STANDARD
Annual report on Waste Generation and Waste Minimization Progress	DOE/EM-0276
Standard for Fire Protection of DOE Electronic Computer/Data Processing Systems	DOE/EP-0108
Waste Minimization/Pollution Prevention Crosscut Plan 1994	DOE/FM-0145
Fire Protection	DOE-STD-1066-2012
Fire Protection for Relocatable Structures	DOE-STD-1088-95
All SPR Environmental Permits as listed in the Annual Site Environmental Report (SER)	Environmental Permits
Protection and Enhancement of Environmental Quality	EO 11514
Floodplain Management	EO 11988
Protection of Wetlands	EO 11990
Federal Compliance with Pollution Control Requirements	EO 12088
Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations	EO 12898
Marine Protected Area	EO 13158
Responsibilities of Federal Agencies to Protect Migratory Birds	EO 13186
Energy Efficient Standby Power Devices	EO 13221
Preserve America	EO 13287
REVOKED Strengthening Federal Environmental, Energy, and Transportation Management	EO 13423 REVOKED
REVOKED Federal Leadership in Environmental, Energy, and Economic Performance	EO 13514 REVOKED
REVOKED Planning for Sustainability in the Next Decade	EO 13693 REVOKED
Efficient Federal Operations	EO 13834
Protocol for Equipment Leak Emission Estimates, Jun 1993	EPA 453/R-93-026
Practical Guide for Groundwater Sampling	EPA 600/2-85/105
Handbook for Analytical Quality Control in Water and Wastewater Laboratories	EPA 600/4-79-019
Methods for Chemical Analysis of Water and Wastes	EPA 600/4-79-020
Handbook for Sampling and Sample Preservation of Water and Wastewater	EPA 600/4-82-029
Addendum to Handbook for Sampling and Sample Preservation, EPA 600/4-82-029	EPA 600/4-83-039
Microbiological Methods for Monitoring the Environment, Water and Wastes	EPA 600/8-78-017
Facility Pollution Prevention Guide	EPA 600/R-92/088
Short Term Methods for Measuring Acute Toxicity of Effluents to Aquatic Organisms	EPA 821-R-02-014
Water Measurement Manual	EPA 832B81102
Storm Water Management for Industrial Activities	EPA 833-R-92-002
Engineering Support Branch Standard Operating Procedures and Quality Assurance Manual, 4/1/86	EPA Region IV
Current National Water Quality Criteria	EPA Web Site
EPA Waste Minimization Opportunity Assessment Manual	EPA,ISBN:0-86587-752-1
Specification for 8’ and 12’ Unlighted and Externally Lighted Wind Cone Assembly	FAA AC 150/5345-27
Heliport Design, January 4, 1988	FAA AC 150/5390-2
Obstruction Marking and Lighting, October 1985	FAA AC 70/7460-1G
For all applicable FAR and DEAR Clauses see Contract DE-FE0011020, Applicable Clauses List	FAR and DEAR Clauses

DESCRIPTION	STANDARD
Factory Mutual - Approval Guide and Loss Prevention Data Sheets	FM
Hazardous Waste Management Regulations (Mississippi)	HW-1
Oil Cos. International. Marine Forum - International Oil Tanker & Terminal Safety Guide	ICIMF
OSHA Referenced Standards	IEEE Standards
OBSOLETE: Strategic Petroleum Reserve Management and Operating and Constuction Management Services Contractors- Environmental	IWA: DOE-DM-AGSC OBSOLETE
OBSOLETE: Strategic Petroleum Reserve Management and Operating And Constuction Management Services Contractors- Safety and Health	IWA: DOE-DM-AGSC OBSOLETE
Pollution Prevention Assessment Manual for Texas Businesses	LP 92-03
Surface Water and Ground Water Use and Protection (Mississippi)	LW-2
Regarding Implementation of the Executive Order 13186, “Responsibilities of Federal Agencies to Protect Migratory Birds"	MOU USFWS with DOE
MOU with ATFE for Louisiana Sites during Emergencies	MOU with ATFE in LA
MOU with ATFE for the Texas Sites during Emergencies	MOU with ATFE TX
MOU with the BCSO for BM during Emergencies	MOU with BCSO
MOU with Cameron Parish Sheriff's Office for WH during Emergencies	MOU with CamPSO
MOU with Calcasieu Parish Sheriff's Office for WH during Emergencies	MOU with CPSO
MOU with Entergy	MOU with Entergy
MOU with the FBI for Louisiana Sites during Emergencies	MOU with FBI in LA
MOU with the FBI for the Texas Sites during Emergencies	MOU with FBI TX
MOU with Ft. Polk for Louisiana Sites during Emergencies	MOU with Ft. Polk
MOU with JCSO for BH during Emergencies	MOU with JCSO
MOU with LA Homeland Security for Louisiana Sites during Emergencies	MOU with LA Homeland Security
MOU with LA State Police for Louisiana Sites during Emergencies	MOU with LA State Police
MOU with US Army 797th Explosive Ordinance Co. for the Texas Sites during Emergencies	MOU with US Army 797 EOC
SPR Gas and Geothermal Heat Effects on Crude Oil Vapor Pressure, Dec. 1994	MP 94W0000131
Power to capture or destroy animals injurious to property	MSC Section 49-1-39
Nuisance Wildlife	MSC Section 49-7-1
Laboratory Programs & Procedures	MSL 7000.133
National Standards. The latest edition of the nationally recognized standards herein, in effect at the time of design contract award, shall be used during design and construction.	**National Standards**
SPR Qualified Products List	No number
SPRPMO Level III Design Criteria	No number
Earth Manual, 3rd Ed., U.S. Department of the Interior, Bureau of Reclamation	No number
Louisiana’s Suggested Chemical Weed Control Guide current edition (LA Cooperative Extension Services)	No number
The Sterling Brine Handbook (Int’l Salt Co.)	No number
Technical Guidance Package for Chemical Sources, Storage Tanks, TCEQ, Feb 2001	No number
OBSOLETE: Membership in Louisiana Environmental Leadership Program (LaELP) http://www.deq.state.la.us/assistance/elp	No number

DESCRIPTION	STANDARD
OBSOLETE - July 2014 Environmental, Safety, and Health Management Plan (FY 1998 - FY 2002)	No number - OBSOLETE
OBSOLETE: DM/AGT cooling water discharge agreement	No Number OBSOLETE
OBSOLETE- Membership in Clean Texas Program http://www.cleantexas.org/index.cfm	No number OBSOLETE
Organizational and Management Assessments	NOI 1000.72
Pipkin Ranch Road use restrictions in emergencies	Pipkin Ranch Road
Mississippi DWFP Nuisance Animals	Public Notice LE-3799 and LEI 3799
Louisiana Department of Environmental Quality Risk Evaluation/Corrective Action Program	RECAP (2003)
Pollution Prevention Assessment Manual	RG-133
SPR Standard Specifications. All SPR standard specifications listed as SPR Design Criteria Level III with Green Aspects	**Standard Specifications**
DOE Policy on Signatures of RCRA Permit Applications	SEN-22-90
Nonhazardous Solid Waste Management Regulations and Criteria (Mississippi)	SW-2
Special Licenses and Permits	TPWC Chapter 43
Birds; Protection of Nongame Birds; Destroying Nests or Eggs	TPWC Chapter 64
Alligators	TPWC Chapter 65
Disposition of Protected Wildlife	TPWC Section 43.024
Alligators in Texas: Rules, regulations, and general information, most current information	TPWD
Texas Regulations for Control of Radiation - General provisions	TRCR part 11
Texas Regulations for Control of Radiation - Fees	TRCR part 12
Texas Regulations for Control of Radiation - Hearing and Enforcement Procedures	TRCR part 13
Standards for Protection Against Radiation - Permissible Doses, Precautionary Procedures, Waste Disposal	TRCR part 21
Notices, Instructions and Reports to Workers; Inspections	TRCR part 22
Radiation Safety Requirements and Licensing and Registration Procedures for Industrial Radiography	TRCR part 31
Licensing of Radioactive Material -Exemptions, Licenses, General Licenses, Specific Licenses, Reciprocity, Transport	TRCR part 41
State Fire Marshall (Explosives)	TX Statute Chapter 417 State Fire Marshall
Fire Protection Engineering for Facilities	UFC 3-600-01
International Conference of Building Officials - Uniform Building Code and Uniform Fire Code	UFC/UBC
Underwriter's Laboratory - Building Materials, Fire Resistance, Fire Prot. Equip., & Haz. Location Equip. Directories	UL
West Hackberry Emergency Response Procedures	WHI 5500.9
West Hackberry Spill Prevention, Control, and Countermeasures Plan	WHL 5400.20

Appendix A2 – SPR Project Management Office ES&H Directives

DIRECTIVE	DESCRIPTION
DOE O 151.1D	Comprehensive Emergency Management System
DOE O 225.1B	Accident Investigations
DOE O 231.1B Admin Chg. 1	Environment, Safety and Health Reporting
DOE O 420.1C Change 1	Facility Safety
DOE O 422.1 Admin Chg. 1, Admin Chg. 2	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 450.2 Chg. 1 (MinChg)	Integrated Safety Management
DOE O 460.1D	Packaging and Transportation Safety
DOE O 460.2A	Departmental Materials Transportation and Packaging Management
DOE P 450.4A	Safety Management System Policy
SPRPMO O 232.1A	Occurrence Reporting and Processing System
SPRPMO O 420.1D	Conduct of Operations Requirements for SPR Facilities
SPRPMO O 436.1A	Site Sustainability
SPRPMO O 440.2B	Aviation Implementation Plan
SPRPMO O 451.1D	National Environmental Policy Act Implementation Plan
SPRPMO P 451.1E	SPR Environmental Policy
SPRPMO N 450.13	Strategic Petroleum Reserve Environmental, Security, Safety & Health, and Emergency Preparedness Goals FY 2020
SPRPMO N 450.4	Implementation of Environmental, Safety and Health Contractor Requirements Documents

Appendix B

Strategic Petroleum Reserve Environmental Policy

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

POLICY

SPRPMO P 451.1G

APPROVED: 3/25/20

SUBJECT: SPR ENVIRONMENTAL POLICY STATEMENT

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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 established, implemented, and maintained 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 top management pledges that all functional levels will abide by the following:

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

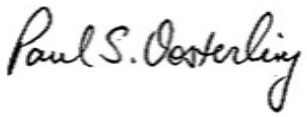
   b. Prevent pollution by undertaking measures to prevent the generation of wastes and other residual materials requiring disposal or release to the environment through recycling, reuse, and source reduction. Where the

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. Improve environmental performance, continually, via the EMS and by establishing and maintaining documented environmental objectives and targets.

This SPR Environmental Policy provides the framework for setting and reviewing environmental objectives and targets that assure excellence in environmental management. Management communicates the Policy to all persons working for, or on behalf of, the SPR. It is available on request at all SPR facilities and 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 DOE and Fluor Federal Petroleum Operations top management to periodically review and update this Policy.



Paul S. Oosterling
Project Manager
Strategic Petroleum Reserve

Appendix C

GROUND WATER SURVEILLANCE MONITORING

DURING 2020

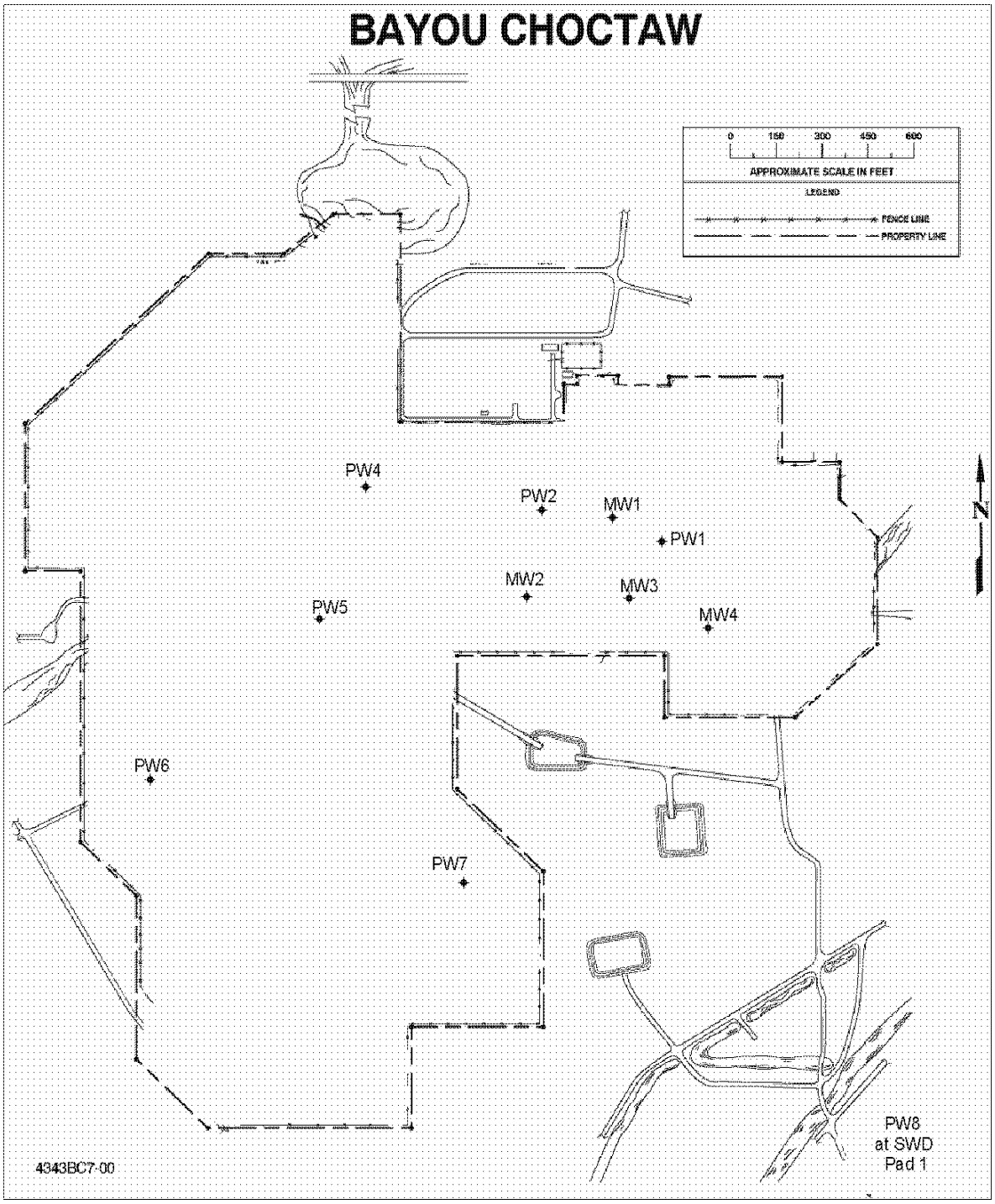


Figure C-1. Bayou Choctaw Ground Water Monitoring Stations

Bayou Choctaw 2020 Contour

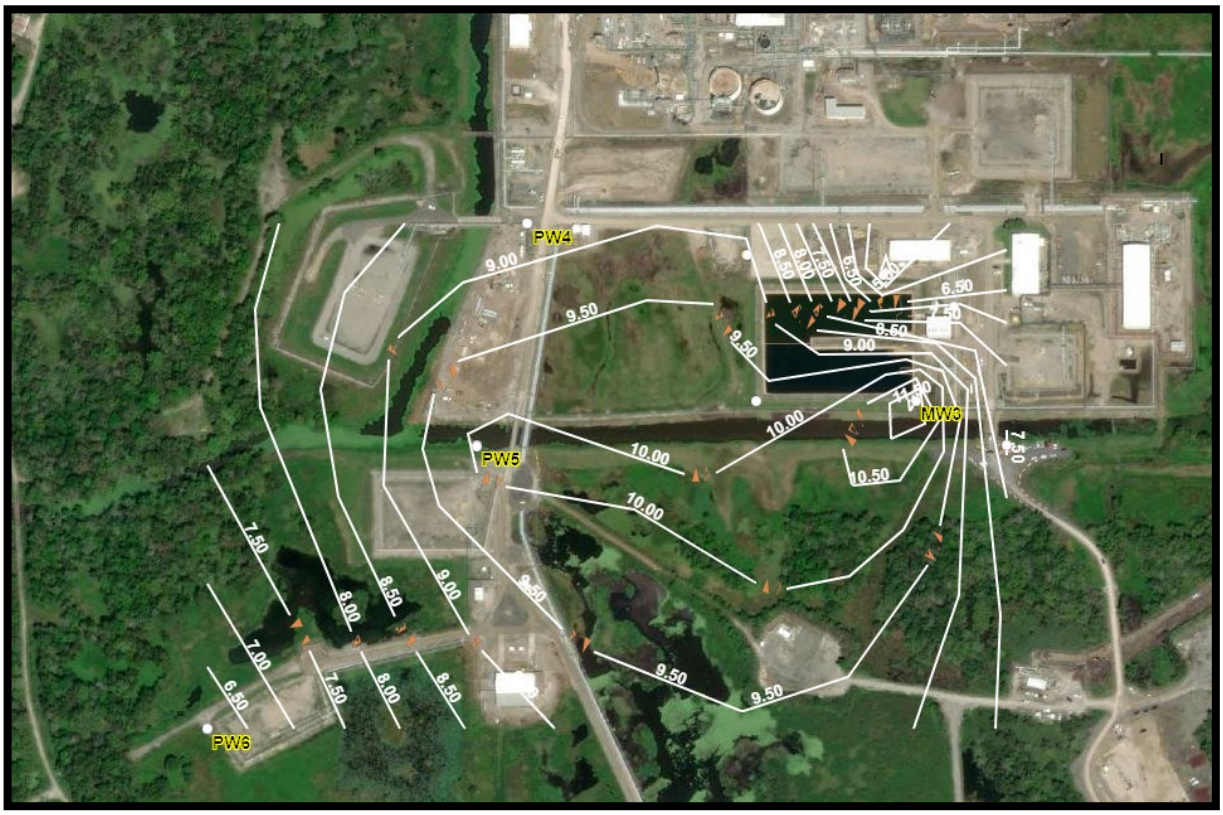
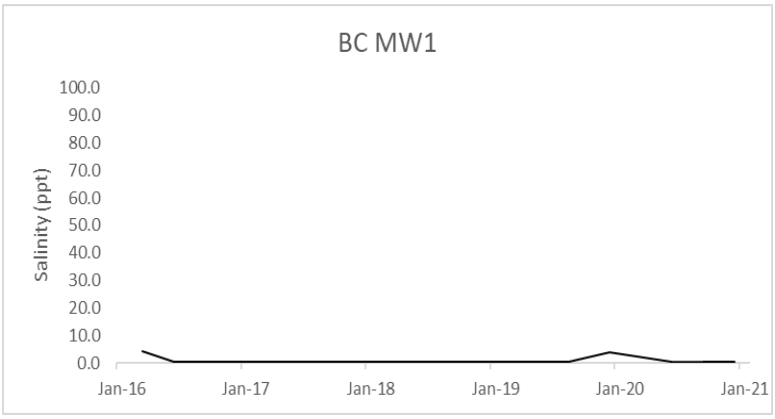
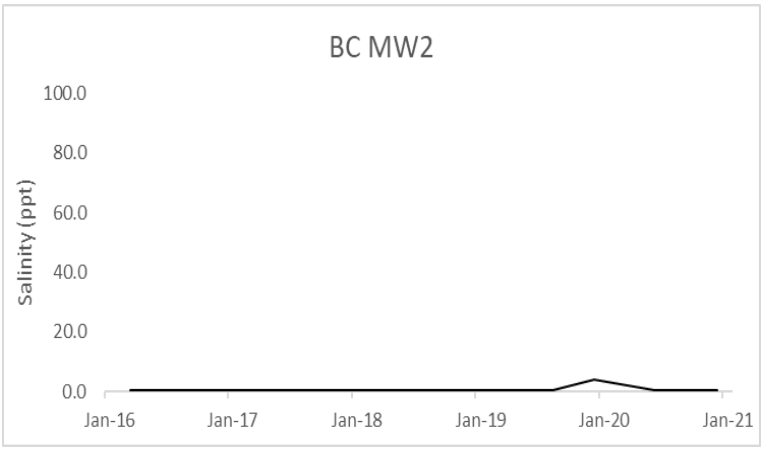


Figure C-2. Bayou Choctaw Ground Water Contoured Elevations September 2020

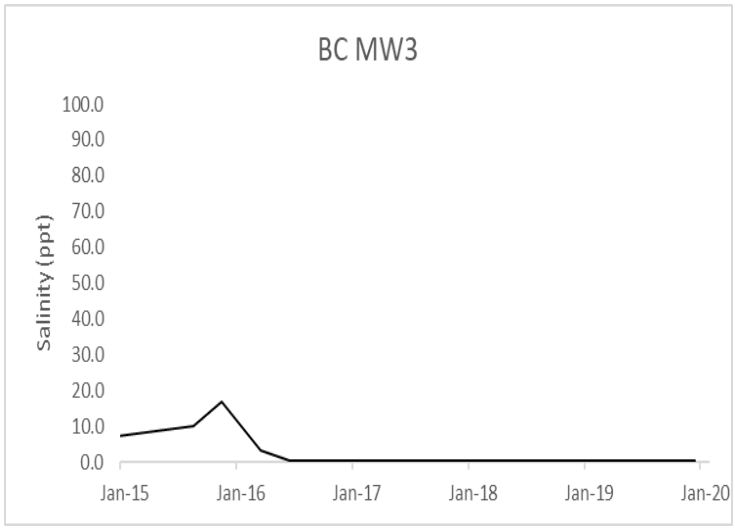
WELL ID	DATE	SALINITY (PPT)
MW1	Mar-16	4.4
MW1	Jun-16	0.5
MW1	Sep-16	0.5
MW1	Dec-16	0.5
MW1	Mar-17	0.5
MW1	Jun-17	0.5
MW1	Sep-17	0.5
MW1	Nov-17	0.5
MW1	Mar-18	0.5
MW1	Jun-18	0.5
MW1	Jul-18	0.5
MW1	Jan-19	0.5
MW1	Jun-19	0.5
MW1	Aug-19	0.5
MW1	Dec-19	3.9
MW1	Jun-20	0.5
MW1	Sep-20	0.5
MW1	Dec-20	0.5
	Average	**0.9**



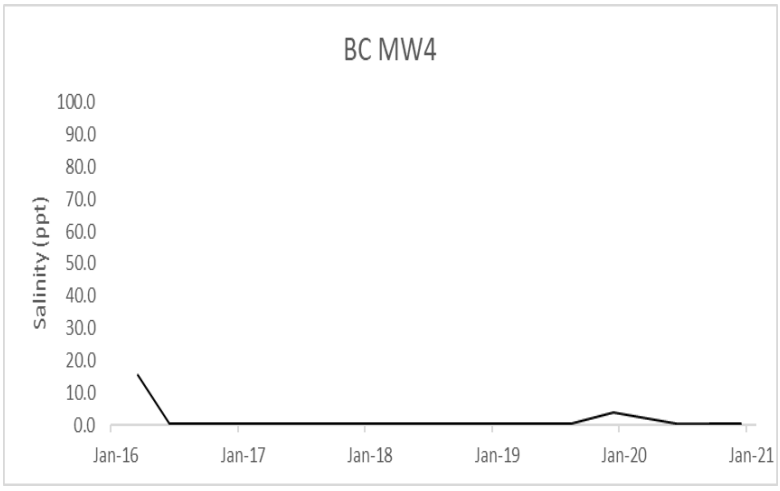
MW2	Mar-16	0.5
MW2	Jun-16	0.5
MW2	Sep-16	0.5
MW2	Dec-16	0.5
MW2	Mar-17	0.5
MW2	Jun-17	0.5
MW2	Sep-17	0.5
MW2	Nov-17	0.5
MW2	Mar-18	0.5
MW2	Jun-18	0.5
MW2	Jul-18	0.5
MW2	Jan-19	0.5
MW2	Jun-19	0.5
MW2	Aug-19	0.5
MW2	Dec-19	3.9
MW2	Jun-20	0.5
MW2	Sep-20	0.5
MW2	Dec-20	0.5
	Average	**0.7**



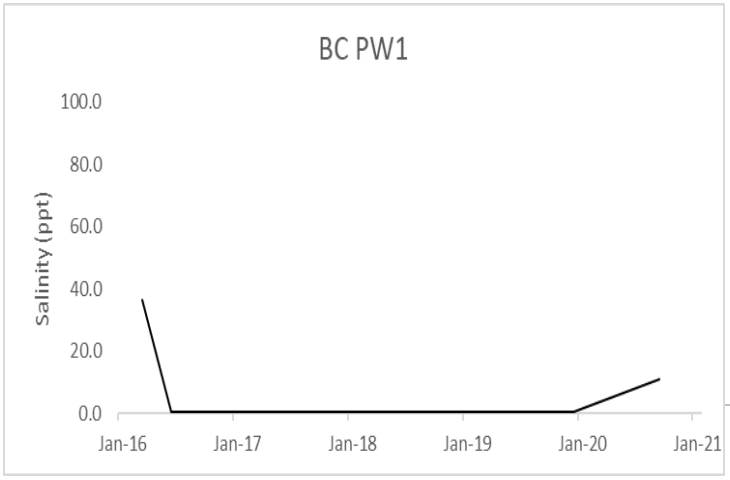
MW3	Sep-14	6.0
MW3	Aug-15	10.0
MW3	Nov-15	17.0
MW3	Mar-16	3.4
MW3	Jun-16	0.5
MW3	Sep-16	0.5
MW3	Dec-16	0.5
MW3	Mar-17	0.5
MW3	Jun-17	0.5
MW3	Sep-17	0.5
MW3	Nov-17	0.5
MW3	Mar-18	0.5
MW3	Jun-18	0.5
MW3	Jul-18	0.5
MW3	Jan-19	0.5
MW3	Jun-19	0.5
MW3	Aug-19	0.5
MW3	Dec-19	0.5
	Average	**2.4**



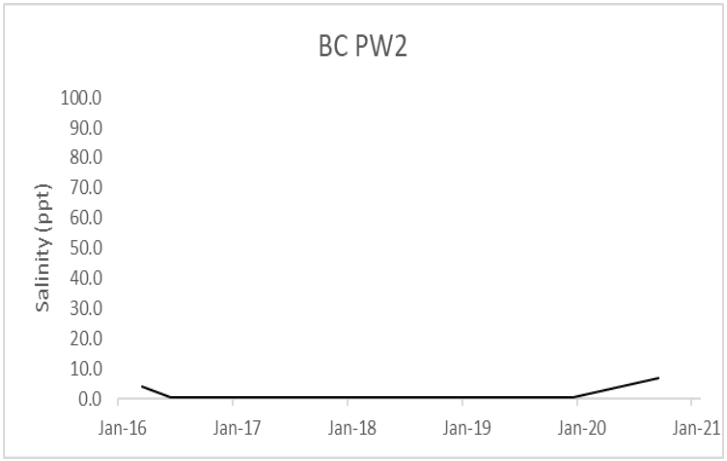
MW4	Mar-16	15.4
MW4	Jun-16	0.5
MW4	Sep-16	0.5
MW4	Dec-16	0.5
MW4	Mar-17	0.5
MW4	Jun-17	0.5
MW4	Sep-17	0.5
MW4	Nov-17	0.5
MW4	Mar-18	0.5
MW4	Jun-18	0.5
MW4	Jul-18	0.5
MW4	Jan-19	0.5
MW4	Jun-19	0.5
MW4	Aug-19	0.5
MW4	Dec-19	3.9
MW4	Jun-20	0.5
MW4	Sep-20	0.5
MW4	Dec-20	0.5
	Average	**1.5**



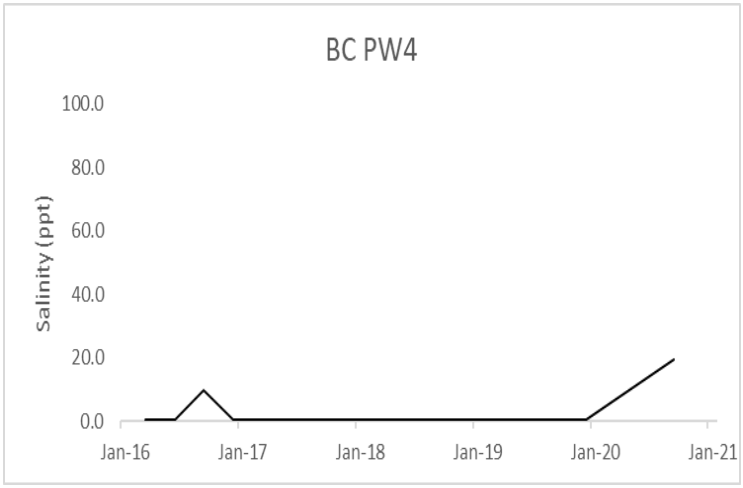
PW1	Mar-16	36.6
PW1	Jun-16	0.5
PW1	Sep-16	0.5
PW1	Dec-16	0.5
PW1	Mar-17	0.5
PW1	Jun-17	0.5
PW1	Sep-17	0.5
PW1	Nov-17	0.5
PW1	Mar-18	0.5
PW1	Jun-18	0.5
PW1	Jul-18	0.5
PW1	Jan-19	0.5
PW1	Jun-19	0.5
PW1	Aug-19	0.5
PW1	Dec-19	0.5
PW1	Sep-20	11.1
	Average	**3.4**



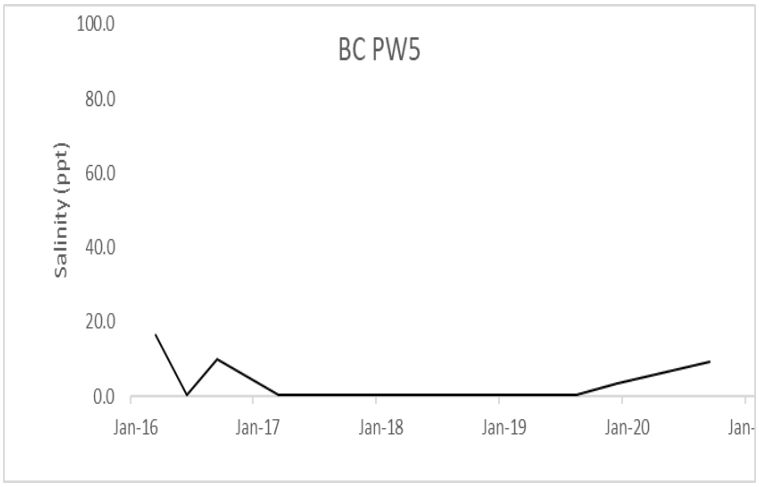
PW2	Mar-16	4.0
PW2	Jun-16	0.5
PW2	Sep-16	0.5
PW2	Dec-16	0.5
PW2	Mar-17	0.5
PW2	Jun-17	0.5
PW2	Sep-17	0.5
PW2	Nov-17	0.5
PW2	Mar-18	0.5
PW2	Jun-18	0.5
PW2	Jul-18	0.5
PW2	Jan-19	0.5
PW2	Aug-19	0.5
PW2	Dec-19	0.5
PW2	Sep-20	6.9
	Average	**1.1**



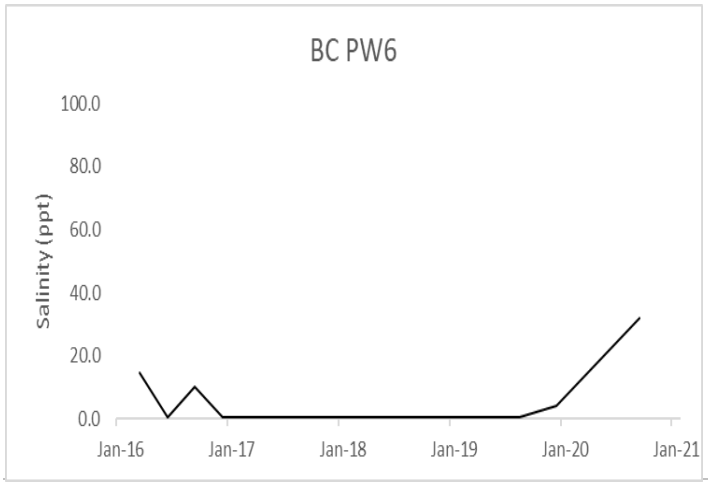
PW4	Mar-16	0.5
PW4	Jun-16	0.5
PW4	Sep-16	10.0
PW4	Dec-16	0.5
PW4	Mar-17	0.5
PW4	Jun-17	0.5
PW4	Sep-17	0.5
PW4	Nov-17	0.5
PW4	Mar-18	0.5
PW4	Jun-18	0.5
PW4	Jul-18	0.5
PW4	Jan-19	0.5
PW4	Jun-19	0.5
PW4	Aug-19	0.5
PW4	Dec-19	0.5
PW4	Sep-20	19.4
	Average	**2.3**



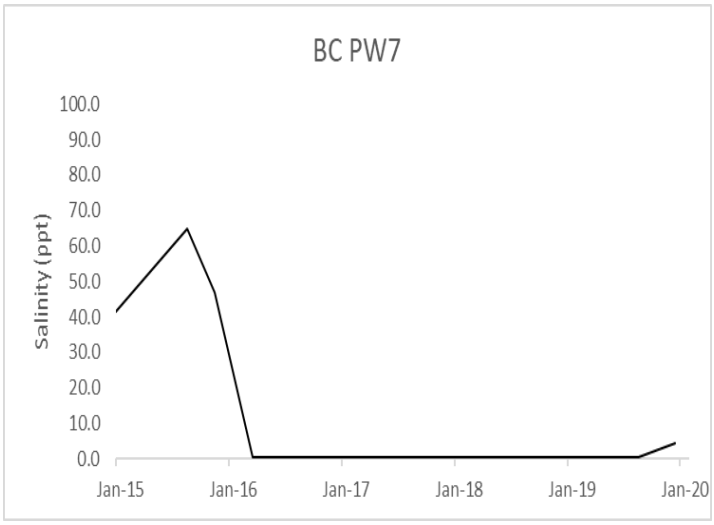
PW5	Mar-16	16.6
PW5	Jun-16	0.5
PW5	Sep-16	10.0
PW5	Mar-17	0.5
PW5	Jun-17	0.5
PW5	Sep-17	0.5
PW5	Nov-17	0.5
PW5	Mar-18	0.5
PW5	Jun-18	0.5
PW5	Jul-18	0.5
PW5	Jan-19	0.5
PW5	Jun-19	0.5
PW5	Aug-19	0.5
PW5	Dec-19	3.4
PW5	Sep-20	9.3
	Average	**3.0**



PW6	Mar-16	14.8
PW6	Jun-16	0.5
PW6	Sep-16	10.0
PW6	Dec-16	0.5
PW6	Mar-17	0.5
PW6	Jun-17	0.5
PW6	Sep-17	0.5
PW6	Nov-17	0.5
PW6	Mar-18	0.5
PW6	Jun-18	0.5
PW6	Jul-18	0.5
PW6	Jan-19	0.5
PW6	Jun-19	0.5
PW6	Aug-19	0.5
PW6	Dec-19	4.0
PW6	Sep-20	32.1
	Average	**4.2**



PW7	Sep-14	31.0
PW7	Aug-15	65.0
PW7	Nov-15	47.0
PW7	Mar-16	0.5
PW7	Jun-16	0.5
PW7	Sep-16	0.5
PW7	Dec-16	0.5
PW7	Mar-17	0.5
PW7	Jun-17	0.5
PW7	Sep-17	0.5
PW7	Nov-17	0.5
PW7	Mar-18	0.5
PW7	Jun-18	0.5
PW7	Jul-18	0.5
PW7	Jan-19	0.5
PW7	Jun-19	0.5
PW7	Aug-19	0.5
PW7	Dec-19	4.2
	Average	**8.6**



PW8	Sep-14	15.0
PW8	Aug-15	25.0
PW8	Nov-15	30.0
PW8	Mar-16	5.7
PW8	Jun-16	0.5
PW8	Sep-16	0.5
PW8	Dec-16	0.5
PW8	Mar-17	0.5
PW8	Jun-17	0.5
PW8	Sep-17	0.5
PW8	Nov-17	0.5
PW8	Mar-18	0.5
PW8	Jun-18	0.5
PW8	Jul-18	0.5
PW8	Jan-19	0.5
PW8	Jun-19	0.5
PW8	Aug-19	0.5
PW8	Dec-19	0.5
	Average	**4.6**

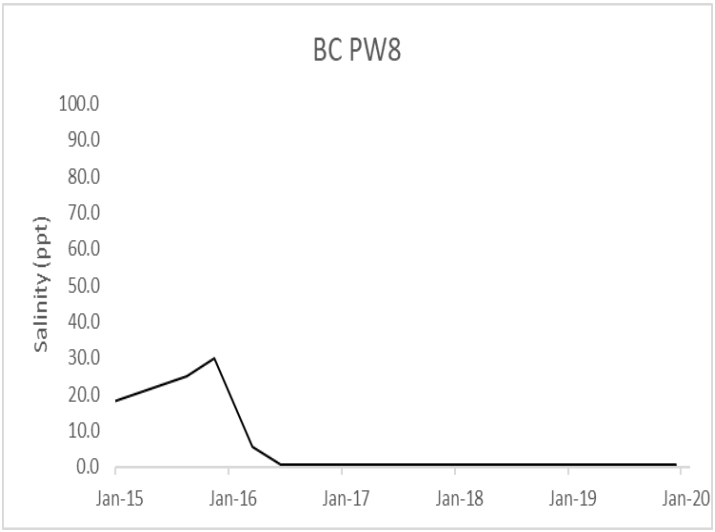


Figure C-3. Bayou Choctaw Ground Water Monitoring Well Salinities

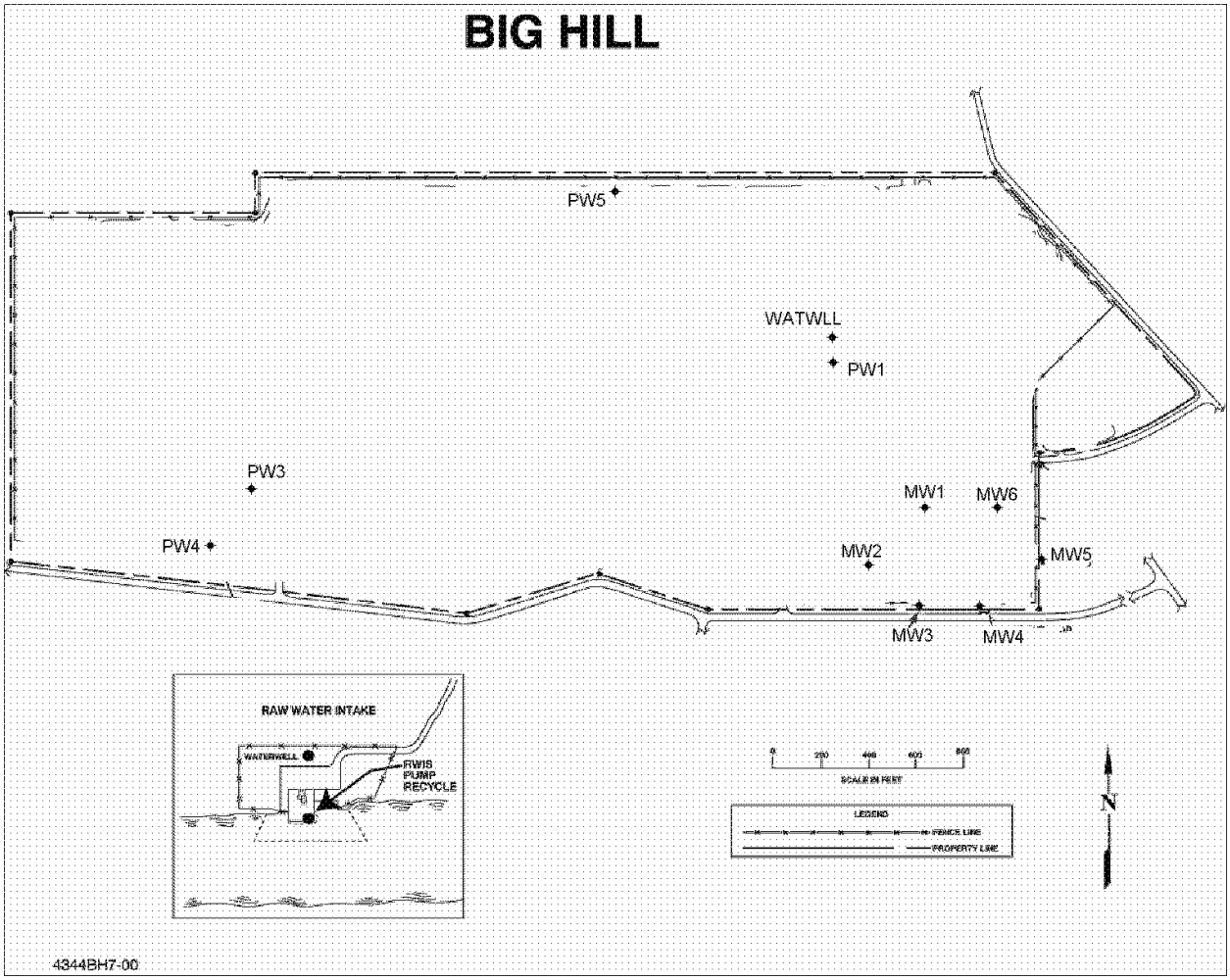


Figure C-4. Big Hill Ground Water Monitoring Stations

Big Hill 2020 Contour

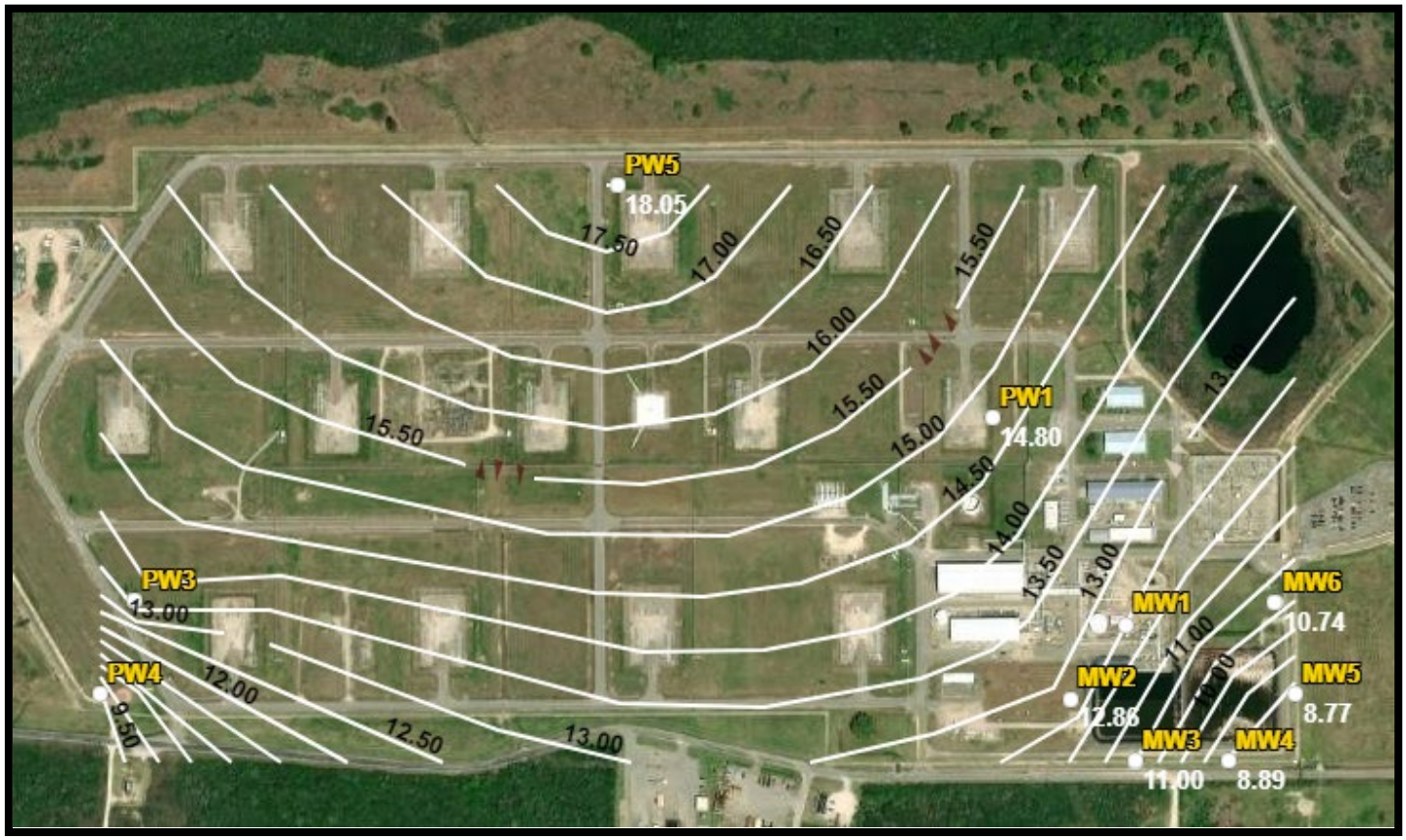
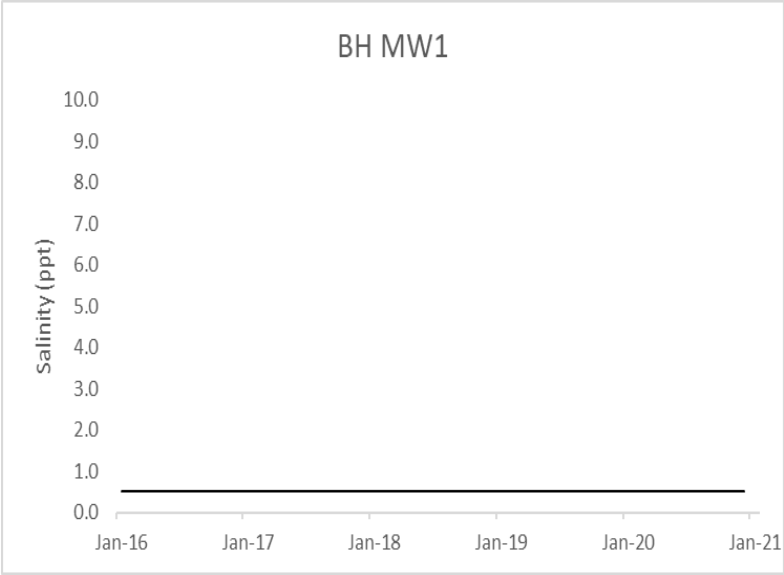


Figure C-5. Big Hill Ground Water Contoured Elevations May 2020

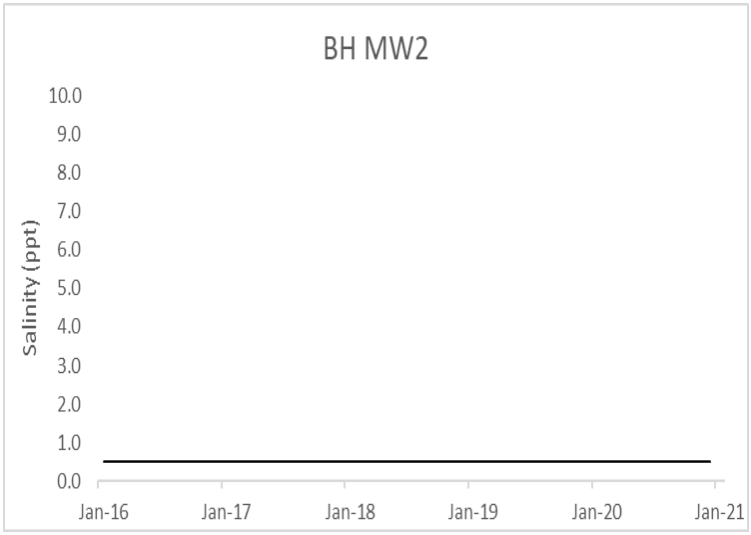
Figure C-6. Big Hill Ground Water Monitoring Well Salinities

MW1	Jan-16	0.5
MW1	Feb-16	0.5
MW1	Mar-16	0.5
MW1	Apr-16	0.5
MW1	May-16	0.5
MW1	Jun-16	0.5
MW1	Jul-16	0.5
MW1	Aug-16	0.5
MW1	Sep-16	0.5
MW1	Oct-16	0.5
MW1	Nov-16	0.5
MW1	Dec-16	0.5
MW1	Jan-17	0.5
MW1	Feb-17	0.5
MW1	Mar-17	0.5
MW1	Jun-17	0.5
MW1	Jul-17	0.5
MW1	Aug-17	0.5
MW1	Sep-17	0.5
MW1	Oct-17	0.5
MW1	Jan-18	0.5
MW1	Feb-18	0.5
MW1	Mar-18	0.5
MW1	Apr-18	0.5
MW1	May-18	0.5
MW1	Jun-18	0.5
MW1	Jul-18	0.5
MW1	Aug-18	0.5
MW1	Sep-18	0.5
MW1	Oct-18	0.5
MW1	Nov-18	0.5
MW1	Dec-18	0.5
MW1	Jan-19	0.5
MW1	Feb-19	0.5
MW1	Mar-19	0.5
MW1	Apr-19	0.5
MW1	May-19	0.5
MW1	Jun-19	0.5
MW1	Jul-19	0.5



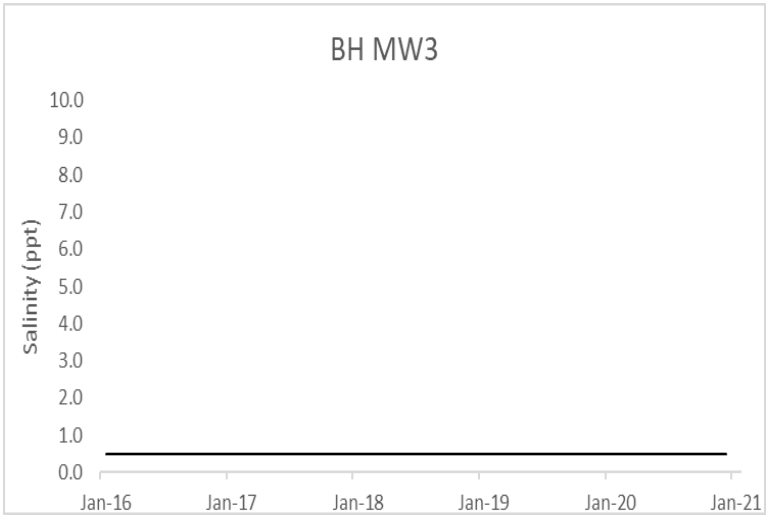
MW1	Aug-19	0.5
MW1	Sep-19	0.5
MW1	Oct-19	0.5
MW1	Nov-19	0.5
MW1	Jan-20	0.5
MW1	Feb-20	0.5
MW1	Mar-20	0.5
MW1	May-20	0.5
MW1	Jun-20	0.5
MW1	Jul-20	0.5
MW1	Aug-20	0.5
MW1	Sep-20	0.5
MW1	Oct-20	0.5
MW1	Nov-20	0.5
MW1	Dec-20	0.5
	Average	**0.5**

MW2	Jan-16	0.5
MW2	Feb-16	0.5
MW2	Mar-16	0.5
MW2	Apr-16	0.5
MW2	May-16	0.5
MW2	Jun-16	0.5
MW2	Jul-16	0.5
MW2	Aug-16	0.5
MW2	Sep-16	0.5
MW2	Oct-16	0.5
MW2	Nov-16	0.5
MW2	Dec-16	0.5
MW2	Jan-17	0.5
MW2	Feb-17	0.5
MW2	Mar-17	0.5
MW2	Jun-17	0.5
MW2	Jul-17	0.5
MW2	Aug-17	0.5
MW2	Sep-17	0.5
MW2	Oct-17	0.5
MW2	Jan-18	0.5
MW2	Feb-18	0.5
MW2	Mar-18	0.5
MW2	Apr-18	0.5
MW2	May-18	0.5
MW2	Jun-18	0.5
MW2	Aug-18	0.5
MW2	Sep-18	0.5
MW2	Oct-18	0.5
MW2	Nov-18	0.5
MW2	Dec-18	0.5
MW2	Jan-19	0.5
MW2	Feb-19	0.5
MW2	Mar-19	0.5
MW2	Apr-19	0.5
MW2	May-19	0.5
MW2	Jun-19	0.5
MW2	Jul-19	0.5
MW2	Aug-19	0.5
MW2	Sep-19	0.5
MW2	Oct-19	0.5
MW2	Nov-19	0.5



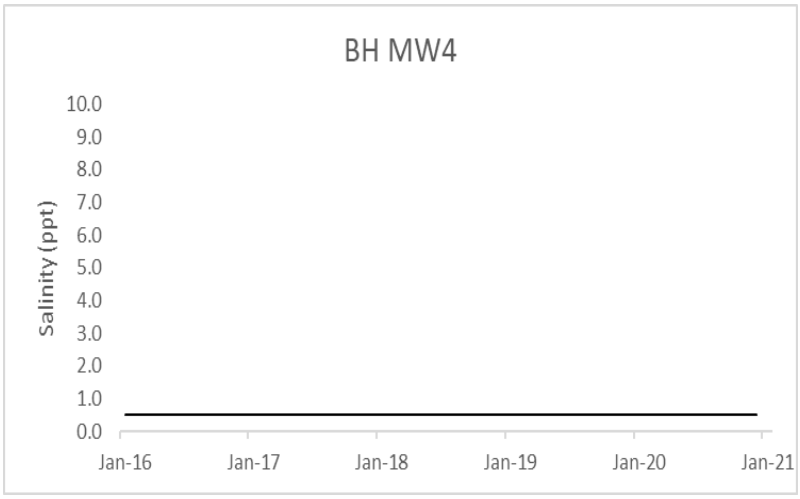
MW2	Jan-20	0.5
MW2	Feb-20	0.5
MW2	Mar-20	0.5
MW2	May-20	0.5
MW2	Jun-20	0.5
MW2	Jul-20	0.5
MW2	Aug-20	0.5
MW2	Sep-20	0.5
MW2	Oct-20	0.5
MW2	Nov-20	0.5
MW2	Dec-20	0.5
	Average	**0.5**

MW3	Jan-16	0.5
MW3	Feb-16	0.5
MW3	Mar-16	0.5
MW3	Apr-16	0.5
MW3	May-16	0.5
MW3	Jun-16	0.5
MW3	Jul-16	0.5
MW3	Aug-16	0.5
MW3	Sep-16	0.5
MW3	Oct-16	0.5
MW3	Nov-16	0.5
MW3	Dec-16	0.5
MW3	Jan-17	0.5
MW3	Feb-17	0.5
MW3	Mar-17	0.5
MW3	Jun-17	0.5
MW3	Jul-17	0.5
MW3	Aug-17	0.5
MW3	Sep-17	0.5
MW3	Oct-17	0.5
MW3	Jan-18	0.5
MW3	Feb-18	0.5
MW3	Mar-18	0.5
MW3	Apr-18	0.5
MW3	May-18	0.5
MW3	Jun-18	0.5
MW3	Jul-18	0.5
MW3	Aug-18	0.5
MW3	Sep-18	0.5
MW3	Oct-18	0.5
MW3	Nov-18	0.5
MW3	Dec-18	0.5
MW3	Jan-19	0.5
MW3	Feb-19	0.5
MW3	Mar-19	0.5
MW3	Apr-19	0.5
MW3	May-19	0.5
MW3	Jun-19	0.5
MW3	Jul-19	0.5
MW3	Aug-19	0.5
MW3	Sep-19	0.5
MW3	Oct-19	0.5



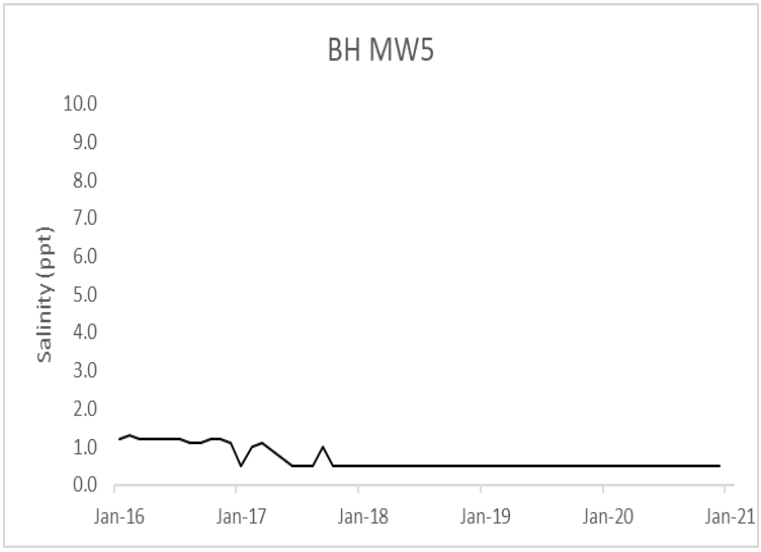
MW3	Nov-19	0.5
MW3	Jan-20	0.5
MW3	Feb-20	0.5
MW3	Mar-20	0.5
MW3	May-20	0.5
MW3	Jun-20	0.5
MW3	Jul-20	0.5
MW3	Aug-20	0.5
MW3	Sep-20	0.5
MW3	Oct-20	0.5
MW3	Nov-20	0.5
MW3	Dec-20	0.5
	Average	**0.5**

MW4	Jan-16	0.5
MW4	Feb-16	0.5
MW4	Mar-16	0.5
MW4	Apr-16	0.5
MW4	May-16	0.5
MW4	Jun-16	0.5
MW4	Jul-16	0.5
MW4	Aug-16	0.5
MW4	Sep-16	0.5
MW4	Oct-16	0.5
MW4	Nov-16	0.5
MW4	Dec-16	0.5
MW4	Jan-17	0.5
MW4	Feb-17	0.5
MW4	Mar-17	0.5
MW4	Jun-17	0.5
MW4	Jul-17	0.5
MW4	Aug-17	0.5
MW4	Sep-17	0.5
MW4	Oct-17	0.5
MW4	Jan-18	0.5
MW4	Feb-18	0.5
MW4	Mar-18	0.5
MW4	Apr-18	0.5
MW4	May-18	0.5
MW4	Jun-18	0.5
MW4	Jul-18	0.5
MW4	Aug-18	0.5
MW4	Sep-18	0.5
MW4	Oct-18	0.5
MW4	Nov-18	0.5
MW4	Dec-18	0.5
MW4	Jan-19	0.5
MW4	Feb-19	0.5
MW4	Mar-19	0.5
MW4	Apr-19	0.5
MW4	May-19	0.5
MW4	Jun-19	0.5
MW4	Jul-19	0.5
MW4	Aug-19	0.5
MW4	Sep-19	0.5
MW4	Oct-19	0.5



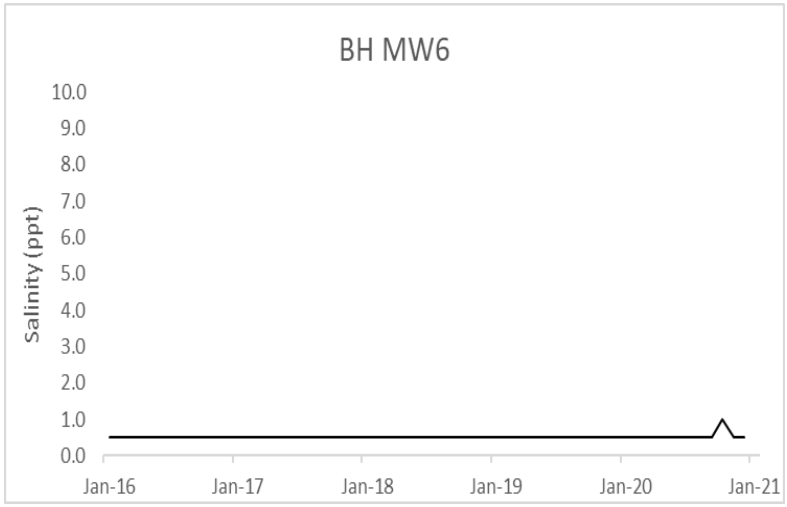
MW4	Nov-19	0.5
MW4	Jan-20	0.5
MW4	Feb-20	0.5
MW4	Mar-20	0.5
MW4	May-20	0.5
MW4	Jun-20	0.5
MW4	Jul-20	0.5
MW4	Aug-20	0.5
MW4	Sep-20	0.5
MW4	Oct-20	0.5
MW4	Nov-20	0.5
MW4	Dec-20	0.5
	Average	**0.5**

MW5	Jan-16	1.2
MW5	Feb-16	1.3
MW5	Mar-16	1.2
MW5	Apr-16	1.2
MW5	May-16	1.2
MW5	Jun-16	1.2
MW5	Jul-16	1.2
MW5	Aug-16	1.1
MW5	Sep-16	1.1
MW5	Oct-16	1.2
MW5	Nov-16	1.2
MW5	Dec-16	1.1
MW5	Jan-17	0.5
MW5	Feb-17	1.0
MW5	Mar-17	1.1
MW5	Jun-17	0.5
MW5	Jul-17	0.5
MW5	Aug-17	0.5
MW5	Sep-17	1.0
MW5	Oct-17	0.5
MW5	Jan-18	0.5
MW5	Feb-18	0.5
MW5	Mar-18	0.5
MW5	Apr-18	0.5
MW5	May-18	0.5
MW5	Jun-18	0.5
MW5	Jul-18	0.5
MW5	Aug-18	0.5
MW5	Sep-18	0.5
MW5	Oct-18	0.5
MW5	Nov-18	0.5
MW5	Dec-18	0.5
MW5	Jan-19	0.5
MW5	Feb-19	0.5
MW5	Mar-19	0.5
MW5	Apr-19	0.5
MW5	May-19	0.5
MW5	Jun-19	0.5
MW5	Jul-19	0.5
MW5	Aug-19	0.5
MW5	Sep-19	0.5
MW5	Oct-19	0.5



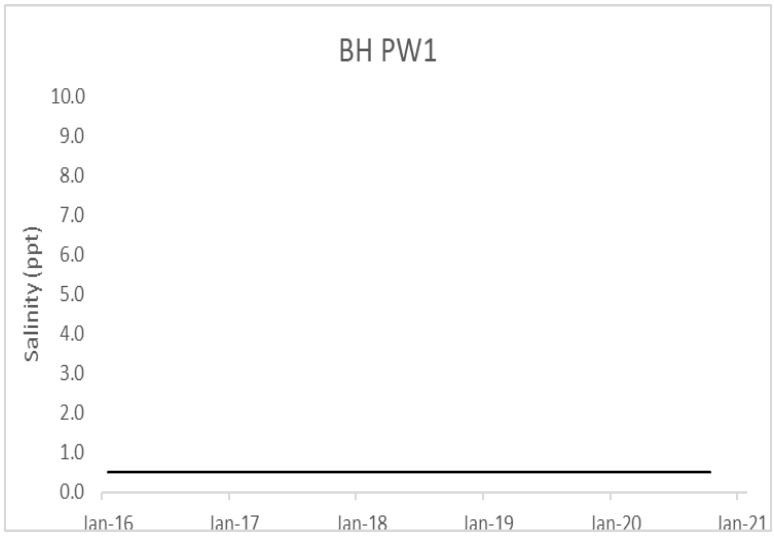
MW5	Nov-19	0.5
MW5	Jan-20	0.5
MW5	Feb-20	0.5
MW5	Mar-20	0.5
MW5	May-20	0.5
MW5	Jun-20	0.5
MW5	Jul-20	0.5
MW5	Aug-20	0.5
MW5	Sep-20	0.5
MW5	Oct-20	0.5
MW5	Nov-20	0.5
MW5	Dec-20	0.5
	Average	**0.7**

MW6	Jan-16	0.5
MW6	Feb-16	0.5
MW6	Mar-16	0.5
MW6	Apr-16	0.5
MW6	May-16	0.5
MW6	Jun-16	0.5
MW6	Jul-16	0.5
MW6	Aug-16	0.5
MW6	Sep-16	0.5
MW6	Oct-16	0.5
MW6	Nov-16	0.5
MW6	Dec-16	0.5
MW6	Jan-17	0.5
MW6	Feb-17	0.5
MW6	Mar-17	0.5
MW6	Jun-17	0.5
MW6	Jul-17	0.5
MW6	Aug-17	0.5
MW6	Sep-17	0.5
MW6	Oct-17	0.5
MW6	Jan-18	0.5
MW6	Feb-18	0.5
MW6	Mar-18	0.5
MW6	Apr-18	0.5
MW6	May-18	0.5
MW6	Jun-18	0.5
MW6	Jul-18	0.5
MW6	Aug-18	0.5
MW6	Sep-18	0.5
MW6	Oct-18	0.5
MW6	Nov-18	0.5
MW6	Dec-18	0.5
MW6	Jan-19	0.5
MW6	Feb-19	0.5
MW6	Mar-19	0.5
MW6	Apr-19	0.5
MW6	May-19	0.5
MW6	Jun-19	0.5
MW6	Jul-19	0.5
MW6	Aug-19	0.5
MW6	Sep-19	0.5
MW6	Oct-19	0.5

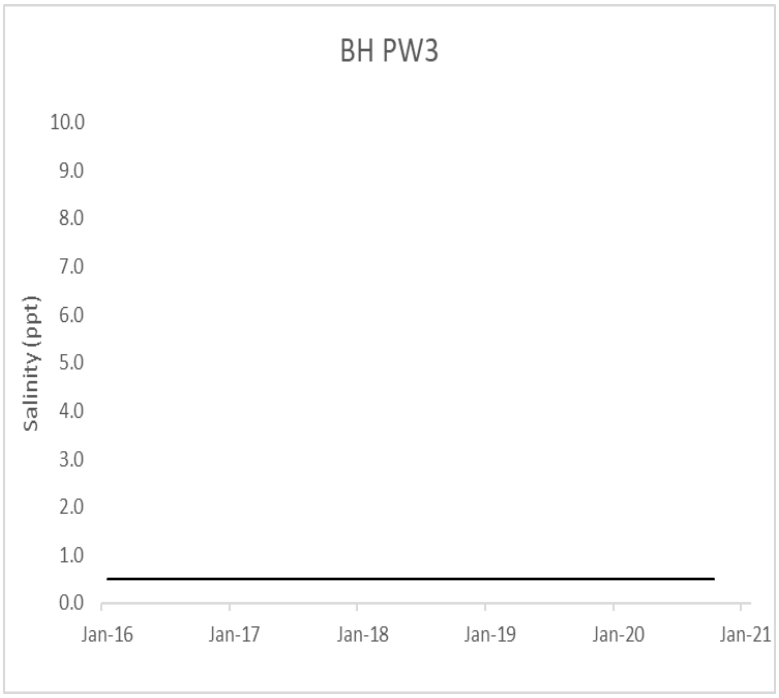


MW6	Nov-19	0.5
MW6	Jan-20	0.5
MW6	Feb-20	0.5
MW6	Mar-20	0.5
MW6	May-20	0.5
MW6	Jun-20	0.5
MW6	Jul-20	0.5
MW6	Aug-20	0.5
MW6	Sep-20	0.5
MW6	Oct-20	1.0
MW6	Nov-20	0.5
MW6	Dec-20	0.5
	Average	**0.5**

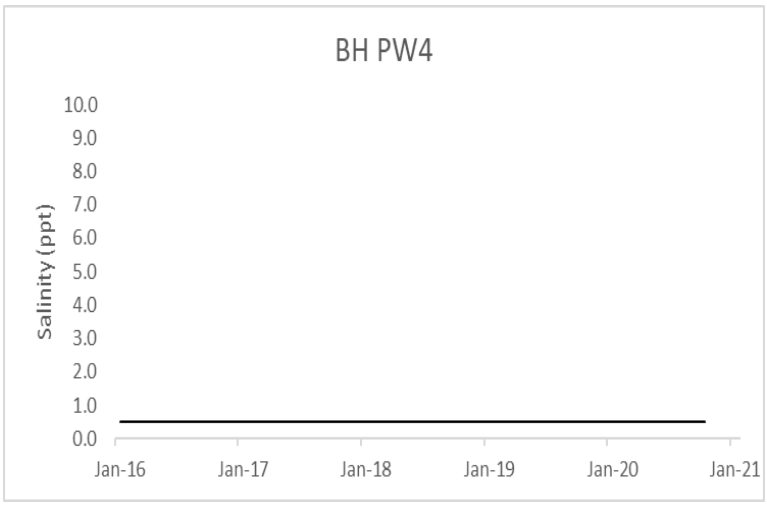
PW1	Jan-16	0.5
PW1	Apr-16	0.5
PW1	Jul-16	0.5
PW1	Oct-16	0.5
PW1	Jul-17	0.5
PW1	Oct-17	0.5
PW1	Jan-18	0.5
PW1	Apr-18	0.5
PW1	Jul-18	0.5
PW1	Oct-18	0.5
PW1	Jan-19	0.5
PW1	Apr-19	0.5
PW1	Jul-19	0.5
PW1	Oct-19	0.5
PW1	Jan-20	0.5
PW1	May-20	0.5
PW1	Oct-20	0.5
	Average	**0.5**



PW3	Jan-16	0.5
PW3	Apr-16	0.5
PW3	Jul-16	0.5
PW3	Oct-16	0.5
PW3	Jan-17	0.5
PW3	Jul-17	0.5
PW3	Oct-17	0.5
PW3	Jan-18	0.5
PW3	Apr-18	0.5
PW3	Jul-18	0.5
PW3	Oct-18	0.5
PW3	Jan-19	0.5
PW3	Apr-19	0.5
PW3	Oct-19	0.5
PW3	Jan-20	0.5
PW3	May-20	0.5
PW3	Oct-20	0.5
	Average	**0.5**



PW4	Jan-16	0.5
PW4	Apr-16	0.5
PW4	Jul-16	0.5
PW4	Oct-16	0.5
PW4	Jan-17	0.5
PW4	Jul-17	0.5
PW4	Oct-17	0.5
PW4	Jan-18	0.5
PW4	Apr-18	0.5
PW4	Jul-18	0.5
PW4	Oct-18	0.5
PW4	Jan-19	0.5
PW4	Apr-19	0.5
PW4	Jul-19	0.5
PW4	Oct-19	0.5
PW4	Jan-20	0.5
PW4	May-20	0.5
PW4	Oct-20	0.5
	Average	**0.5**



PW5	Jan-16	0.5
PW5	Apr-16	0.5
PW5	Jul-16	0.5
PW5	Oct-16	0.5
PW5	Jan-17	0.5
PW5	Jul-17	0.5
PW5	Oct-17	0.5
PW5	Jan-18	0.5
PW5	Apr-18	0.5
PW5	Jul-18	0.5
PW5	Oct-18	0.5
PW5	Jan-19	0.5
PW5	Apr-19	0.5
PW5	Jul-19	0.5
PW5	Oct-19	0.5
PW5	Jan-20	0.5
PW5	May-20	0.5
PW5	Oct-20	0.5
	Average	**0.5**

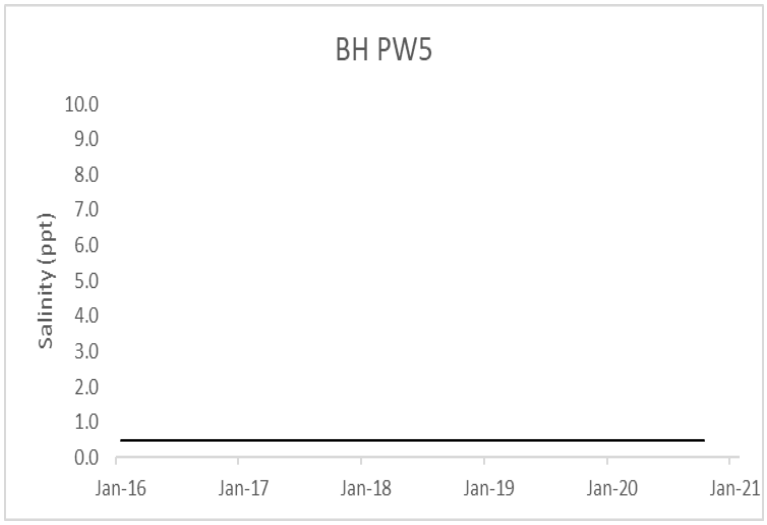


Figure C-6. Big Hill Ground Water Monitoring Well Salinities

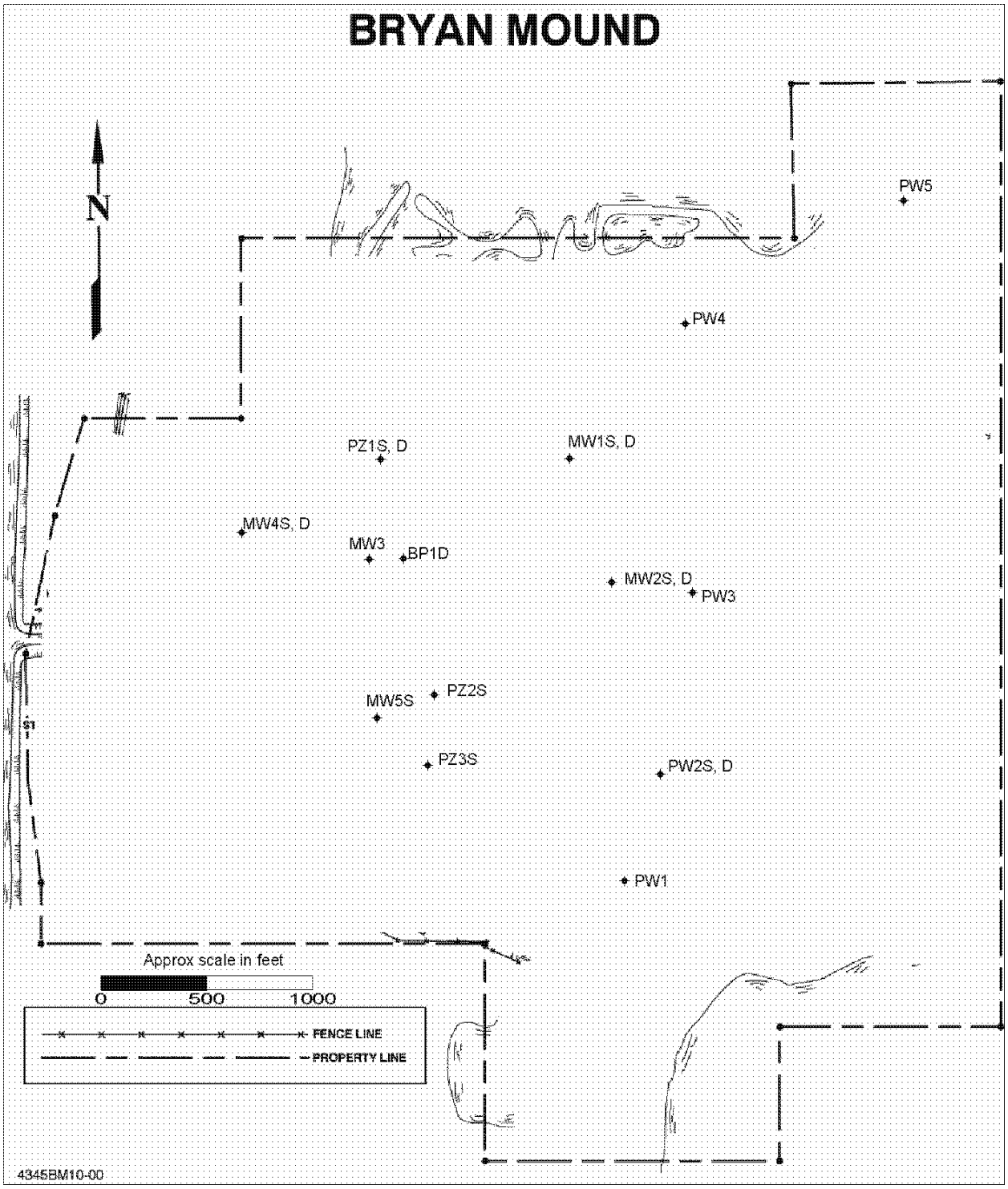


Figure C-7. Bryan Mound Ground Water Monitoring Stations, Deep and Shallow

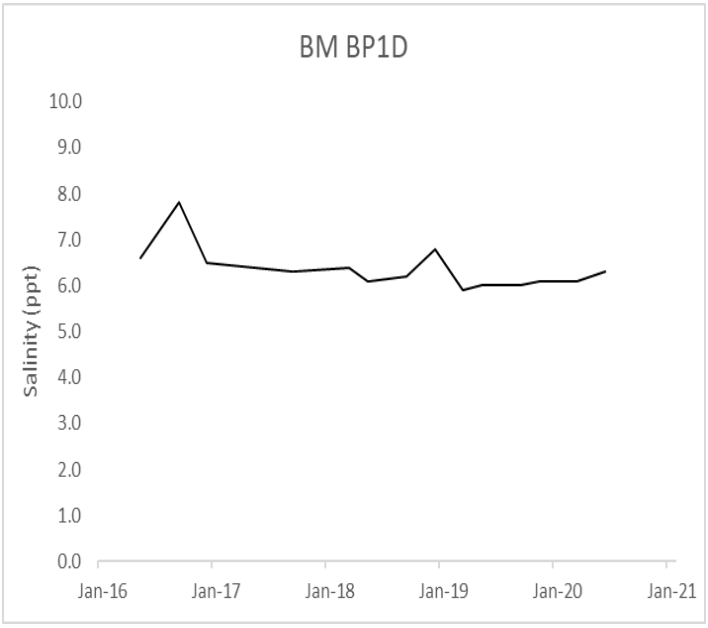
Bryan Mound 2020 Contour-Shallow

Figure C-8. Bryan Mound Shallow Ground Water Zone Contoured Elevations March 2020

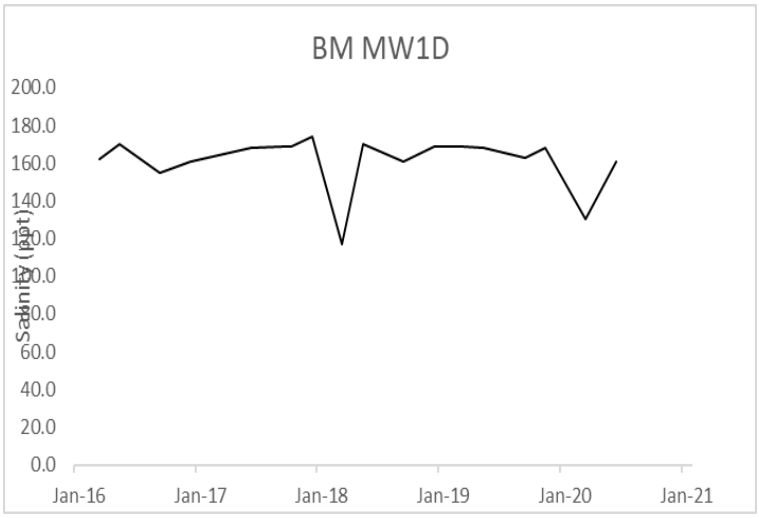
Bryan Mound 2020 Contour-Deep

Figure C-9. Bryan Mound Deep Ground Water Zone Contoured Elevations March 2020

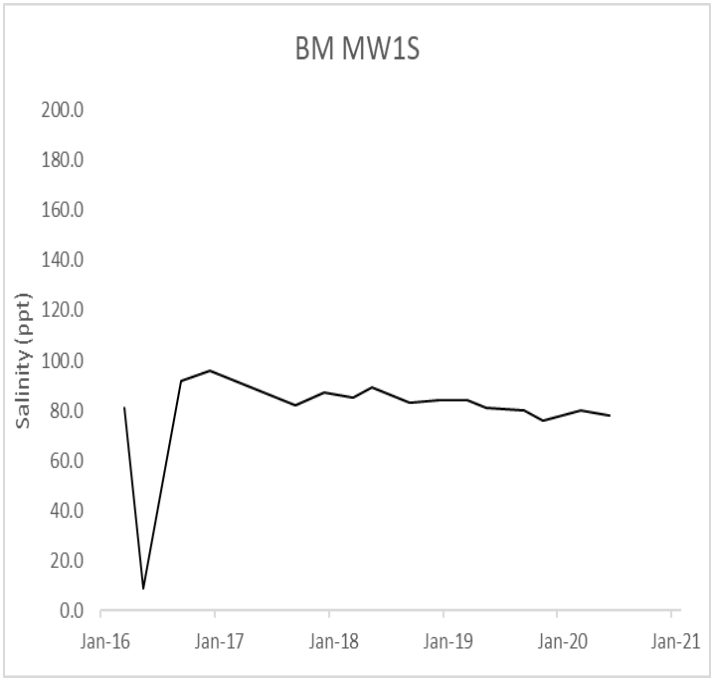
BP1D	May-16	6.6
BP1D	Sep-16	7.8
BP1D	Dec-16	6.5
BP1D	Sep-17	6.3
BP1D	Mar-18	6.4
BP1D	May-18	6.1
BP1D	Sep-18	6.2
BP1D	Dec-18	6.8
BP1D	Mar-19	5.9
BP1D	May-19	6.0
BP1D	Sep-19	6.0
BP1D	Nov-19	6.1
BP1D	Mar-20	6.1
BP1D	Jun-20	6.3
	Average	**6.4**



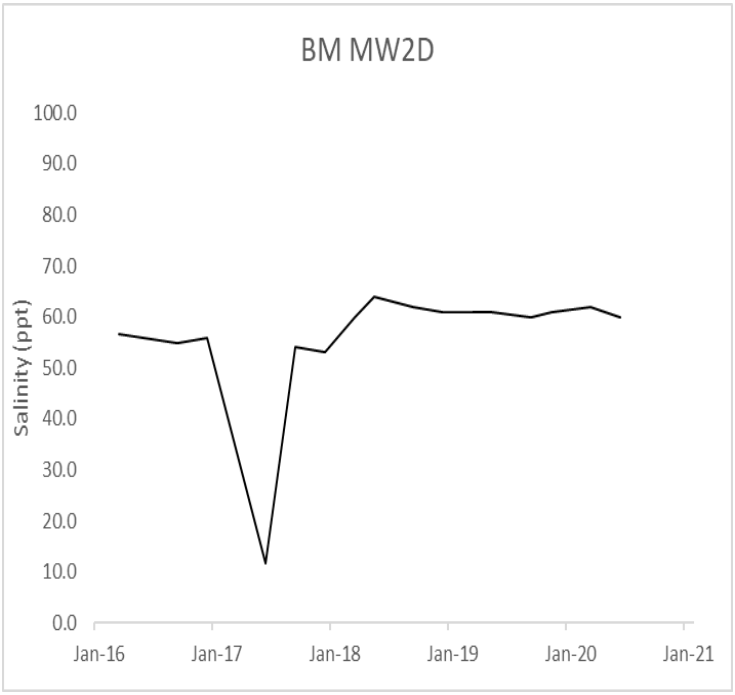
MW1D	Mar-16	162.0
MW1D	May-16	170.0
MW1D	Sep-16	155.0
MW1D	Dec-16	161.0
MW1D	Jun-17	168.0
MW1D	Sep-17	169.0
MW1D	Oct-17	169.0
MW1D	Dec-17	174.0
MW1D	Mar-18	117.0
MW1D	May-18	170.0
MW1D	Sep-18	161.0
MW1D	Dec-18	169.0
MW1D	Mar-19	169.0
MW1D	May-19	168.0
MW1D	Sep-19	163.0
MW1D	Nov-19	168.0
MW1D	Mar-20	130.0
MW1D	Jun-20	161.0
	Average	**161.3**



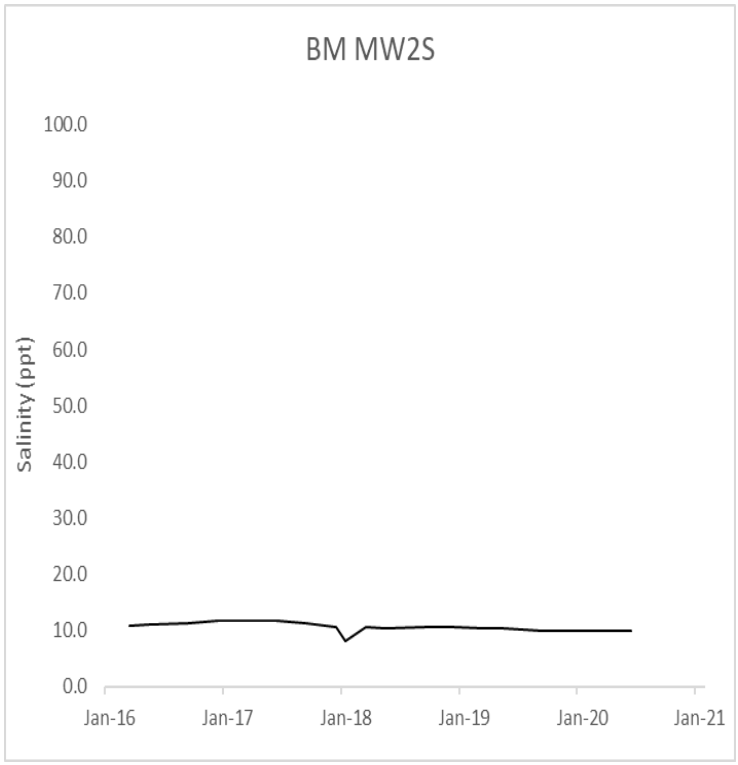
MW1S	Mar-16	81.0
MW1S	May-16	9.0
MW1S	Sep-16	92.0
MW1S	Dec-16	96.0
MW1S	Sep-17	82.0
MW1S	Dec-17	87.0
MW1S	Mar-18	85.0
MW1S	May-18	89.0
MW1S	Sep-18	83.0
MW1S	Dec-18	84.0
MW1S	Mar-19	84.0
MW1S	May-19	81.0
MW1S	Sep-19	80.0
MW1S	Nov-19	76.0
MW1S	Mar-20	80.0
MW1S	Jun-20	78.0
	Average	**79.2**



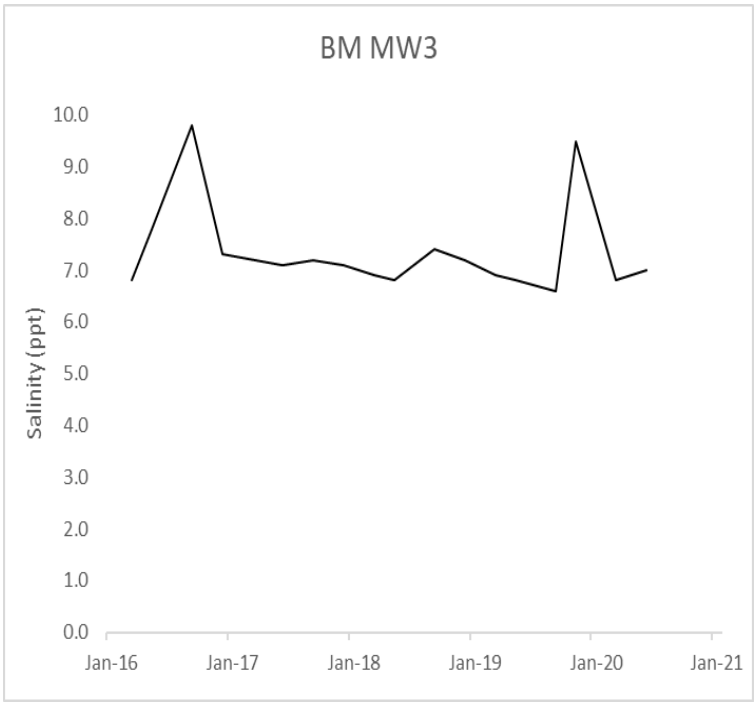
MW2D	Mar-16	56.6
MW2D	Sep-16	55.0
MW2D	Dec-16	56.0
MW2D	Jun-17	11.8
MW2D	Sep-17	54.0
MW2D	Dec-17	53.0
MW2D	Mar-18	60.0
MW2D	May-18	64.0
MW2D	Sep-18	62.0
MW2D	Dec-18	61.0
MW2D	Mar-19	61.0
MW2D	May-19	61.0
MW2D	Sep-19	60.0
MW2D	Nov-19	61.0
MW2D	Mar-20	62.0
MW2D	Jun-20	60.0
	Average	**56.2**



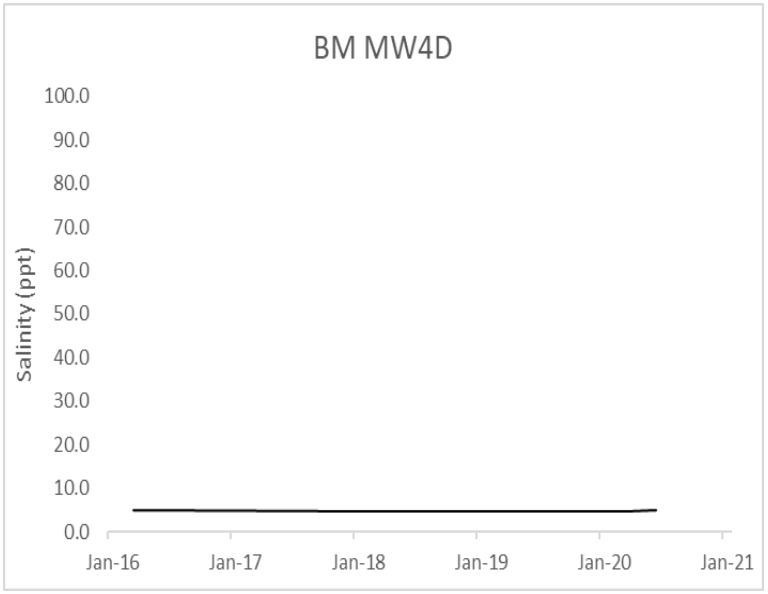
MW2S	Mar-16	10.9
MW2S	May-16	11.1
MW2S	Sep-16	11.3
MW2S	Dec-16	11.8
MW2S	Jun-17	11.8
MW2S	Sep-17	11.4
MW2S	Dec-17	10.5
MW2S	Jan-18	8.2
MW2S	Mar-18	10.5
MW2S	May-18	10.4
MW2S	Sep-18	10.7
MW2S	Dec-18	10.5
MW2S	Mar-19	10.4
MW2S	May-19	10.3
MW2S	Sep-19	10.0
MW2S	Nov-19	10.0
MW2S	Mar-20	10.0
MW2S	Jun-20	10.0
	Average	**10.5**



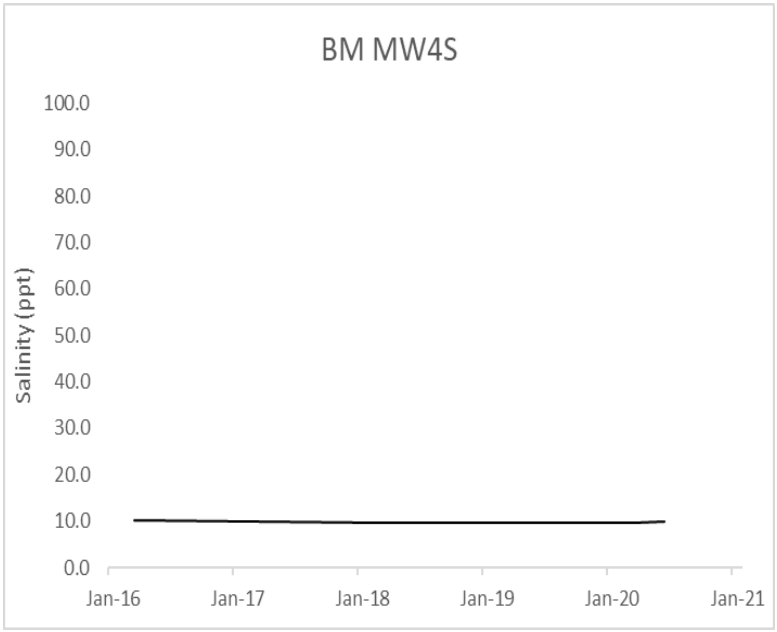
MW3	Mar-16	6.8
MW3	May-16	7.8
MW3	Sep-16	9.8
MW3	Dec-16	7.3
MW3	Jun-17	7.1
MW3	Sep-17	7.2
MW3	Dec-17	7.1
MW3	Mar-18	6.9
MW3	May-18	6.8
MW3	Sep-18	7.4
MW3	Dec-18	7.2
MW4	Mar-19	6.9
MW5	May-19	6.8
MW3	Sep-19	6.6
MW4	Nov-19	9.5
MW4	Mar-20	6.8
MW4	Jun-20	7.0
	Average	**7.4**



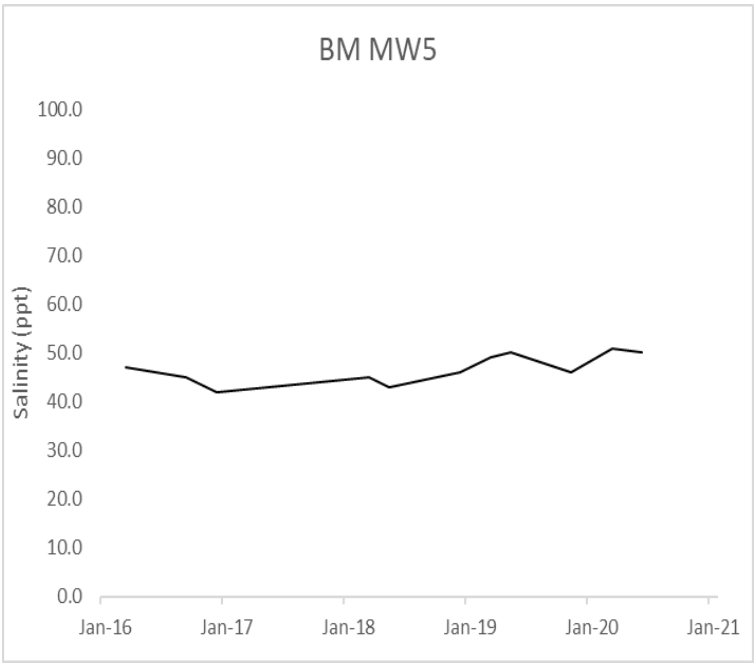
MW4D	Mar-16	4.8
MW4D	Mar-18	4.6
MW4D	May-18	4.6
MW4D	Mar-19	4.7
MW4D	May-19	4.6
MW4D	Mar-20	4.7
MW4D	Jun-20	4.9
	Average	**4.7**



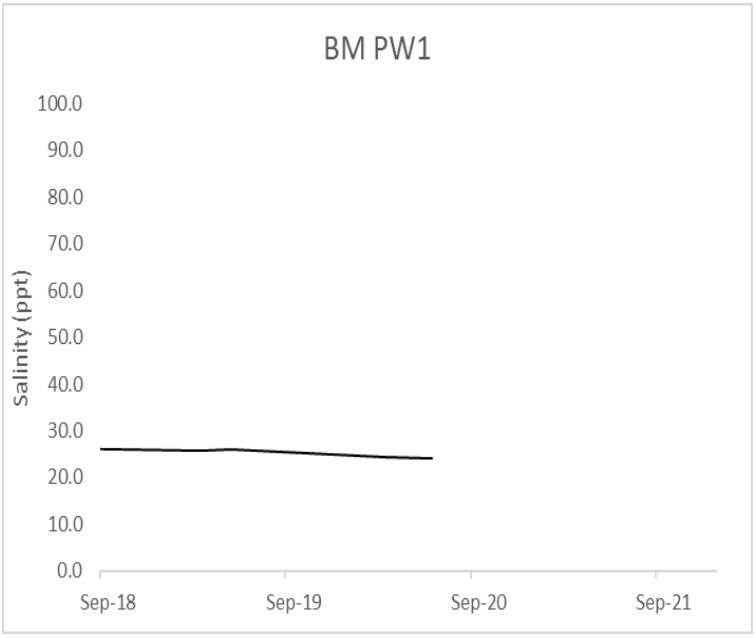
MW4S	Mar-16	10.1
MW4S	Mar-18	9.6
MW4S	May-18	9.6
MW4S	Dec-18	9.5
MW4S	Mar-19	9.6
MW4S	May-19	9.7
MW4S	Mar-20	9.7
MW4S	Jun-20	9.8
	Average	**9.7**



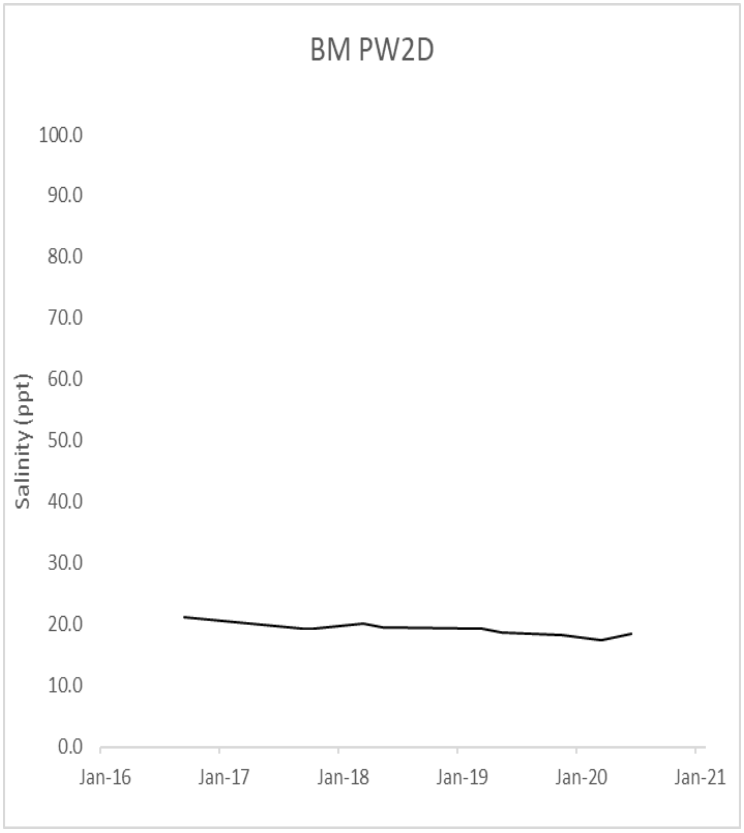
MW5	Mar-16	47.0
MW5	Sep-16	45.0
MW5	Dec-16	42.0
MW5	Mar-18	45.0
MW5	May-18	43.0
MW5	Dec-18	46.0
MW5	Mar-19	49.0
MW5	May-19	50.0
MW5	Nov-19	46.0
MW5	Mar-20	51.0
MW5	Jun-20	50.0
	Average	**46.7**



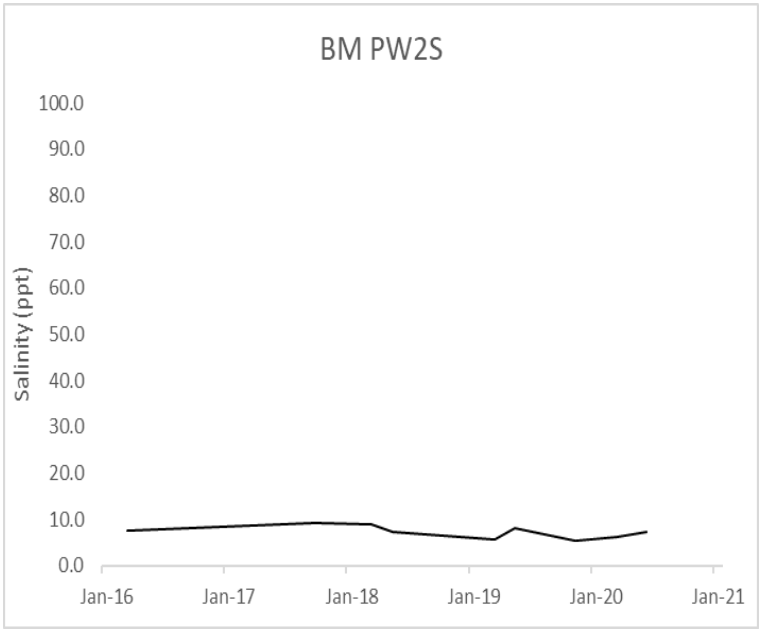
PW1	Mar-18	27.3
PW1	May-18	26.4
PW1	Mar-19	25.8
PW1	May-19	26.1
PW1	Mar-20	24.5
PW1	Jun-20	24.0
	Average	**25.7**



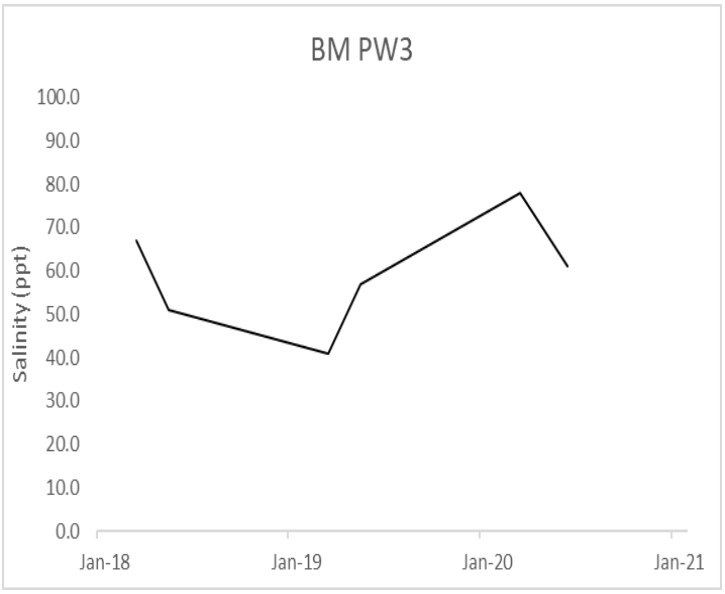
PW2D	Sep-16	21.2
PW2D	Sep-17	19.2
PW2D	Oct-17	19.2
PW2D	Mar-18	20.1
PW2D	May-18	19.6
PW2D	Mar-19	19.2
PW2D	May-19	18.7
PW2D	Nov-19	18.2
PW2D	Mar-20	17.4
PW2D	Jun-20	18.5
	Average	**19.1**



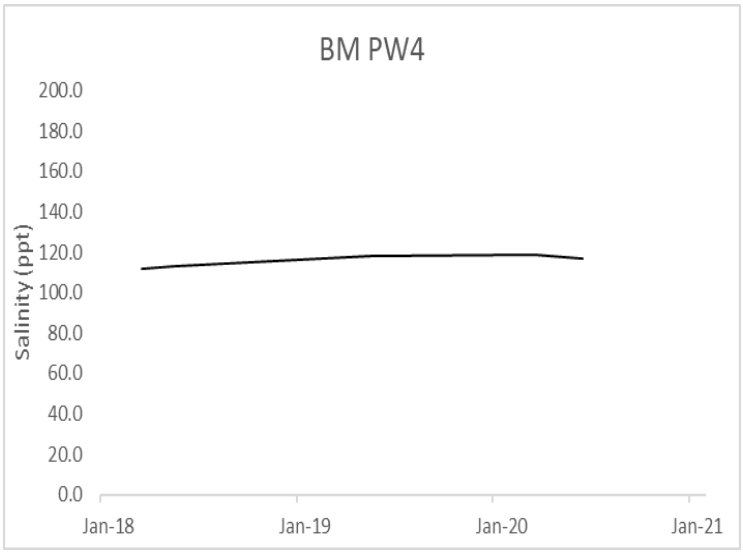
PW2S	Mar-16	7.5
PW2S	Sep-16	8.1
PW2S	Sep-17	9.3
PW2S	Oct-17	9.3
PW2S	Mar-18	8.9
PW2S	May-18	7.3
PW2S	Mar-19	5.8
PW2S	May-19	8.1
PW2S	Nov-19	5.4
PW2S	Mar-20	6.3
PW2S	Jun-20	7.3
	Average	**7.6**



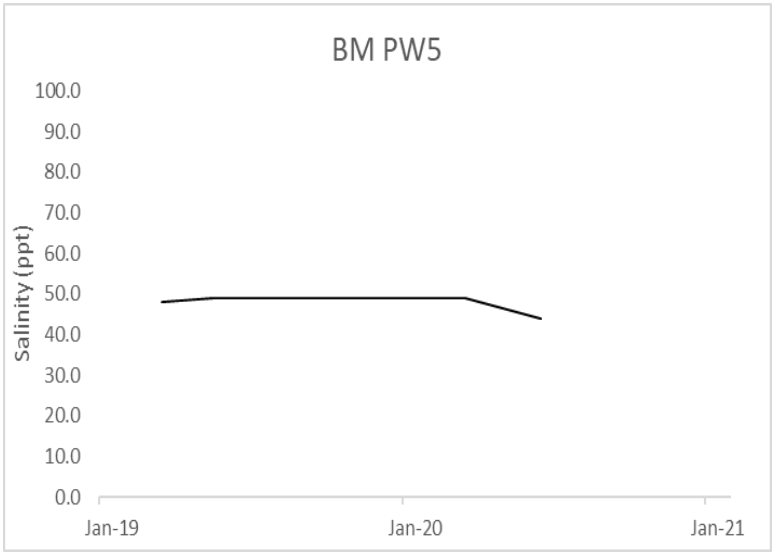
PW3	Mar-18	67.0
PW3	May-18	51.0
PW3	Mar-19	41.0
PW3	May-19	57.0
PW3	Mar-20	78.0
PW3	Jun-20	61.0
	Average	**59.2**



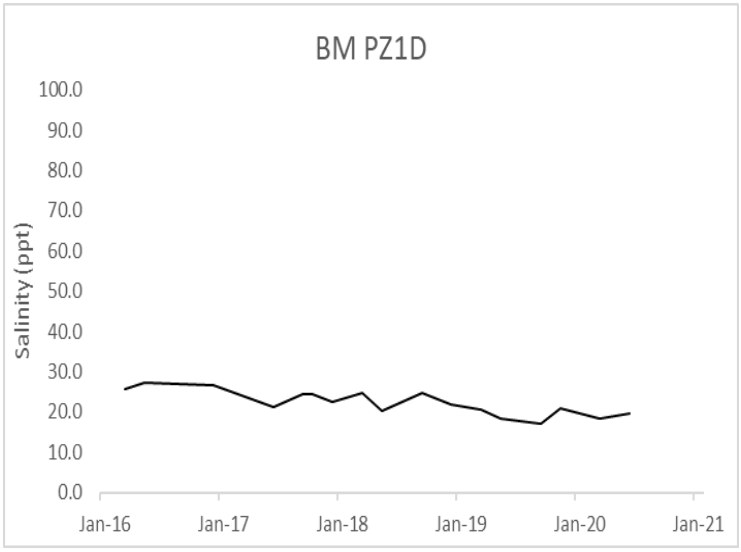
PW4	Mar-18	112.0
PW4	May-18	113.0
PW4	May-19	118.0
PW4	Mar-20	119.0
PW4	Jun-20	117.0
	Average	**115.8**



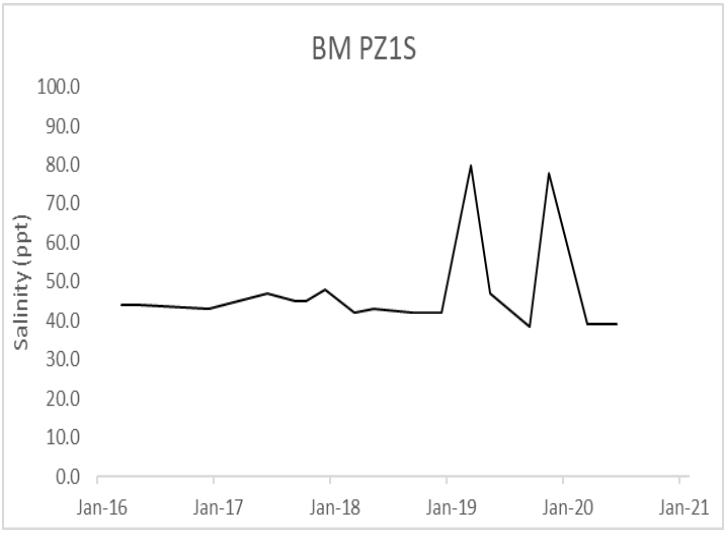
PW5	Mar-19	48.0
PW5	May-19	49.0
PW5	Mar-20	49.0
PW5	Jun-20	44.0
	Average	**47.5**



PZ1D	Mar-16	25.6
PZ1D	May-16	27.3
PZ1D	Dec-16	26.8
PZ1D	Jun-17	21.1
PZ1D	Sep-17	24.5
PZ1D	Oct-17	24.5
PZ1D	Dec-17	22.4
PZ1D	Mar-18	24.7
PZ1D	May-18	20.3
PZ1D	Sep-18	24.9
PZ1D	Dec-18	21.8
PZ1D	Mar-19	20.7
PZ1D	May-19	18.4
PZ1D	Sep-19	17.2
PZ1D	Nov-19	20.9
PZ1D	Mar-20	18.4
PZ1D	Jun-20	19.5
	Average	**22.3**



PZ1S	Mar-16	44.0
PZ1S	May-16	44.0
PZ1S	Dec-16	43.0
PZ1S	Jun-17	47.0
PZ1S	Sep-17	45.0
PZ1S	Oct-17	45.0
PZ1S	Dec-17	48.0
PZ1S	Mar-18	42.0
PZ1S	May-18	43.0
PZ1S	Sep-18	42.0
PZ1S	Dec-18	42.0
PZ1S	Mar-19	79.8
PZ1S	May-19	47.0
PZ1S	Sep-19	38.5
PZ1S	Nov-19	77.8
PZ1S	Mar-20	39.1
PZ1S	Jun-20	39.2
	Average	**47.4**



PZ3	Mar-18	23.1
PZ3	May-18	22.0
PZ3	Mar-19	22.3
PZ3	May-19	22.7
PZ3	Mar-20	22.9
PZ3	Jun-20	23.0
	Average	**22.7**

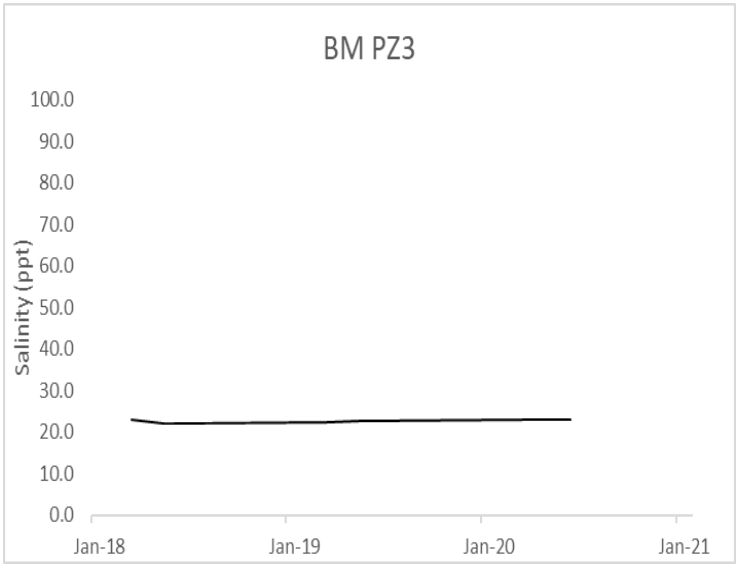


Figure C-10. Bryan Mound Water Monitoring Well Salinities

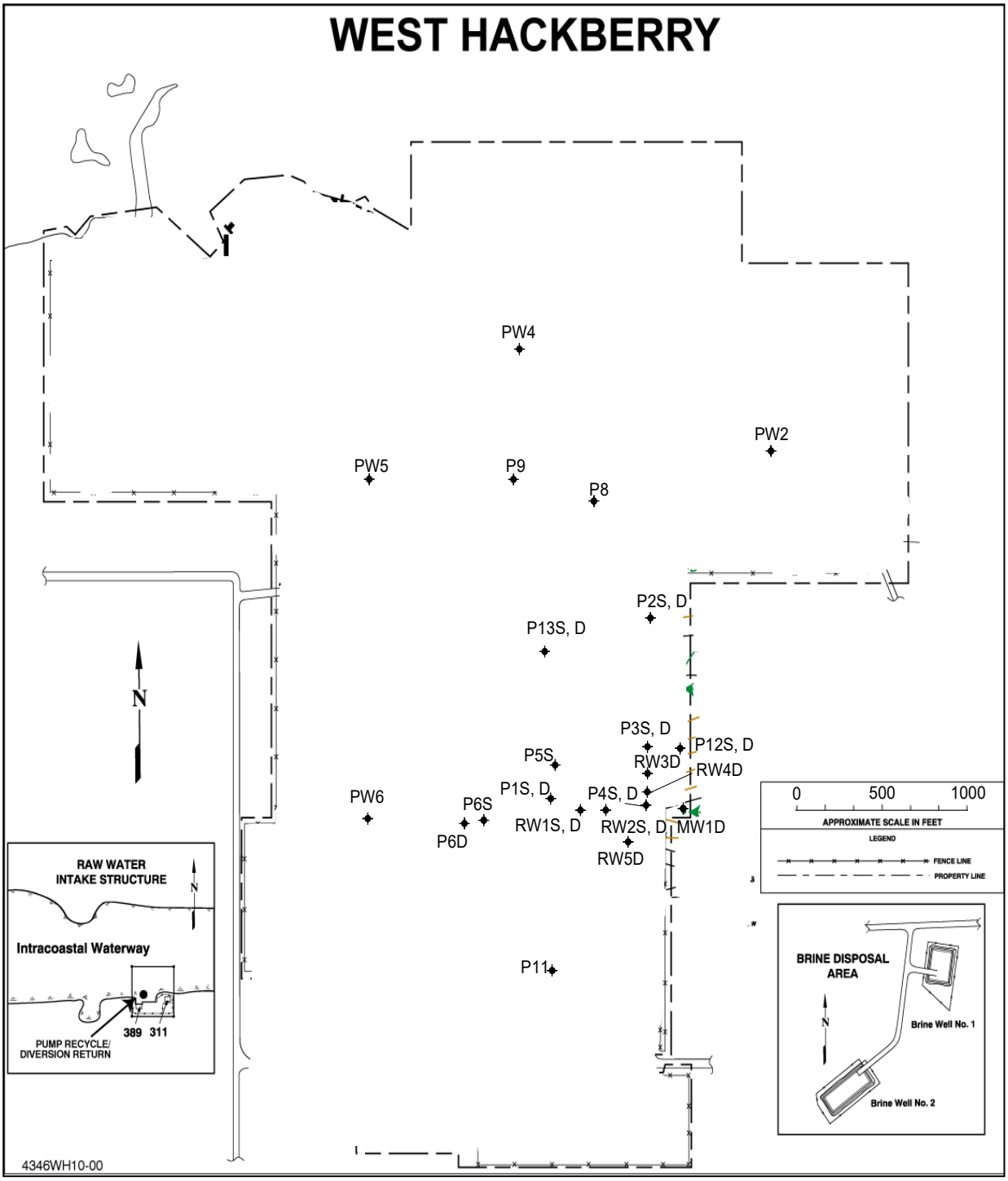


Figure C-11. West Hackberry Ground Water Monitoring Stations, Deep and Shallow

West Hackberry 2020 Contour-Shallow

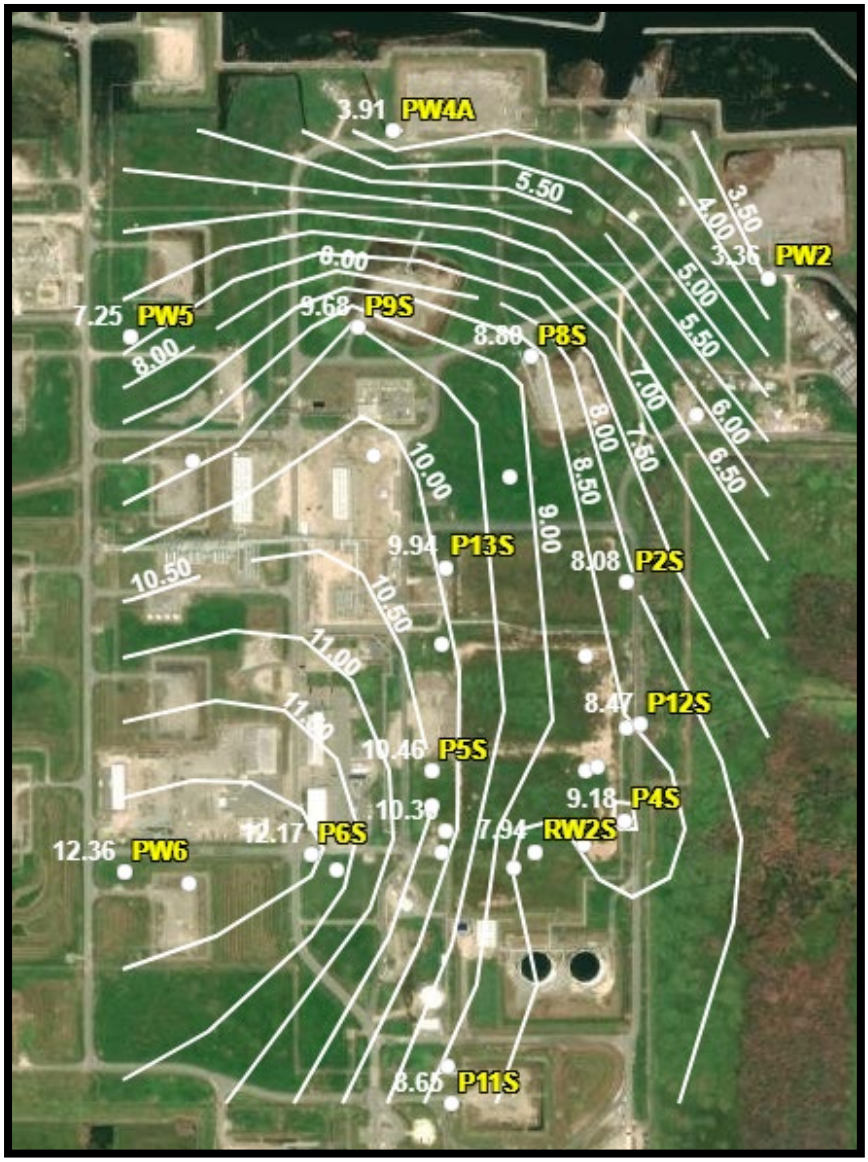


Figure C-12. West Hackberry Shallow Ground Water Zone Contoured Elevations June 2020

West Hackberry 2020 Contour-Deep

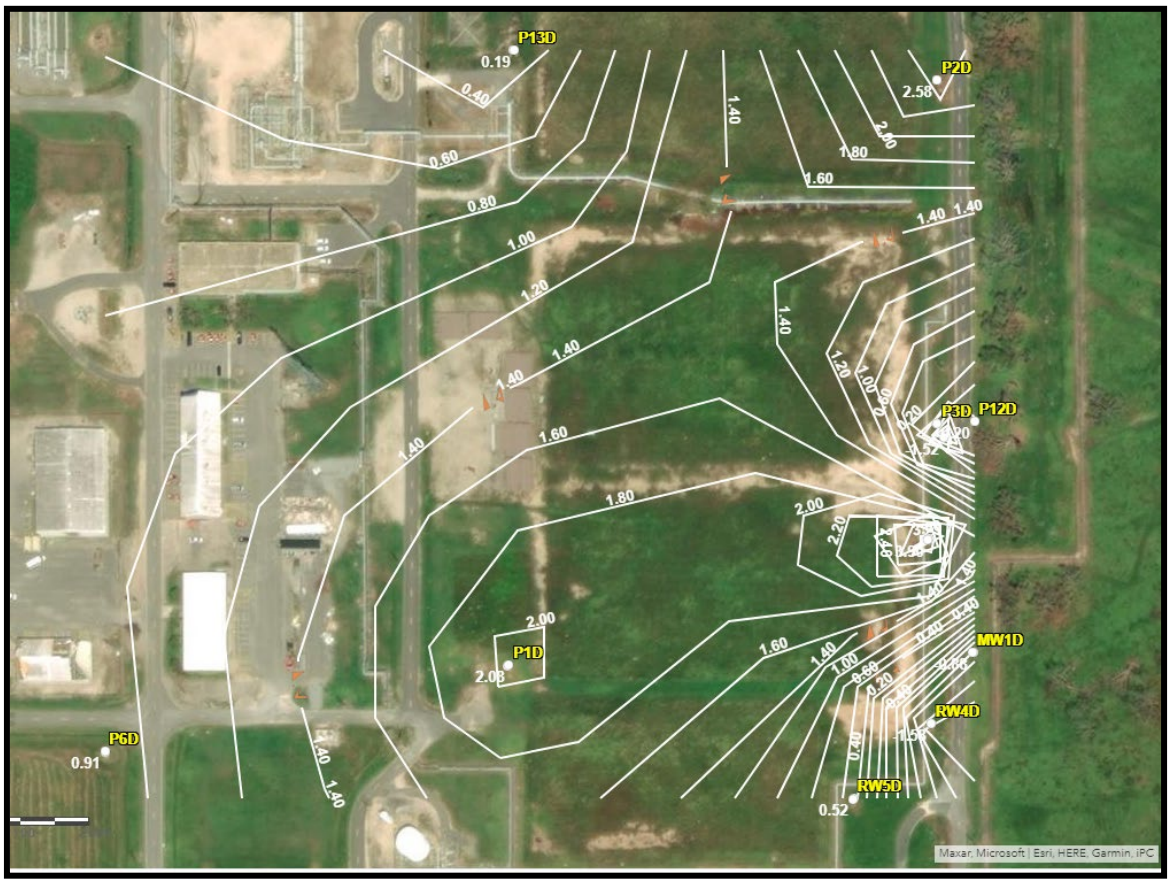
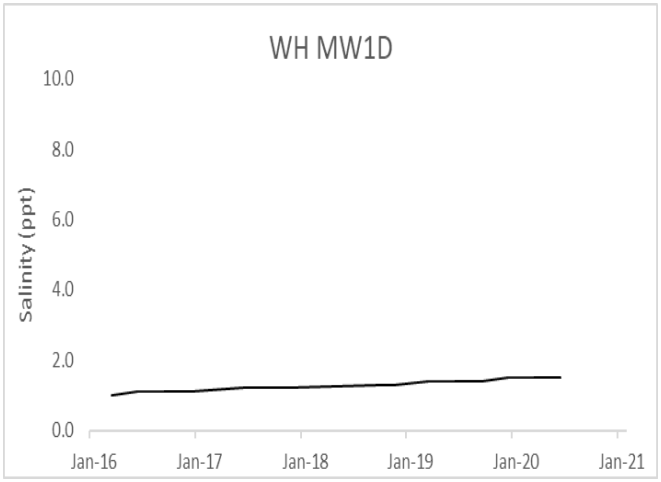
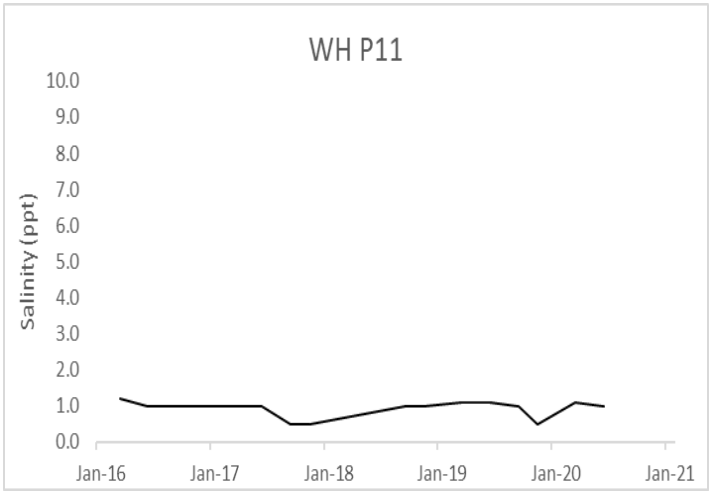


Figure C-13 West Hackberry Deep Ground Water Zone Contoured Elevations June 2020

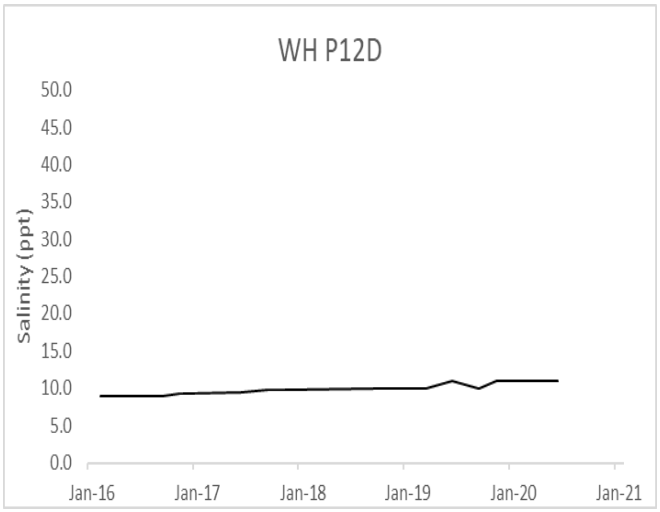
MW1D	Mar-16	1.0
MW1D	Jun-16	1.1
MW1D	Sep-16	1.1
MW1D	Dec-16	1.1
MW1D	Jun-17	1.2
MW1D	Sep-17	1.2
MW1D	Nov-17	1.2
MW1D	Sep-18	1.3
MW1D	Nov-18	1.3
MW1D	Mar-19	1.4
MW1D	Jun-19	1.4
MW1D	Sep-19	1.4
MW1D	Dec-19	1.5
MW1D	Mar-20	1.5
MW1D	Jun-20	1.5
	Average	**1.3**



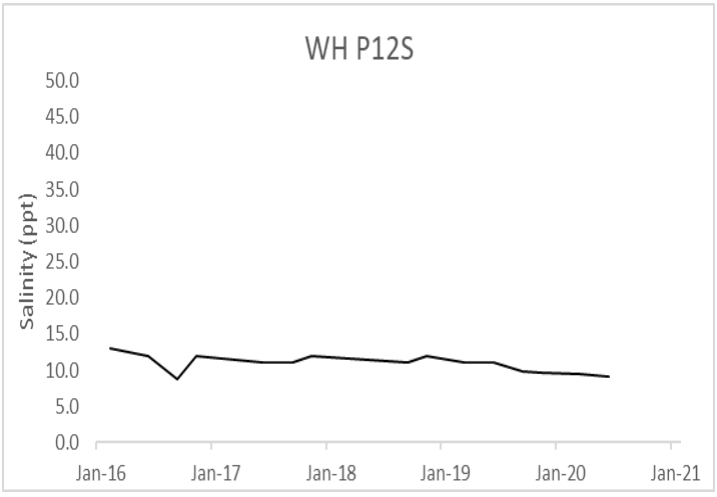
P11	Mar-16	1.2
P11	Jun-16	1.0
P11	Sep-16	1.0
P11	Nov-16	1.0
P11	Jun-17	1.0
P11	Sep-17	0.5
P11	Nov-17	0.5
P11	Sep-18	1.0
P11	Nov-18	1.0
P11	Mar-19	1.1
P11	Jun-19	1.1
P11	Sep-19	1.0
P11	Nov-19	0.5
P11	Mar-20	1.1
P11	Jun-20	1.0
	Average	**0.9**



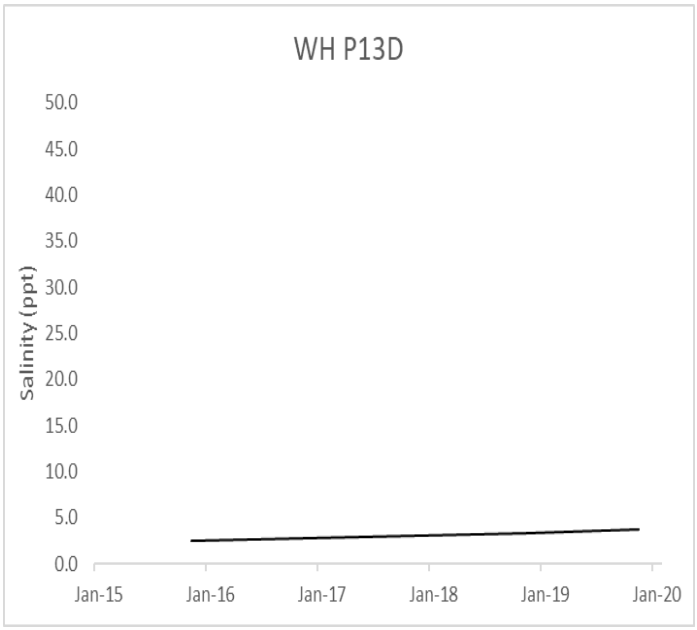
P12D	Feb-16	9.0
P12D	Jun-16	9.0
P12D	Sep-16	9.0
P12D	Nov-16	9.3
P12D	Jun-17	9.4
P12D	Sep-17	9.7
P12D	Nov-17	9.8
P12D	Sep-18	10.0
P12D	Nov-18	10.0
P12D	Mar-19	10.0
P12D	Jun-19	11.0
P12D	Sep-19	10.0
P12D	Nov-19	11.0
P12D	Mar-20	11.0
P12D	Jun-20	11.0
	Average	**9.9**



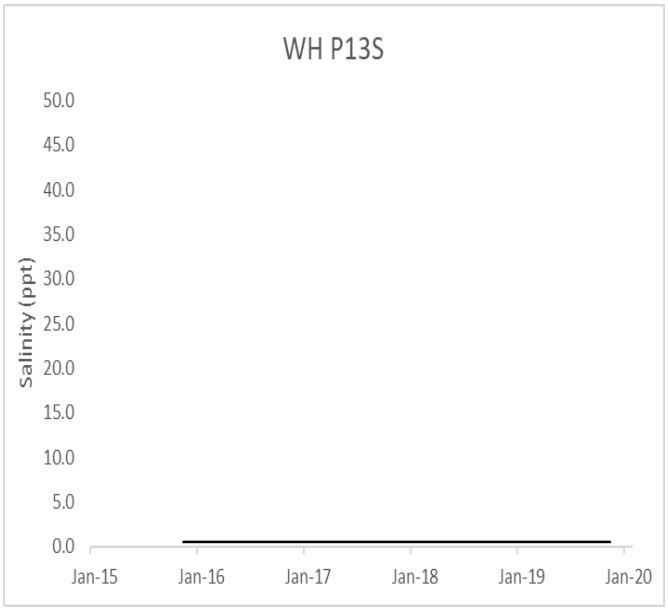
P12S	Feb-16	13.0
P12S	Jun-16	12.0
P12S	Sep-16	8.8
P12S	Nov-16	12.0
P12S	Jun-17	11.0
P12S	Sep-17	11.0
P12S	Nov-17	12.0
P12S	Sep-18	11.0
P12S	Nov-18	12.0
P12S	Mar-19	11.0
P12S	Jun-19	11.0
P12S	Sep-19	9.8
P12S	Nov-19	9.7
P12S	Mar-20	9.5
P12S	Jun-20	9.1
	Average	**10.9**



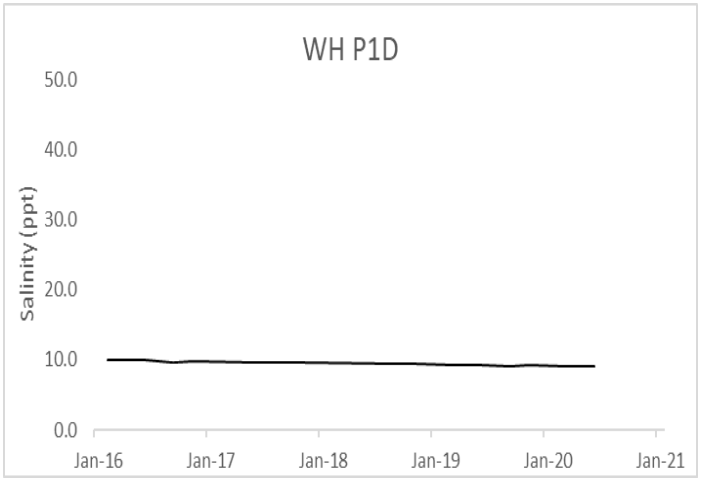
P13D	Nov-15	2.5
P13D	Nov-16	2.8
P13D	Nov-17	3.0
P13D	Nov-18	3.4
P13D	Nov-19	3.7
	Average	**3.1**



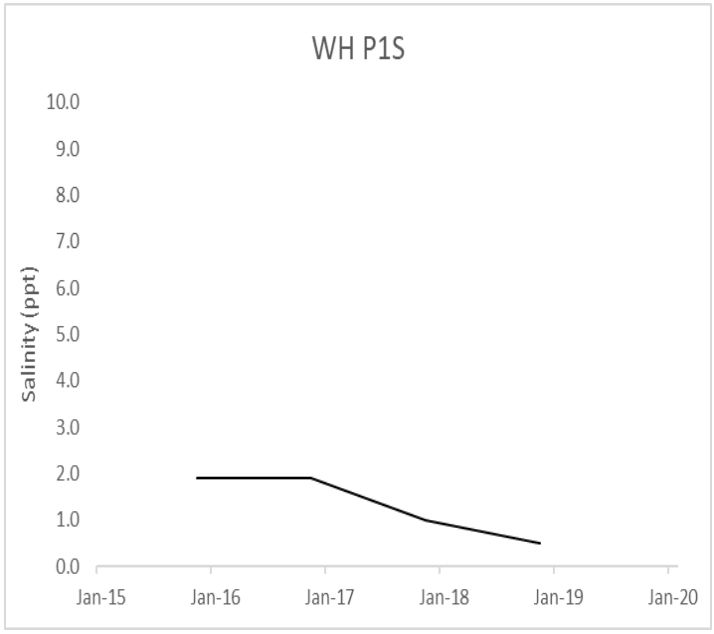
P13S	Nov-15	0.5
P13S	Nov-16	0.5
P13S	Nov-17	0.5
P13S	Nov-18	0.5
P13S	Nov-19	0.5
	Average	**0.5**



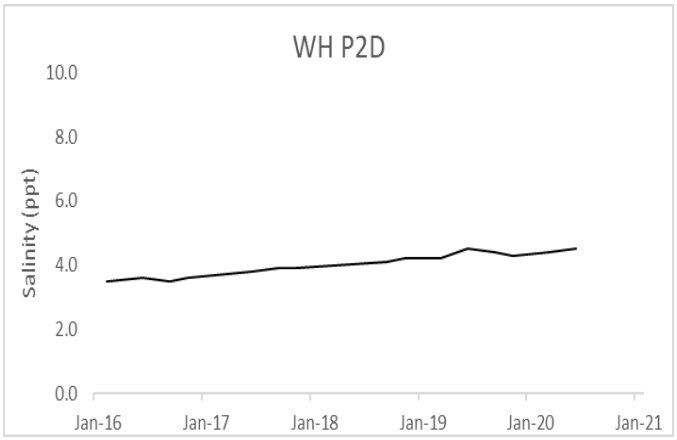
P1D	Feb-16	10.0
P1D	Jun-16	9.9
P1D	Sep-16	9.7
P1D	Nov-16	9.8
P1D	Jun-17	9.7
P1D	Sep-17	9.7
P1D	Nov-17	9.7
P1D	Sep-18	9.4
P1D	Nov-18	9.5
P1D	Mar-19	9.3
P1D	Jun-19	9.3
P1D	Sep-19	9.1
P1D	Nov-19	9.2
P1D	Mar-20	9.1
P1D	Jun-20	9.1
	Average	**9.5**



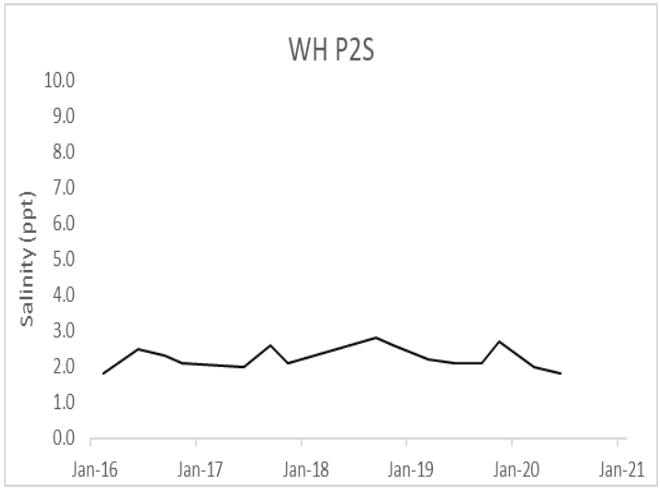
P1S	Nov-15	1.9
P1S	Nov-16	1.9
P1S	Nov-17	1.0
P1S	Nov-18	0.5
P1S	Nov-19	0.5
	Average	**1.2**



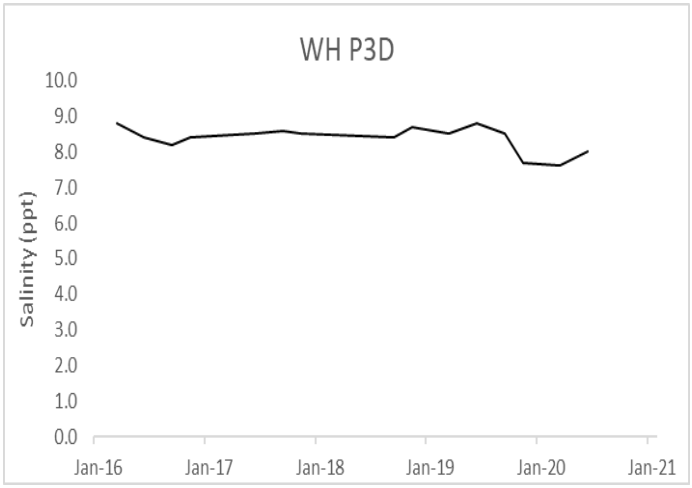
P2D	Feb-16	3.5
P2D	Jun-16	3.6
P2D	Sep-16	3.5
P2D	Nov-16	3.6
P2D	Jun-17	3.8
P2D	Sep-17	3.9
P2D	Nov-17	3.9
P2D	Sep-18	4.1
P2D	Nov-18	4.2
P2D	Mar-19	4.2
P2D	Jun-19	4.5
P2D	Sep-19	4.4
P2D	Nov-19	4.3
P2D	Mar-20	4.4
P2D	Jun-20	4.5
	Average	**4.0**



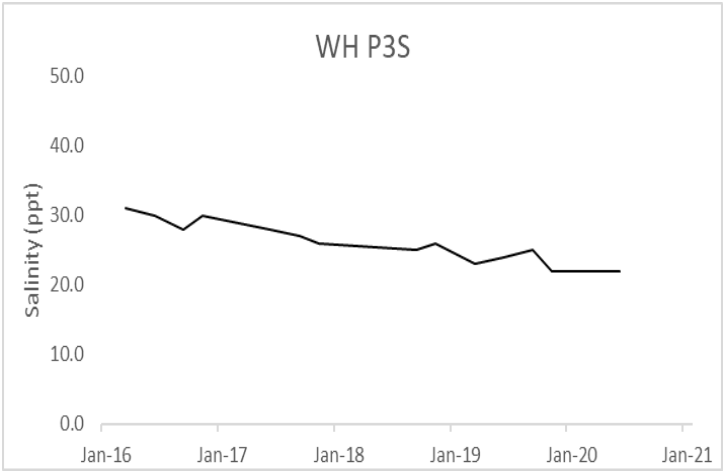
P2S	Feb-16	1.8
P2S	Jun-16	2.5
P2S	Sep-16	2.3
P2S	Nov-16	2.1
P2S	Jun-17	2.0
P2S	Sep-17	2.6
P2S	Nov-17	2.1
P2S	Sep-18	2.8
P2S	Nov-18	2.6
P2S	Mar-19	2.2
P2S	Jun-19	2.1
P2S	Sep-19	2.1
P2S	Nov-19	2.7
P2S	Mar-20	2.0
P2S	Jun-20	1.8
	Average	**2.2**



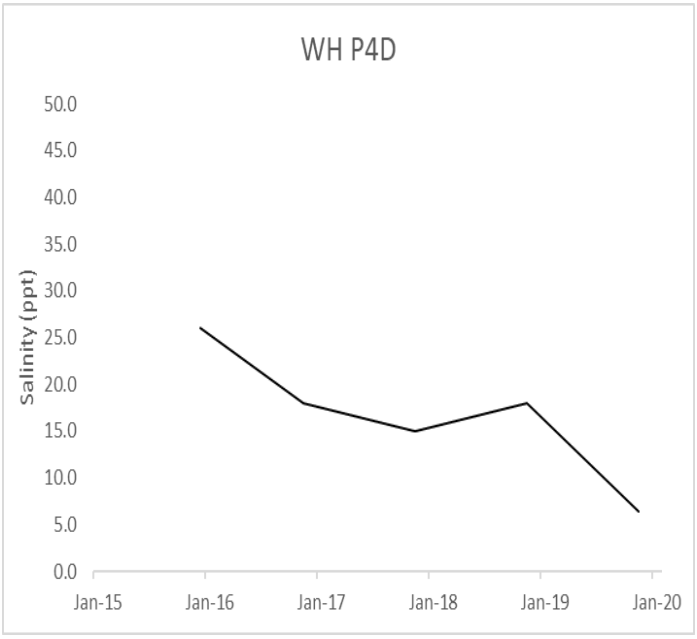
P3D	Mar-16	8.8
P3D	Jun-16	8.4
P3D	Sep-16	8.2
P3D	Nov-16	8.4
P3D	Jun-17	8.5
P3D	Sep-17	8.6
P3D	Nov-17	8.5
P3D	Sep-18	8.4
P3D	Nov-18	8.7
P3D	Mar-19	8.5
P3D	Jun-19	8.8
P3D	Sep-19	8.5
P3D	Nov-19	7.7
P3D	Mar-20	7.6
P3D	Jun-20	8.0
	Average	**8.4**



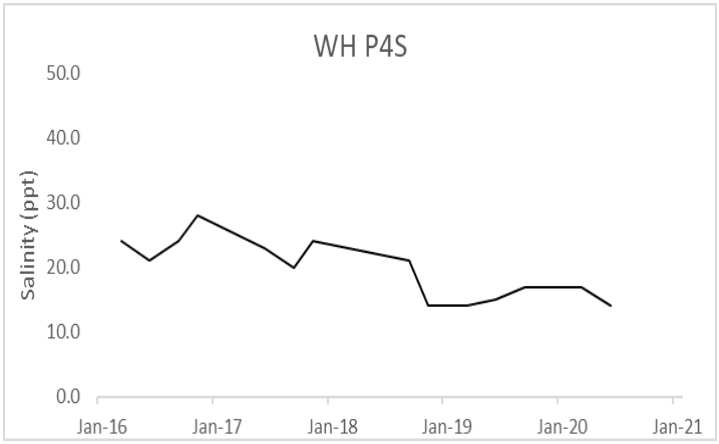
P3S	Mar-16	31.0
P3S	Jun-16	30.0
P3S	Sep-16	28.0
P3S	Nov-16	30.0
P3S	Jun-17	28.0
P3S	Sep-17	27.0
P3S	Nov-17	26.0
P3S	Sep-18	25.0
P3S	Nov-18	26.0
P3S	Mar-19	23.0
P3S	Jun-19	24.0
P3S	Sep-19	25.0
P3S	Nov-19	22.0
P3S	Mar-20	22.0
P3S	Jun-20	22.0
	Average	**25.9**



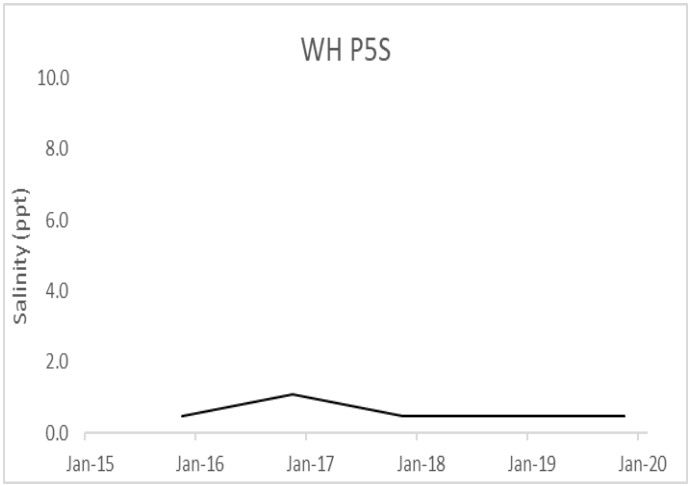
P4D	Dec-15	26.0
P4D	Nov-16	18.0
P4D	Nov-17	15.0
P4D	Nov-18	18.0
P4D	Nov-19	6.4
	Average	**16.7**



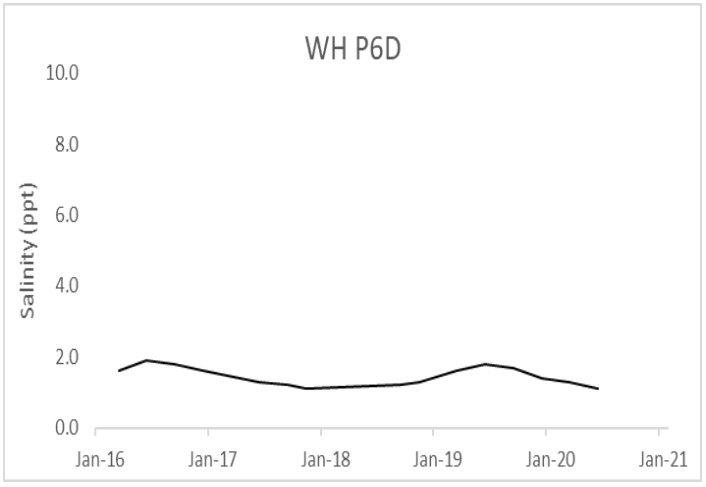
P4S	Mar-16	24.0
P4S	Jun-16	21.0
P4S	Sep-16	24.0
P4S	Nov-16	28.0
P4S	Jun-17	23.0
P4S	Sep-17	20.0
P4S	Nov-17	24.0
P4S	Sep-18	21.0
P4S	Nov-18	14.0
P4S	Mar-19	14.0
P4S	Jun-19	15.0
P4S	Sep-19	17.0
P4S	Nov-19	17.0
P4S	Mar-20	17.0
P4S	Jun-20	14.0
	Average	**19.5**



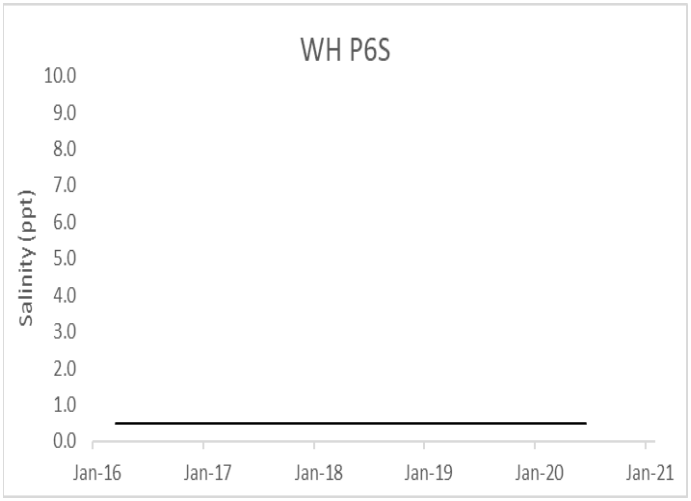
P5S	Nov-15	0.5
P5S	Nov-16	1.1
P5S	Nov-17	0.5
P5S	Nov-18	0.5
P5S	Nov-19	0.5
	Average	**0.6**



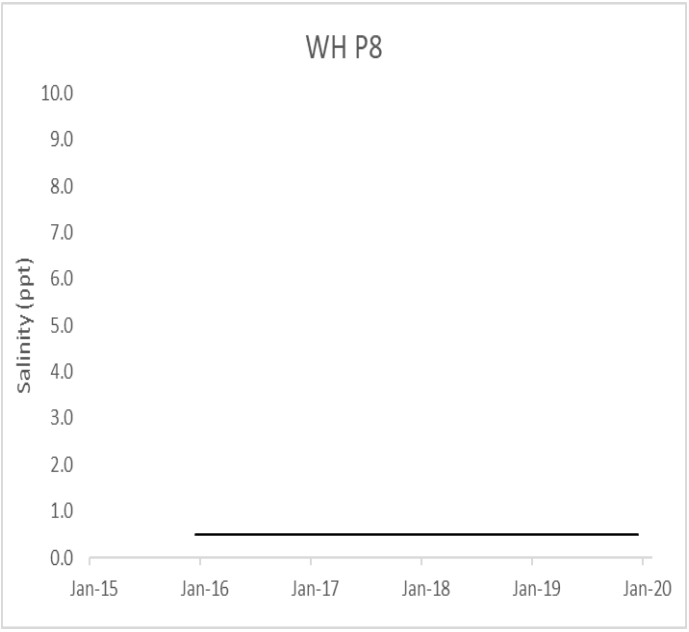
P6D	Mar-16	1.6
P6D	Jun-16	1.9
P6D	Sep-16	1.8
P6D	Dec-16	1.6
P6D	Jun-17	1.3
P6D	Sep-17	1.2
P6D	Nov-17	1.1
P6D	Sep-18	1.2
P6D	Nov-18	1.3
P6D	Mar-19	1.6
P6D	Jun-19	1.8
P6D	Sep-19	1.7
P6D	Dec-19	1.4
P6D	Mar-20	1.3
P6D	Jun-20	1.1
	Average	**1.5**



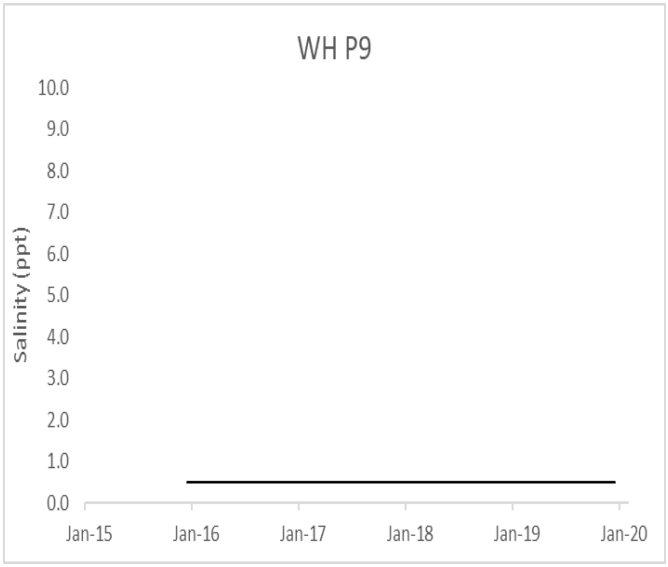
P6S	Mar-16	0.5
P6S	Jun-16	0.5
P6S	Sep-16	0.5
P6S	Dec-16	0.5
P6S	Jun-17	0.5
P6S	Sep-17	0.5
P6S	Nov-17	0.5
P6S	Sep-18	0.5
P6S	Nov-18	0.5
P6S	Mar-19	0.5
P6S	Jun-19	0.5
P6S	Sep-19	0.5
P6S	Dec-19	0.5
P6S	Mar-20	0.5
P6S	Jun-20	0.5
	Average	**0.5**



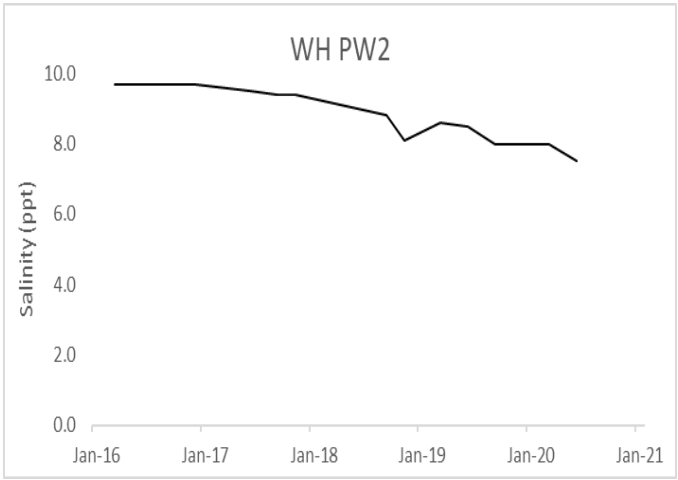
P8	Dec-15	0.5
P8	Dec-16	0.5
P8	Nov-17	0.5
P8	Nov-18	0.5
P8	Dec-19	0.5
	Average	**0.5**



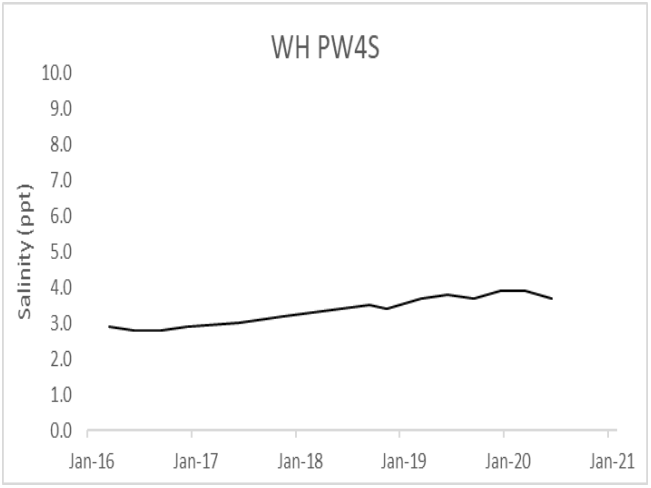
P9	Dec-15	0.5
P9	Dec-16	0.5
P9	Nov-17	0.5
P9	Nov-18	0.5
P9	Dec-19	0.5
	Average	**0.5**



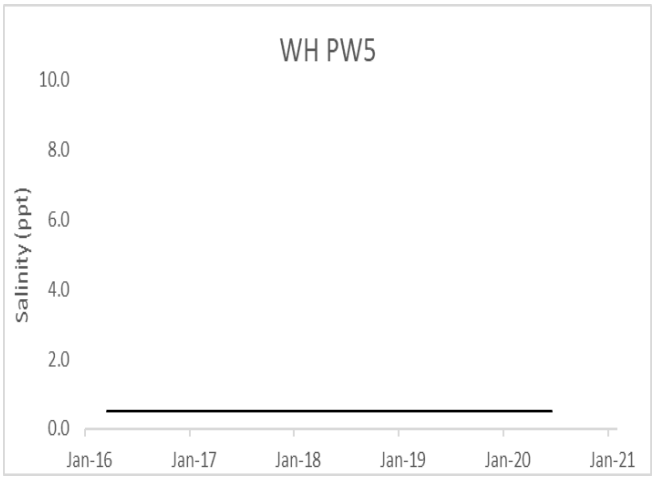
PW2	Mar-16	9.7
PW2	Jun-16	9.7
PW2	Sep-16	9.7
PW2	Dec-16	9.7
PW2	Jun-17	9.5
PW2	Sep-17	9.4
PW2	Nov-17	9.4
PW2	Sep-18	8.8
PW2	Nov-18	8.1
PW2	Mar-19	8.6
PW2	Jun-19	8.5
PW2	Sep-19	8.0
PW2	Dec-19	8.0
PW2	Mar-20	8.0
PW2	Jun-20	7.5
	Average	**8.8**



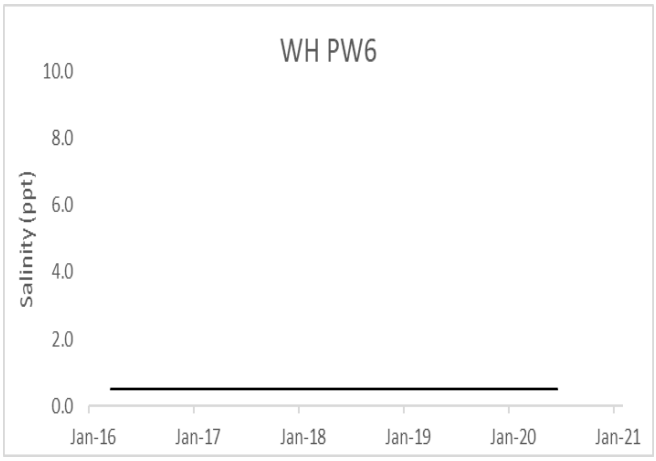
PW4S	Mar-16	2.9
PW4S	Jun-16	2.8
PW4S	Sep-16	2.8
PW4S	Dec-16	2.9
PW4S	Jun-17	3.0
PW4S	Sep-17	3.1
PW4S	Nov-17	3.2
PW4S	Sep-18	3.5
PW4S	Nov-18	3.4
PW4S	Mar-19	3.7
PW4S	Jun-19	3.8
PW4S	Sep-19	3.7
PW4S	Dec-19	3.9
PW4S	Mar-20	3.9
PW4S	Jun-20	3.7
	Average	**3.4**



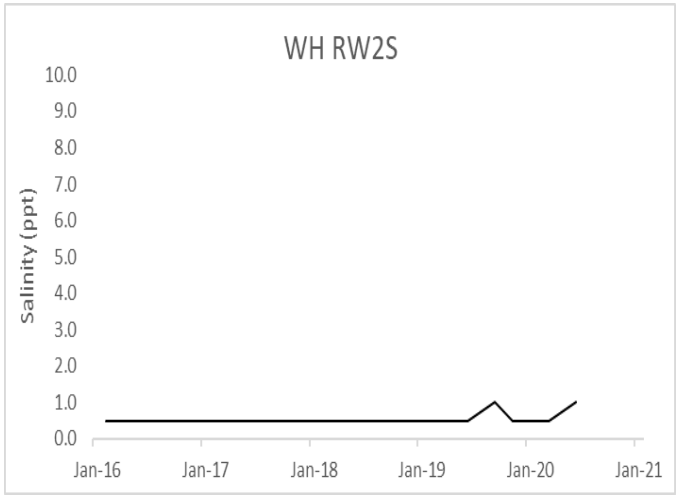
PW5	Mar-16	0.5
PW5	Jun-16	0.5
PW5	Sep-16	0.5
PW5	Dec-16	0.5
PW5	Jun-17	0.5
PW5	Sep-17	0.5
PW5	Nov-17	0.5
PW5	Sep-18	0.5
PW5	Nov-18	0.5
PW5	Mar-19	0.5
PW5	Jun-19	0.5
PW5	Sep-19	0.5
PW5	Dec-19	0.5
PW5	Mar-20	0.5
PW5	Jun-20	0.5
	Average	**0.5**



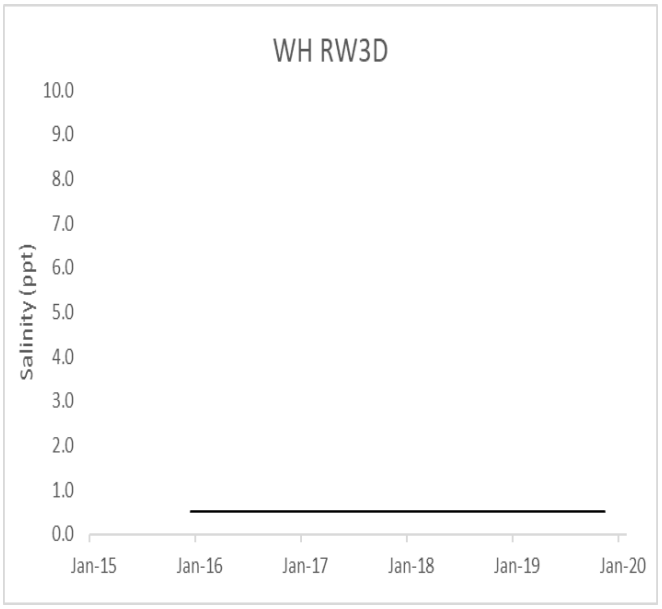
PW6	Mar-16	0.5
PW6	Jun-16	0.5
PW6	Sep-16	0.5
PW6	Dec-16	0.5
PW6	Jun-17	0.5
PW6	Sep-17	0.5
PW6	Nov-17	0.5
PW6	Sep-18	0.5
PW6	Nov-18	0.5
PW6	Mar-19	0.5
PW6	Jun-19	0.5
PW6	Sep-19	0.5
PW6	Dec-19	0.5
PW6	Mar-20	0.5
PW6	Jun-20	0.5
	Average	**0.5**



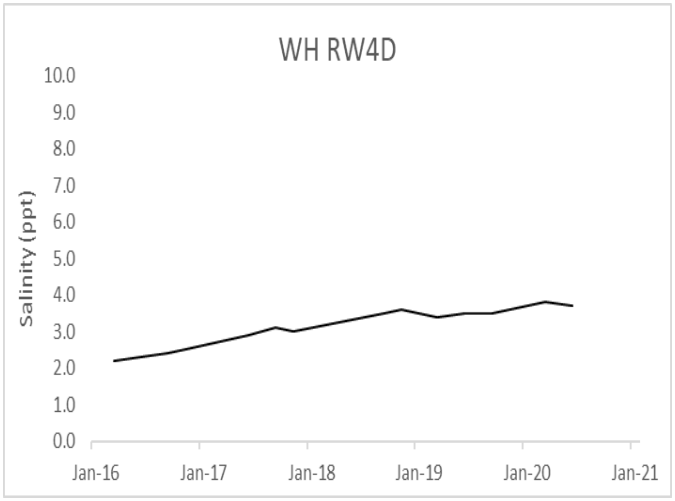
RW2S	Feb-16	0.5
RW2S	Jun-16	0.5
RW2S	Sep-16	0.5
RW2S	Nov-16	0.5
RW2S	Jun-17	0.5
RW2S	Sep-17	0.5
RW2S	Nov-17	0.5
RW2S	Sep-18	0.5
RW2S	Nov-18	0.5
RW2S	Mar-19	0.5
RW2S	Jun-19	0.5
RW2S	Sep-19	1.0
RW2S	Nov-19	0.5
RW2S	Mar-20	0.5
RW2S	Jun-20	1.0
	Average	**0.6**



RW3D	Dec-15	0.5
RW3D	Nov-16	0.5
RW3D	Nov-17	0.5
RW3D	Nov-18	0.5
RW3D	Nov-19	0.5
	Average	**0.5**



RW4D	Mar-16	2.2
RW4D	Jun-16	2.3
RW4D	Sep-16	2.4
RW4D	Nov-16	2.5
RW4D	Jun-17	2.9
RW4D	Sep-17	3.1
RW4D	Nov-17	3.0
RW4D	Sep-18	3.5
RW4D	Nov-18	3.6
RW4D	Mar-19	3.4
RW4D	Jun-19	3.5
RW4D	Sep-19	3.5
RW4D	Nov-19	3.6
RW4D	Mar-20	3.8
RW4D	Jun-20	3.7
	Average	**3.1**



RW5D	Mar-16	19.0
RW5D	Jun-16	16.0
RW5D	Sep-16	14.0
RW5D	Nov-16	11.0
RW5D	Jun-17	15.0
RW5D	Sep-17	14.0
RW5D	Nov-17	11.0
RW5D	Sep-18	9.9
RW5D	Nov-18	12.0
RW5D	Mar-19	12.0
RW5D	Jun-19	8.0
RW5D	Sep-19	7.8
RW5D	Nov-19	8.5
RW5D	Mar-20	9.8
RW5D	Jun-20	8.4
	Average	**11.8**

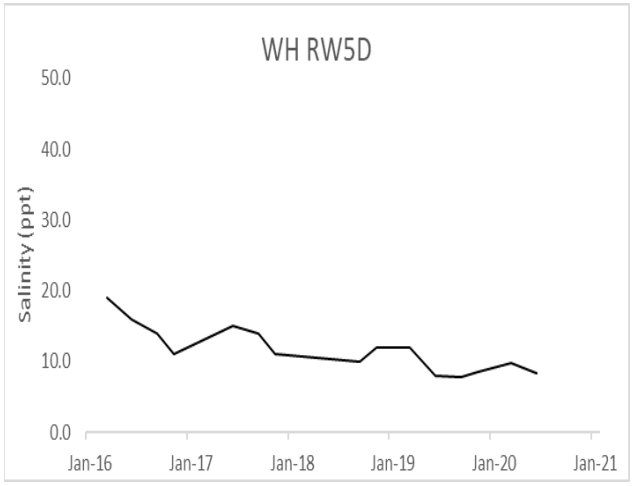
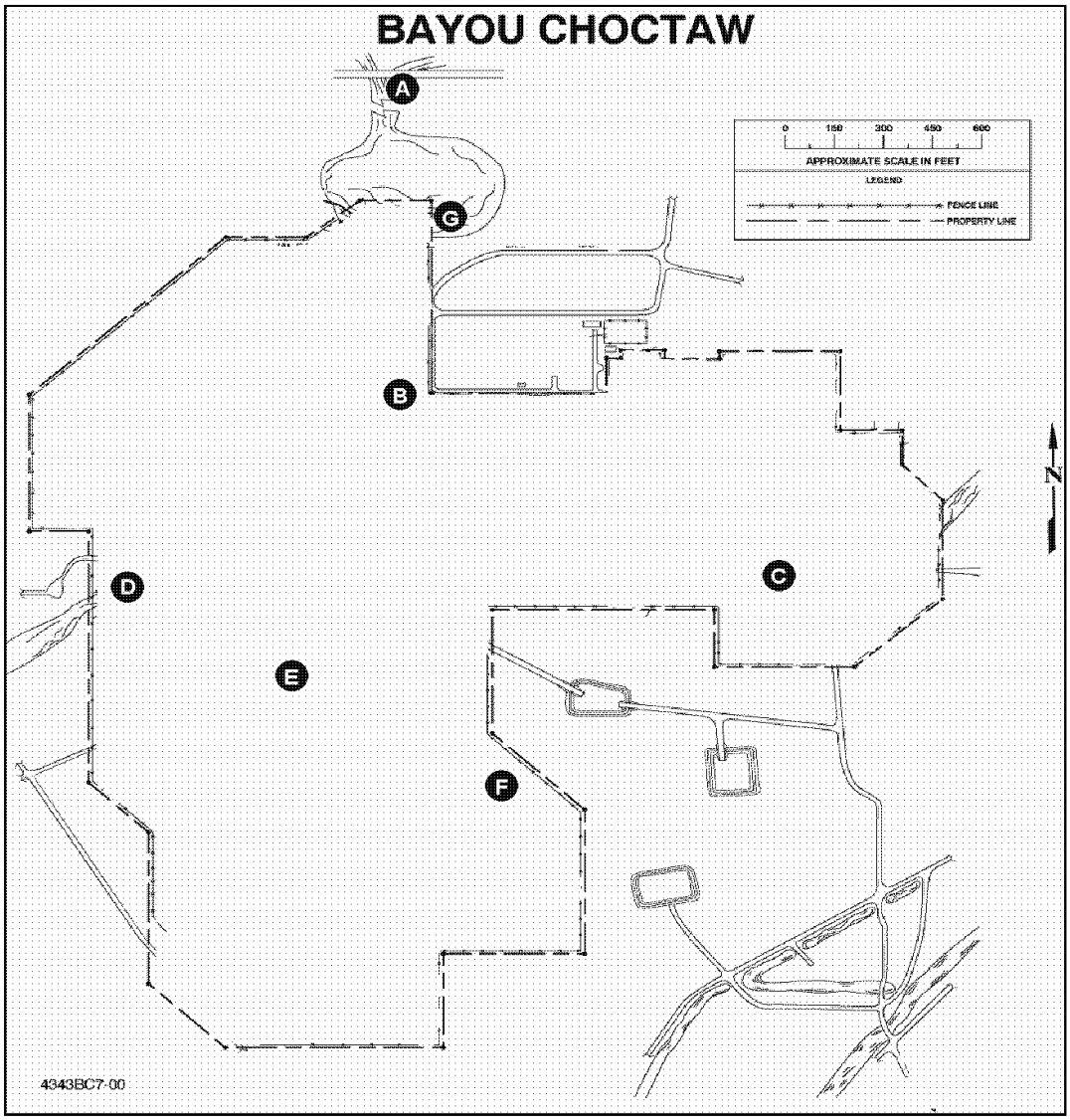


Figure C-14. West Hackberry Monitoring Well Salinities

Appendix D

SURFACE WATER QUALITY SURVEILLANCE MONITORING DURING 2020



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

Table D-1 2020 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	7	7	7	7	7	7
	Number of BDL	0	3	NV	10	NV	0
	Maximum	7.9	2.5	7.9	0.5	22.6	10.6
	Minimum	2.5	2.5	6.7	0.5	13.1	0.5
	Mean	6.2	2.5	7.3	0.5	17.8	7.6
	Median	7.0	2.5	7.4	0.5	17.1	9.1
	Standard Deviation	1.9	0.0	NV	0.0	3.5	3.8
	Coefficient of Variation	30.6	0.0	NV	0.0	19.7	50.0
B	Sample Size	8	8	8	8	8	8
	Number of BDL	0	3	NV	10	NV	0
	Maximum	9.4	2.5	8.1	0.5	22.1	10.9
	Minimum	5.4	2.5	7.3	0.5	12.5	4.2
	Mean	7.3	2.5	7.6	0.5	18.4	7.8
	Median	6.8	2.5	7.6	0.5	19.1	8.4
	Standard Deviation	1.5	0.0	NV	0.0	3.6	2.3
	Coefficient of Variation	20.5	0.0	NV	0.0	19.6	29.5
C	Sample Size	8	8	8	8	8	8
	Number of BDL	0	3	NV	9	NV	0
	Maximum	7.8	2.5	7.6	0.5	18.8	10.4
	Minimum	4.1	2.5	7.0	0.5	8.8	4.2
	Mean	7.0	2.5	7.3	0.5	14.9	8.2
	Median	7.3	2.5	7.3	0.5	16.5	8.8
	Standard Deviation	1.2	0.0	NV	0.0	3.8	2.5
	Coefficient of Variation	17.1	0.0	NV	0.0	25.5	30.5
D	Sample Size	8	8	8	8	8	8
	Number of BDL	0	3	NV	11	NV	0
	Maximum	8.4	2.5	7.7	0.5	21.0	10.2
	Minimum	4.7	2.5	7.0	0.5	10.5	3.1
	Mean	6.8	2.5	7.4	0.5	16.6	7.5
	Median	7.1	2.5	7.4	0.5	16.7	7.9
	Standard Deviation	1.3	0.0	NV	0.0	3.8	2.4
	Coefficient of Variation	19.1	0.0	NV	0.0	22.9	32.0
E	Sample Size	8	8	8	8	8	8
	Number of BDL	0	3	NV	9	NV	0
	Maximum	9.5	2.5	8.4	0.5	21.7	11.4
	Minimum	3.8	2.5	7.2	0.5	6.8	5.2
	Mean	7.3	2.5	7.6	0.5	15.0	8.0
	Median	7.3	2.5	7.4	0.5	15.0	7.6
	Standard Deviation	1.7	0.0	NV	0.0	4.6	2.1
	Coefficient of Variation	23.3	0.0	NV	0.0	30.7	26.3

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

Table D-1 2020 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	8	8	8	8	8	8
	Number of BDL	0	3	NV	9	NV	0
	Maximum	9.1	2.5	8.1	0.5	19.3	15.2
	Minimum	4.0	2.5	7.3	0.5	4.9	3.5
	Mean	7.1	2.5	7.6	0.5	14.5	9.1
	Median	7.5	2.5	7.5	0.5	16.1	8.7
	Standard Deviation	1.6	0.0	NV	0.0	5.2	3.3
	Coefficient of Variation	22.5	0.0	NV	0.0	35.9	36.3
G	Sample Size	7	7	7	7	7	7
	Number of BDL	0	3	NV	11	NV	0
	Maximum	7.9	2.5	7.8	0.5	17.4	12.4
	Minimum	2.2	2.5	7.1	0.5	6.2	3.2
	Mean	6.0	2.5	7.4	0.5	13.5	7.9
	Median	6.7	2.5	7.4	0.5	15.2	8.1
	Standard Deviation	1.9	0.0	NV	0.0	4.1	3.1
	Coefficient of Variation	31.7	0.0	NV	0.0	30.4	39.2

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

Table D-2 5-Year Trending Data for Bayou Choctaw Monitoring Stations

Station	Year	Dissolved Oxygen (mg/L)	Oil & Grease (mg/L)	pH (s.u.)	Salinity (ppt)	Temperature (°C)	Total Organic Carbon (mg/L)
A	2016	5.5	2.5	7.6	0.8	21.7	26.4
	2017	7.5	2.5	7.6	0.5	21.2	24.2
	2018	4.0	2.5	7.5	0.5	22.9	26.3
	2019	5.6	2.3	7.5	0.5	17.8	10.9
	2020	6.2	2.5	7.3	0.5	17.8	7.6
B	2016	5.5	2.5	7.6	0.8	21.1	51.2
	2017	7.6	2.5	7.5	0.5	21.2	39.2
	2018	4.0	2.5	7.7	0.5	21.8	38.0
	2019	7.3	2.3	7.8	0.5	15.6	6.5
	2020	7.3	2.5	7.6	0.5	18.4	7.8
C	2016	4.9	2.5	7.6	0.9	21.8	29.4
	2017	8.3	2.5	7.4	0.5	20.9	22.6
	2018	3.7	2.5	7.6	0.7	23.3	23.1
	2019	6.3	2.3	7.3	0.5	15.7	9.7
	2020	7.0	2.5	7.3	0.5	14.9	8.2
D	2016	4.8	2.5	7.6	0.8	22.1	28.1
	2017	7.7	2.5	7.5	0.5	21.6	21.1
	2018	3.6	2.5	7.8	0.5	23.4	24.6
	2019	7.0	2.3	7.5	0.5	15.9	7.4
	2020	6.8	2.5	7.4	0.5	16.6	7.5
E	2016	4.7	2.5	7.4	0.9	20.9	30.4
	2017	8.6	2.5	7.5	0.5	21.1	24.6
	2018	3.5	2.5	7.8	0.6	23.3	20.6
	2019	6.8	2.3	7.3	0.5	16.2	7.9
	2020	7.3	2.5	7.6	0.5	15.0	8.0
F	2016	6.1	2.5	7.4	0.9	20.8	30.3
	2017	8.3	2.5	7.6	0.5	21.0	21.1
	2018	4.4	2.5	7.8	0.6	22.6	23.0
	2019	7.1	2.3	7.4	0.5	15.5	8.6
	2020	7.1	2.5	7.6	0.5	14.5	9.1
G	2016	5.5	2.5	7.5	0.9	21.6	26.9
	2017	7.6	2.5	7.7	0.5	22.1	24.4
	2018	4.7	2.5	7.7	0.5	23.1	25.1
	2019	6.2	2.3	7.4	0.5	15.3	9.6
	2020	6.0	2.5	7.4	0.5	13.5	7.9

Figure D-2 5-Year Trending Data for Bayou Choctaw Environmental Monitoring Stations

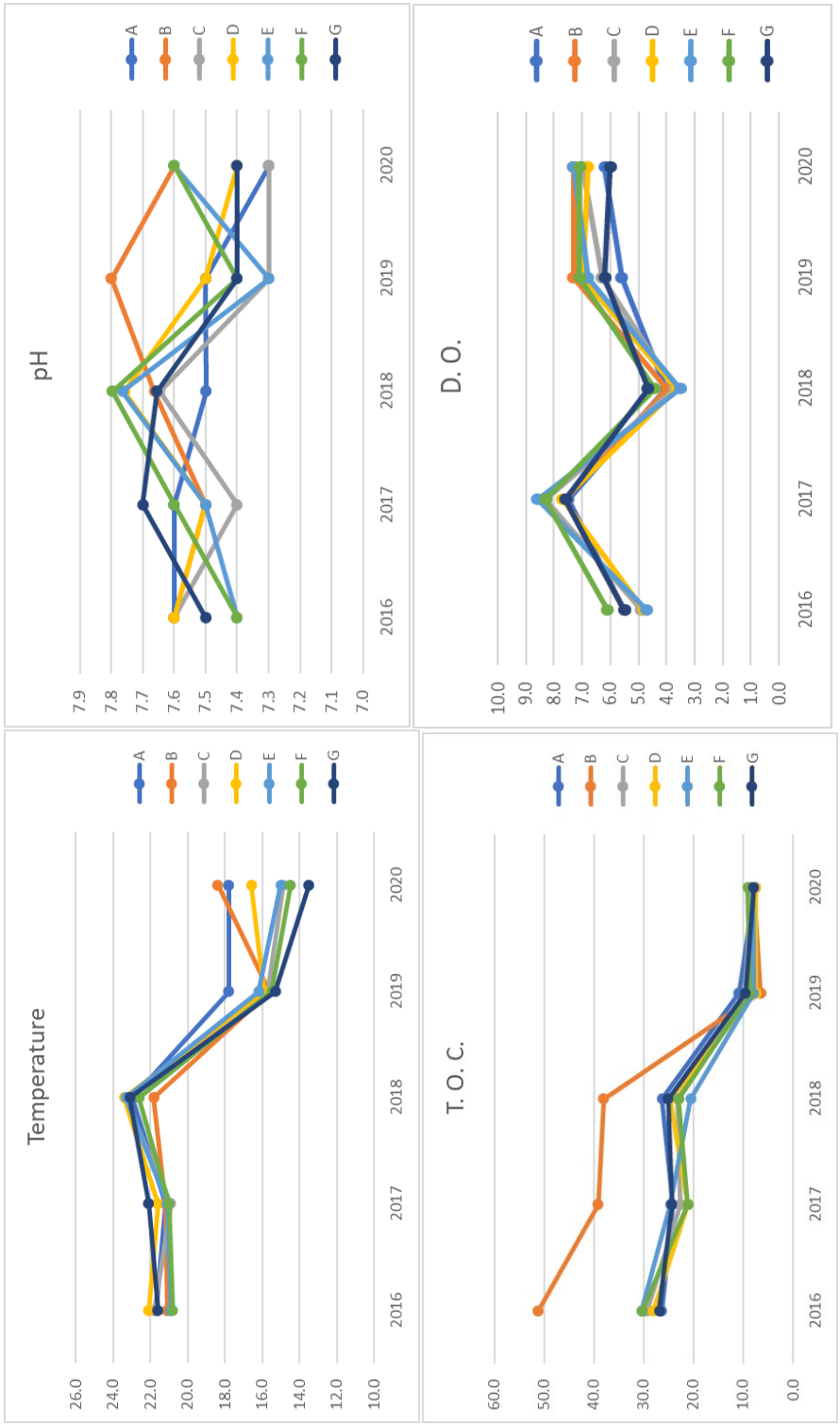
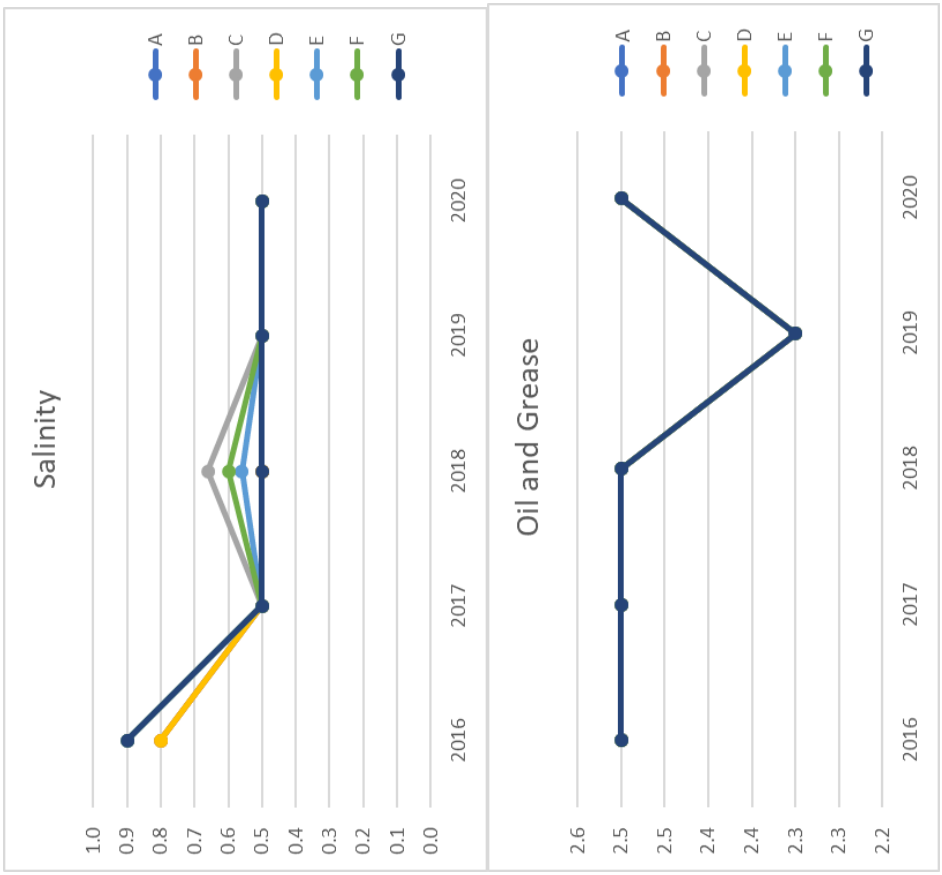
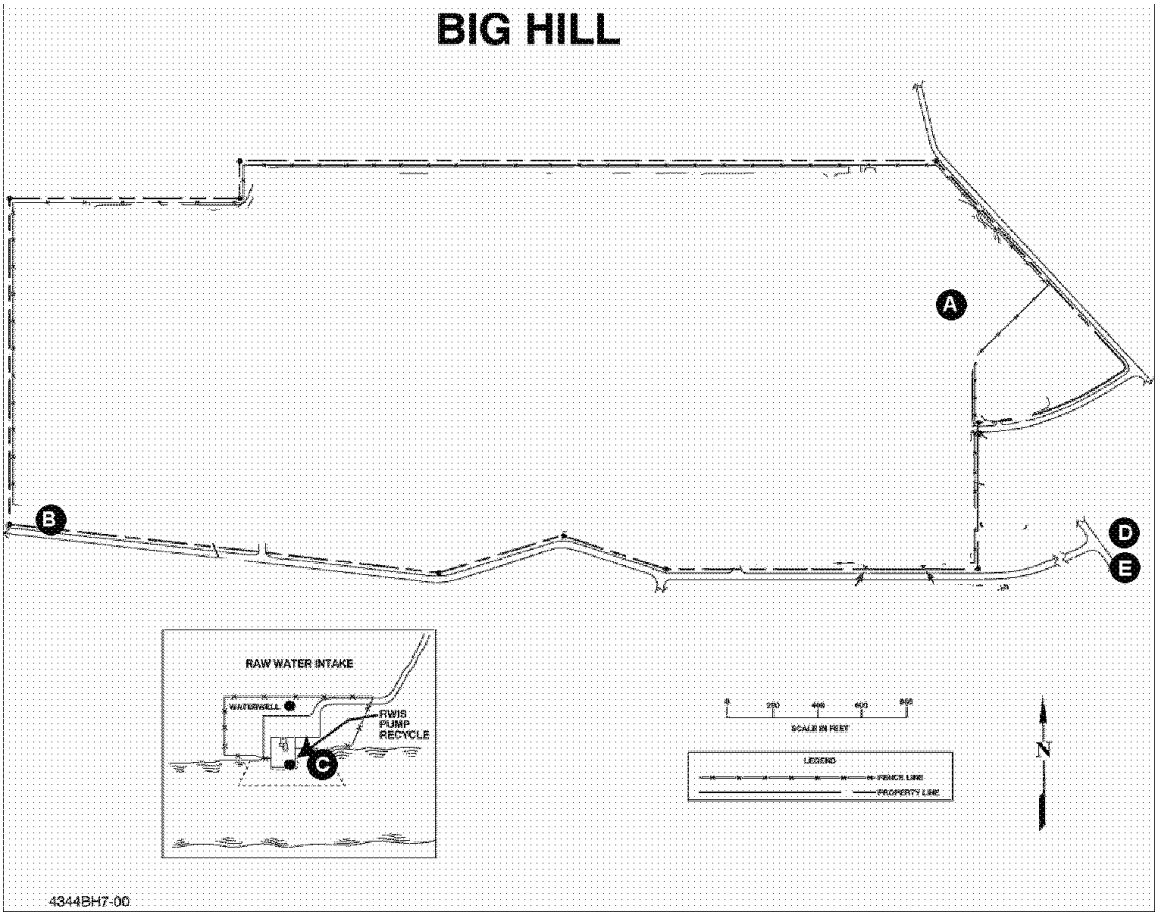


Figure D-2 5- Year Trending Data for Bayou Choctaw Environmental Monitoring Stations (continued)





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-3 Big Hill Environmental Monitoring Stations

Table D-3 2020 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)
B	Sample Size	11	4	11	11	11	10
	Number of BDL	0	4	NV	1	NV	0
	Maximum	9.0	2.5	7.4	1.0	30.0	14.6
	Minimum	0.3	2.5	6.7	0.5	15.0	3.8
	Mean	4.5	2.5	7.0	0.6	24.5	9.7
	Median	3.8	2.5	7.1	0.5	27.0	10.7
	Standard Deviation	2.4	0.0	NV	0.2	5.2	3.5
	Coefficient of Variation	53.3	0.0	NV	33.3	21.2	36.1
Station	**Statistical Parameters**	**Dissolved Oxygen (mg/L)**	**Oil & Grease (mg/L)**	**pH (s.u.)**	**Salinity (ppt)**	**Temperature (°C)**	**Total Organic Carbon (mg/L)**
C	Sample Size	12	4	12	12	12	11
	Number of BDL	0	4	NV	1	NV	0
	Maximum	9.3	2.5	7.6	16.8	31.0	11.0
	Minimum	2.9	2.5	6.7	2.0	15.0	2.5
	Mean	6.7	2.5	7.1	7.8	24.1	7.1
	Median	6.9	2.5	7.1	6.3	25.0	7.3
	Standard Deviation	2.1	0.0	NV	4.2	5.6	3.0
	Coefficient of Variation	31.3	0.0	NV	53.8	23.2	42.3
Station	**Statistical Parameters**	**Dissolved Oxygen (mg/L)**	**Oil & Grease (mg/L)**	**pH (s.u.)**	**Salinity (ppt)**	**Temperature (°C)**	**Total Organic Carbon (mg/L)**
D	Sample Size	12	4	12	12	12	11
	Number of BDL	0	4	NV	11	NV	0
	Maximum	11.4	2.5	7.9	3.9	30.0	20.0
	Minimum	0.5	2.5	6.5	0.5	16.0	5.6
	Mean	4.3	2.5	7.2	1.6	24.3	14.1
	Median	4.1	2.5	7.2	0.8	25.5	14.8
	Standard Deviation	2.9	0.0	NV	1.5	4.9	5.3
	Coefficient of Variation	67.4	0.0	NV	93.8	20.2	37.6
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	11
	Number of BDL	0	4	NV	1	NV	0
	Maximum	7.4	2.5	7.6	10.8	29.0	23.7
	Minimum	0.2	2.5	6.4	0.5	16.0	5.3
	Mean	3.0	2.5	7.0	4.1	23.8	12.6
	Median	2.7	2.5	7.0	4.2	25.5	12.2
	Standard Deviation	2.3	0.0	NV	2.7	5.0	4.7
	Coefficient of Variation	76.7	0.0	NV	65.9	21.0	37.3

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

Table D-4 5- Year Trending Data for Big Hill Monitoring Stations

Station	Year	Dissolved Oxygen (mg/L)	Oil & Grease (mg/L)	pH (s.u.)	Salinity (ppt)	Temperature (°C)	Total Organic Carbon (mg/L)
A	2016	N/A	N/A	N/A	N/A	N/A	N/A
	2017	N/A	N/A	N/A	N/A	N/A	N/A
	2018	N/A	N/A	N/A	N/A	N/A	N/A
	2019	N/A	N/A	N/A	N/A	N/A	N/A
	2020	N/A	N/A	N/A	N/A	N/A	N/A
B	2016	4.3	2.5	7.0	1.1	23.8	13.5
	2017	4.3	2.5	7.1	0.9	23.5	11.3
	2018	7.3	2.5	7.4	1.3	22.5	14.2
	2019	5.7	2.5	7.1	1.0	22.8	11.1
	2020	4.5	2.5	7.0	0.6	24.5	9.7
C	2016	6.0	2.5	7.3	4.4	24.1	8.5
	2017	5.2	2.5	7.3	7.0	24.3	7.8
	2018	9.4	2.5	7.5	6.2	23.1	8.5
	2019	6.5	2.5	7.3	4.6	23.0	10.1
	2020	6.7	2.5	7.1	7.8	24.1	7.1
D	2016	6.3	2.5	7.1	0.5	24.3	14.0
	2017	5.2	2.5	7.1	0.5	23.9	10.4
	2018	7.0	2.5	7.3	1.6	22.7	11.5
	2019	7.1	2.5	7.2	1.7	23.6	11.7
	2020	4.3	2.5	7.2	1.6	24.3	14.1
E	2016	5.2	2.5	6.7	1.0	24.0	13.7
	2017	3.0	2.5	6.7	2.0	23.8	12.5
	2018	7.9	2.5	7.0	1.0	22.3	15.0
	2019	4.9	2.5	6.9	1	22.5	11.7
	2020	3.0	2.5	7.0	4.1	23.8	12.6

Figure D-4 5- Year Trending Data for Big Hill Environmental Monitoring Stations

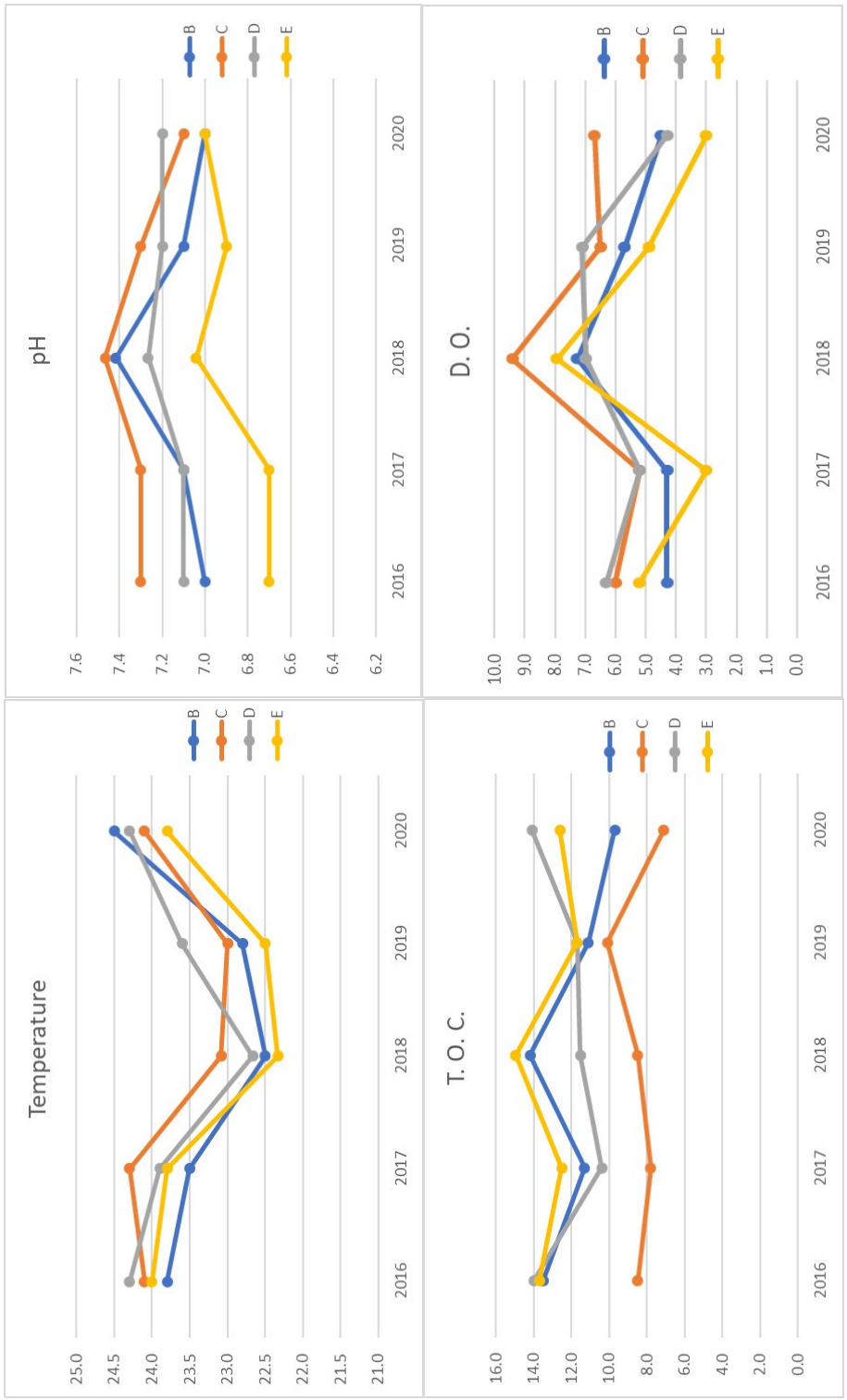
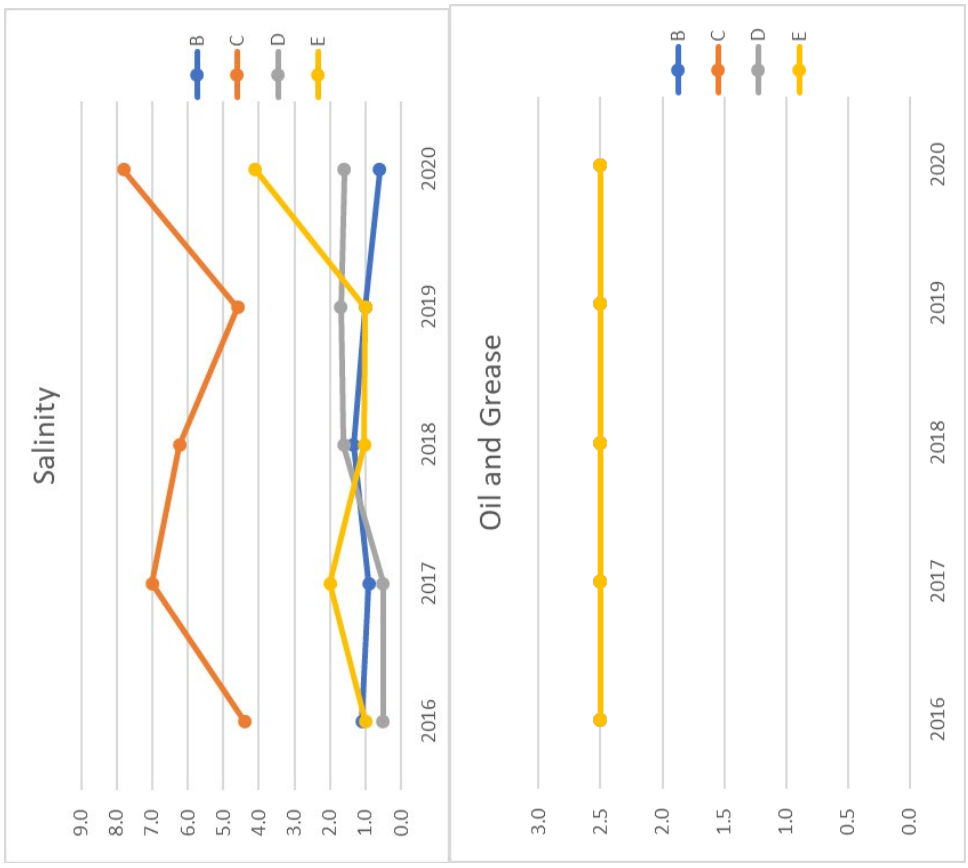
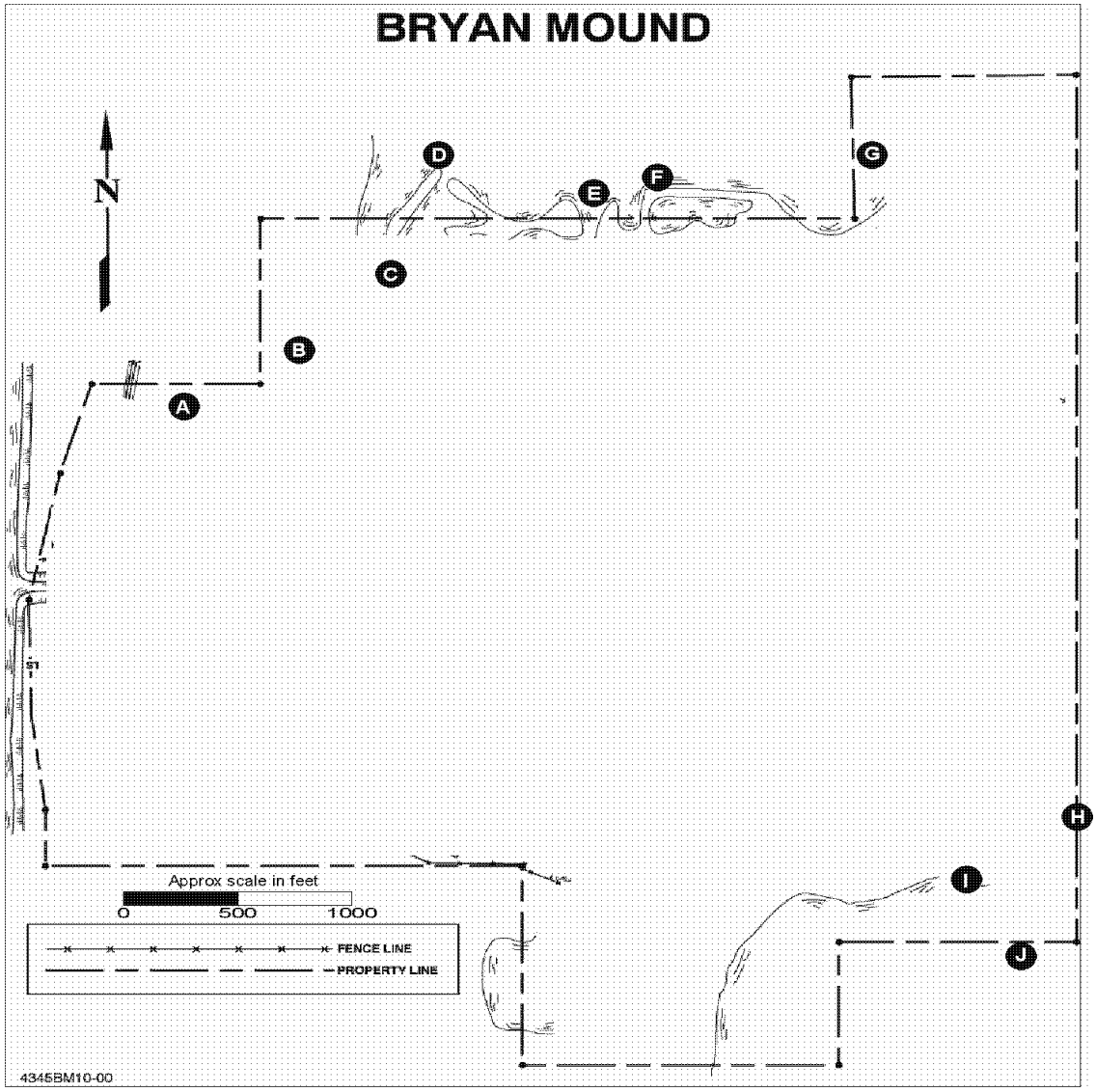


Figure D-4 5- Year Trending Data for Big Hill Environmental Monitoring Stations (continued)





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-5 Bryan Mound Environmental Monitoring Stations

Table D-5 2020 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	3	2	3	3	3	3
	Number of BDL	0	3	NV	1	NV	0
	Maximum	8.7	5.2	7.9	2.1	26.7	49.0
	Minimum	2.5	2.5	7.8	1.5	16.8	28.8
	Mean	4.6	3.9	7.8	1.8	22.5	42.1
	Median	2.5	3.9	7.8	1.7	24.1	48.5
	Standard Deviation	3.6	1.9	NV	0.3	5.1	11.5
	Coefficient of Variation	78.3	48.7	NV	16.7	22.7	27.3
B	Sample Size	3	2	3	3	3	3
	Number of BDL	0	4	NV	1	NV	0
	Maximum	7.1	2.5	7.7	2.1	26.7	49.3
	Minimum	2.4	2.5	7.1	1.5	16.8	24.8
	Mean	4.1	2.5	7.5	1.8	22.6	39.5
	Median	2.9	2.5	7.6	1.7	24.3	44.3
	Standard Deviation	2.6	0.0	NV	0.3	5.2	12.9
	Coefficient of Variation	63.4	0.0	NV	16.7	23.0	32.7
C	Sample Size	3	2	3	3	3	3
	Number of BDL	0	4	NV	1	NV	0
	Maximum	8.0	2.5	7.8	2.1	26.8	49.5
	Minimum	2.2	2.5	7.5	1.5	16.8	25.8
	Mean	4.1	2.5	7.7	1.8	22.6	39.6
	Median	2.2	2.5	7.8	1.8	24.3	43.4
	Standard Deviation	3.3	0.0	NV	0.3	5.2	12.3
	Coefficient of Variation	80.5	0.0	NV	16.7	23.0	31.1
D	Sample Size	3	2	3	3	3	3
	Number of BDL	0	4	NV	1	NV	0
	Maximum	8.2	2.5	7.3	2.1	26.7	50.6
	Minimum	2.4	2.5	7.3	1.5	16.8	31.5
	Mean	4.3	2.5	7.3	1.8	22.6	41.7
	Median	2.5	2.5	7.3	1.8	24.3	43.1
	Standard Deviation	3.3	0.0	NV	0.3	5.2	9.6
	Coefficient of Variation	76.7	0.0	NV	16.7	23.0	23.0
E	Sample Size	3	2	3	3	3	3
	Number of BDL	0	4	NV	0	NV	0
	Maximum	8.3	2.5	7.9	2.2	26.6	50.6
	Minimum	2.4	2.5	7.4	1.4	16.8	26.1
	Mean	4.4	2.5	7.7	1.8	22.5	39.6
	Median	2.5	2.5	7.9	1.7	24.2	42.0
	Standard Deviation	3.4	0.0	NV	0.4	5.1	12.4
	Coefficient of Variation	77.3	0.0	NV	22.2	22.7	31.3

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

Table D-5 2020 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	3	2	3	3	3	3
	Number of BDL	0	4	NV	1	NV	0
	Maximum	8.0	2.5	7.7	2.2	26.6	41.3
	Minimum	2.0	2.5	7.1	1.4	16.7	2.0
	Mean	4.1	2.5	7.4	1.8	22.5	24.0
	Median	2.2	2.5	7.3	1.7	24.1	28.8
	Standard Deviation	3.4	0.0	NV	0.4	5.1	20.1
	Coefficient of Variation	82.9	0.0	NV	22.2	22.7	83.8
G	Sample Size	3	2	3	3	3	3
	Number of BDL	0	4	NV	1	NV	0
	Maximum	8.3	2.5	7.8	2.1	26.7	50.5
	Minimum	2.1	2.5	7.4	1.5	16.7	25.9
	Mean	4.2	2.5	7.6	1.8	22.5	39.2
	Median	2.3	2.5	7.5	1.7	24.1	41.2
	Standard Deviation	3.5	0.0	NV	0.3	5.2	12.4
	Coefficient of Variation	83.3	0.0	NV	16.7	23.1	31.6
H	Sample Size	4	2	4	4	4	4
	Number of BDL	0	4	NV	1	NV	0
	Maximum	8.3	2.5	8.0	20.2	27.1	40.1
	Minimum	2.6	2.5	7.1	2.3	17.4	17.0
	Mean	5.2	2.5	7.6	9.1	22.6	28.3
	Median	5.0	2.5	7.6	6.9	22.9	28.1
	Standard Deviation	2.3	0.0	NV	8.1	4.3	9.9
	Coefficient of Variation	44.2	0.0	NV	89.0	19.0	35.0
I	Sample Size	4	2	4	4	4	4
	Number of BDL	0	4	NV	1	NV	0
	Maximum	5.8	2.5	7.9	20.2	27.1	39.8
	Minimum	2.1	2.5	7.3	2.3	17.4	16.3
	Mean	4.6	2.5	7.7	9.1	22.6	28.2
	Median	5.3	2.5	7.8	6.9	22.9	28.3
	Standard Deviation	1.7	0.0	NV	8.1	4.3	10.2
	Coefficient of Variation	37.0	0.0	NV	89.0	19.0	36.2
J	Sample Size	4	2	4	4	4	4
	Number of BDL	0	4	NV	1	NV	0
	Maximum	5.4	2.5	8.0	19.9	27.0	40.0
	Minimum	2.4	2.5	7.2	2.3	17.4	16.9
	Mean	4.3	2.5	7.6	9.0	22.6	28.4
	Median	4.7	2.5	7.7	6.9	22.9	28.3
	Standard Deviation	1.4	0.0	NV	8.0	4.2	9.8
	Coefficient of Variation	32.6	0.0	NV	88.9	18.6	34.5

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

Table D-6 5-Year Trending Data for Bryan Mound Monitoring Stations

A	2016	7.3	4	7.3	2.5	22.3	24.1
	2017	11.1	2.5	7.7	1.7	22.4	24.1
	2018	12.24	2.50	7.55	4.38	24.73	25.85
	2019	11.50	2.50	7.10	7.50	25.40	36.10
	2020	4.6	3.9	7.8	1.8	22.5	42.1
B	2016	7.4	2.5	7.4	2.5	22.3	22.8
	2017	11.8	2.5	7.6	1.7	22.4	25.6
	2018	12.2	2.5	7.6	4.4	24.8	24.8
	2019	11.7	2.5	7.4	3.3	24.8	35.9
	2020	4.1	2.5	7.5	1.8	22.6	39.5
C	2016	7.4	2.5	7.4	2.5	22.3	23.7
	2017	11.2	2.5	7.7	1.7	22.4	24.8
	2018	12.5	2.5	7.9	4.4	24.8	27.6
	2019	11.4	2.5	7.2	3.3	24.8	36.3
	2020	4.1	2.5	7.7	1.8	22.6	39.6
D	2016	7.1	2.5	7.4	2.5	22.3	21.8
	2017	11.4	2.5	7.4	1.7	22.5	24.6
	2018	12.4	2.5	7.9	4.4	24.8	23.7
	2019	11.5	2.5	7.2	3.3	24.9	35.7
	2020	4.3	2.5	7.3	1.8	22.6	41.7
E	2016	7.3	2.5	7.5	2.5	22.3	21.4
	2017	11.6	2.5	7.5	1.7	22.5	23.6
	2018	12.0	2.5	7.6	4.4	24.8	24.7
	2019	11.7	2.5	7.1	3.4	24.8	35.7
	2020	4.4	2.5	7.7	1.8	22.5	39.6
F	2016	7.4	2.5	7.4	2.5	22.3	21.5
	2017	11.2	2.5	7.7	1.7	22.5	23
	2018	12.2	2.5	7.5	4.4	24.8	22.9
	2019	11.6	2.5	7.3	3.5	24.7	32.4
	2020	4.1	2.5	7.4	1.8	22.5	24.0

Table D-6 5-Year Trending Data for Bryan Mound Monitoring Stations (continued)

G	2016	7.8	2.5	7.4	2.5	22.3	21
	2017	11.5	2.5	7.6	5.3	22.4	22.8
	2018	12.5	2.5	7.7	4.4	24.8	22.5
	2019	11.7	2.5	7.3	4.2	24.8	34.0
	2020	4.2	2.5	7.6	1.8	22.5	39.2
H	2016	11.2	2.5	7.1	5.3	22.6	23.8
	2017	10.1	2.5	7.1	12.1	25.1	21.4
	2018	5.3	2.5	7.2	14.2	24.1	21.0
	2019	10.4	2.5	7.3	10.0	22.3	28.5
	2020	5.2	2.5	7.6	9.1	22.6	28.3
I	2016	11.3	2.5	7.1	5.3	22.6	23.6
	2017	10.4	2.5	7.5	13.4	24.8	18.6
	2018	5.3	2.5	7.2	12.4	24.1	19.4
	2019	10.5	2.5	7.3	11.4	24.4	29.1
	2020	4.6	2.5	7.7	9.1	22.6	28.2
J	2016	11	2.5	7	5.3	21.3	23.1
	2017	10.6	2.5	7.4	13.4	24.8	17.8
	2018	5.3	2.5	7.1	11.5	24.1	19.5
	2019	10.2	2.5	7.1	11.0	24.4	27.6
	2020	4.3	2.5	7.6	9.0	22.6	28.4

Figure D-6 5- Year Trending Data for Bryan Mound Environmental Monitoring Stations

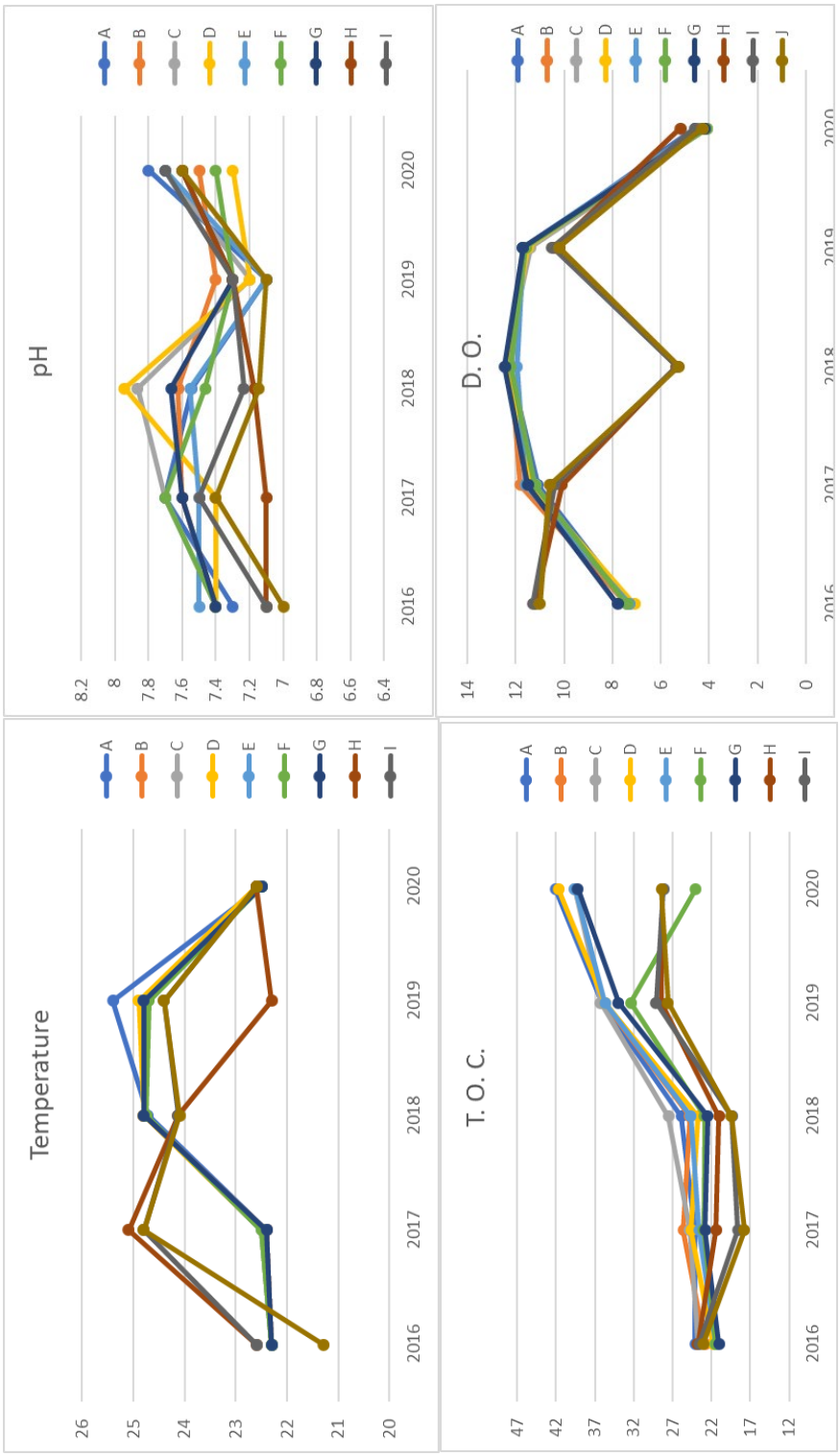
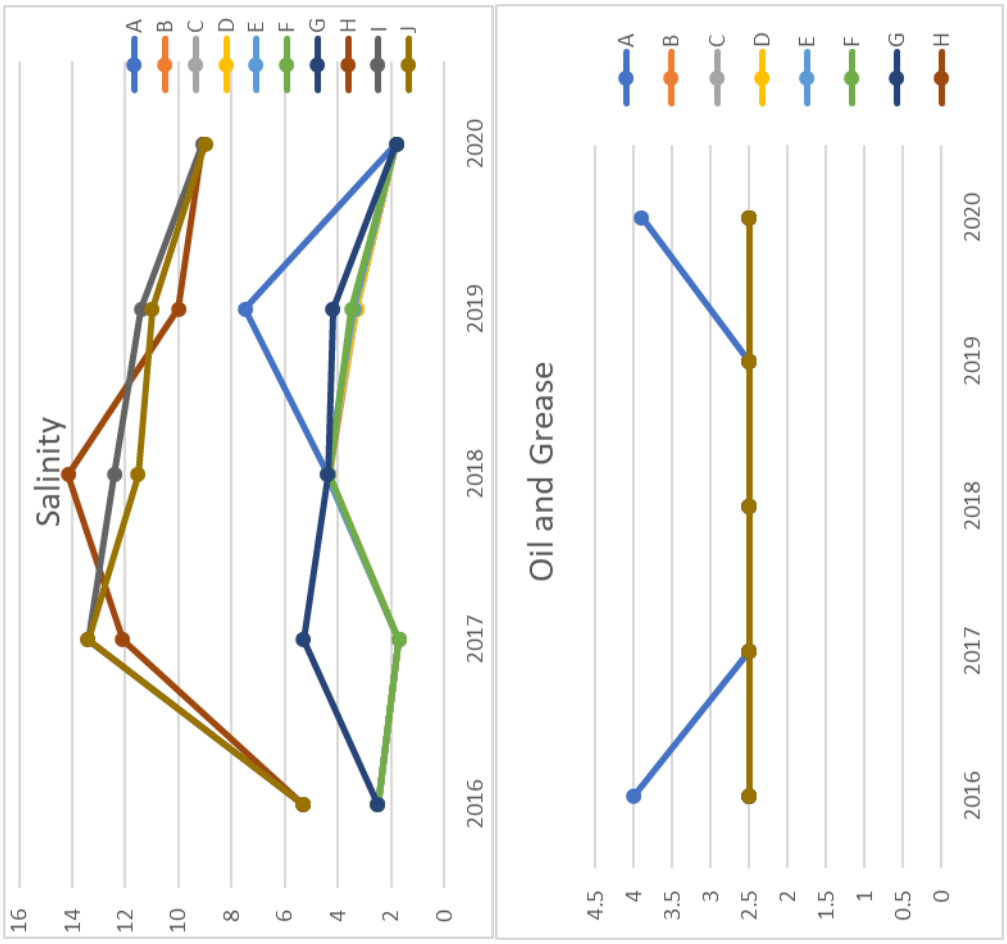
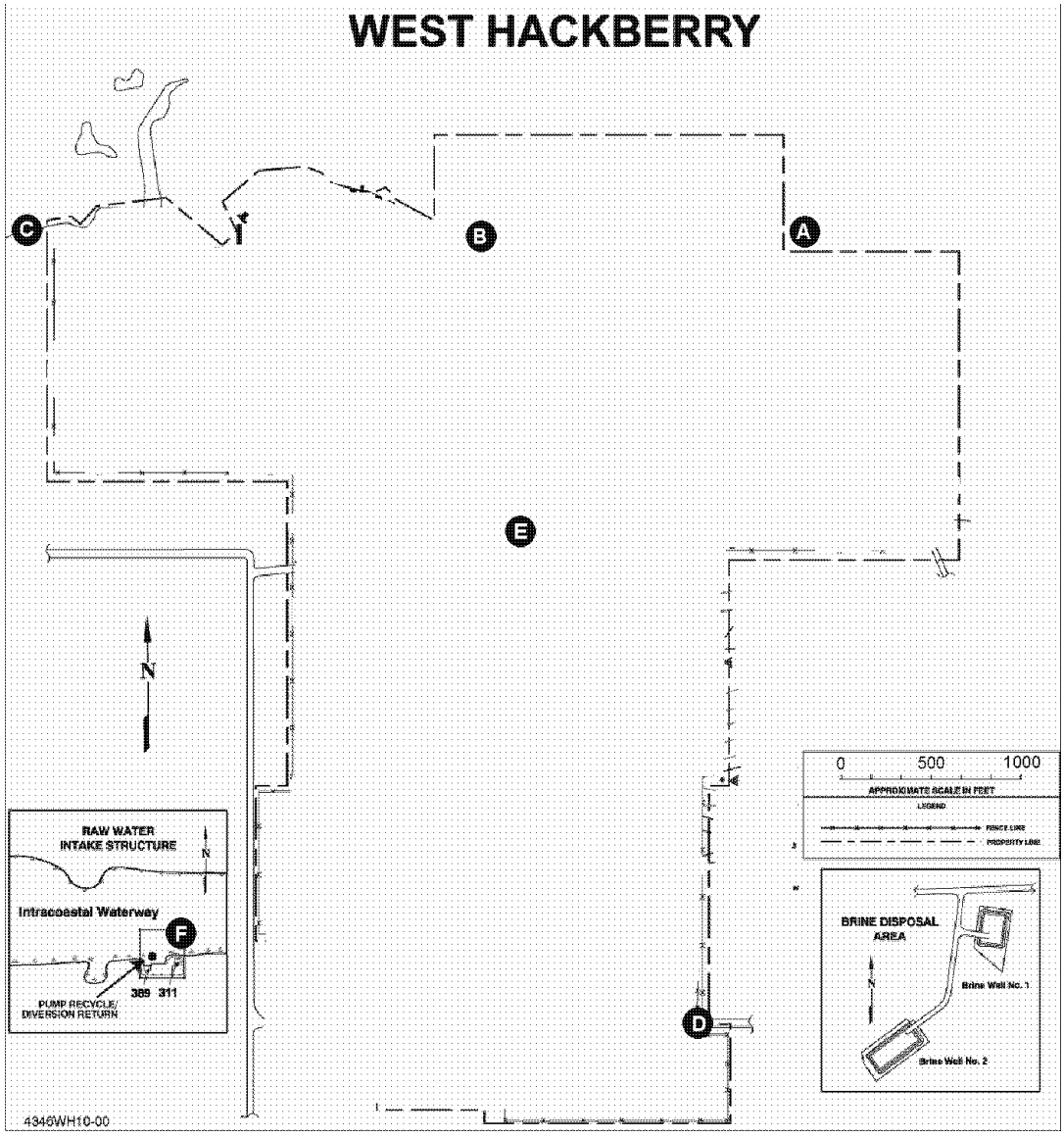


Figure D-6 5-Year Trending Data for Bryan Mound Environmental Monitoring Stations (continued)





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-7 West Hackberry Environmental Monitoring Stations

Table D-7 2020 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	5	2	5	5	5	5
	Number of BDL	0	2	NV	0	NV	0
	Maximum	9.6	2.5	8.0	8.8	30.0	7.5
	Minimum	6.6	2.5	7.8	4.1	14.0	6.8
	Mean	8.0	2.5	7.9	6.8	21.8	7.1
	Median	7.5	2.5	7.9	6.5	24.0	7.0
	Standard Deviation	1.4	0.0	NV	1.9	7.0	0.3
	Coefficient of Variation	17.5	0.0	NV	27.9	32.1	4.2
Station	Statistical Parameters	Dissolved Oxygen (mg/L)	Oil & Grease (mg/L)	pH (s.u.)	Salinity (ppt)	Temperature (°C)	Total Organic Carbon (mg/L)
B	Sample Size	5	2	5	5	5	5
	Number of BDL	0	4	NV	0	NV	0
	Maximum	9.7	2.5	8.0	8.8	30.0	7.4
	Minimum	6.7	2.5	7.6	4.0	14.0	6.5
	Mean	8.1	2.5	7.9	6.6	21.6	7.1
	Median	7.4	2.5	7.9	6.4	24.0	7.3
	Standard Deviation	1.5	0.0	NV	1.8	7.3	0.4
	Coefficient of Variation	18.5	0.0	NV	27.3	33.8	5.6
Station	Statistical Parameters	Dissolved Oxygen (mg/L)	Oil & Grease (mg/L)	pH (s.u.)	Salinity (ppt)	Temperature (°C)	Total Organic Carbon (mg/L)
C	Sample Size	5	2	5	5	5	5
	Number of BDL	0	4	NV	0	NV	0
	Maximum	10.8	2.5	8.1	8.8	29.0	7.5
	Minimum	6.2	2.5	7.5	3.9	14.0	6.7
	Mean	8.1	2.5	7.8	6.5	21.4	7.2
	Median	7.7	2.5	7.9	6.4	24.0	7.3
	Standard Deviation	2.0	0.0	NV	1.9	7.0	0.3
	Coefficient of Variation	24.7	0.0	NV	29.2	32.7	4.2
Station	Statistical Parameters	Dissolved Oxygen (mg/L)	Oil & Grease (mg/L)	pH (s.u.)	Salinity (ppt)	Temperature (°C)	Total Organic Carbon (mg/L)
D	Sample Size	6	2	6	6	6	6
	Number of BDL	0	2	NV	12	NV	0
	Maximum	9.2	2.5	8.0	0.5	28.0	10.4
	Minimum	5.4	2.5	7.6	0.5	11.0	4.0
	Mean	7.1	2.5	7.8	0.5	21.5	6.8
	Median	6.8	2.5	7.7	0.5	24.0	6.7
	Standard Deviation	1.6	0.0	NV	0.0	6.9	2.4
	Coefficient of Variation	22.5	0.0	NV	0.0	32.1	35.3

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

Table D-7 2020 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	6	2	6	6	6	6
	Number of BDL	0	4	NV	5	NV	0
	Maximum	10.7	2.5	8.1	1.0	29.0	4.1
	Minimum	2.5	2.5	7.4	0.5	8.0	2.0
	Mean	7.1	2.5	7.7	0.6	21.2	2.6
	Median	7.5	2.5	7.8	0.5	24.0	2.3
	Standard Deviation	3.3	0.0	NV	0.2	8.0	0.8
	Coefficient of Variation	46.5	0.0	NV	33.3	37.7	30.8
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	5	2	5	5	5	5
	Number of BDL	0	3	NV	6	NV	0
	Maximum	9.2	2.5	7.8	8.2	30.0	8.8
	Minimum	6.3	2.5	6.8	0.5	15.0	6.6
	Mean	7.8	2.5	7.3	3.1	21.8	7.7
	Median	7.6	2.5	7.2	0.5	22.0	7.3
	Standard Deviation	1.4	0.0	NV	3.6	6.8	0.9
	Coefficient of Variation	17.9	0.0	NV	116.1	31.2	11.7

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

Table D-8 5-Year Trending Data for West Hackberry Monitoring Stations

Station	Year	Dissolved Oxygen (mg/L)	Oil & Grease (mg/L)	pH (s.u.)	Salinity (ppt)	Temperature (°C)	Total Organic Carbon (mg/L)
A	2016	8.4	2.5	7.8	7.4	21.8	7.0
	2017	8.1	2.5	7.7	8.0	23.3	6.7
	2018	7.6	2.5	7.8	5.0	24.3	6.8
	2019	7.3	2.5	7.7	7.6	22.3	7.7
	2020	8.0	2.5	7.9	6.8	21.8	7.1
B	2016	8.4	2.5	7.8	7.3	21.9	7.1
	2017	8.1	2.5	7.7	8.0	23.3	6.7
	2018	7.6	2.5	7.7	5.0	24.4	6.7
	2019	7.2	2.5	7.7	7.5	22.3	7.9
	2020	8.1	2.5	7.9	6.6	21.6	7.1
C	2016	8.6	2.5	7.9	6.8	22.1	7.2
	2017	8.3	2.5	7.7	8.1	23.2	6.7
	2018	7.6	2.5	7.8	4.9	24.6	7.0
	2019	7.4	2.5	7.6	0.5	21.7	6.0
	2020	8.1	2.5	7.8	6.5	21.4	7.2
D	2016	8.1	2.5	7.9	0.7	22.3	5.8
	2017	7.8	2.5	7.0	0.5	20.7	5.7
	2018	7.3	2.5	7.9	0.6	22.5	5.1
	2019	8.3	2.5	7.8	0.5	22.5	4.1
	2020	7.1	2.5	7.8	0.5	21.5	6.8
E	2016	8.1	2.5	7.9	0.7	22.5	3.9
	2017	8.0	2.5	7.7	0.6	22.8	3.3
	2018	7.4	2.5	7.8	0.5	22.9	3.1
	2019	7.7	2.5	7.0	3.4	22.5	7.8
	2020	7.1	2.5	7.7	0.6	21.2	2.6
F	2016	7.5	2.5	7.5	4.8	22.8	7.8
	2017	7.3	3.3	7.1	2.6	23.2	7.5
	2018	7.1	2.5	7	2.1	25	7.6
	2019	6.1	2.5	7.0	2.1	25.0	7.6
	2020	7.8	2.5	7.3	3.1	21.8	7.7

Figure D-8 5-Year Trending Data for West Hackberry Monitoring Stations

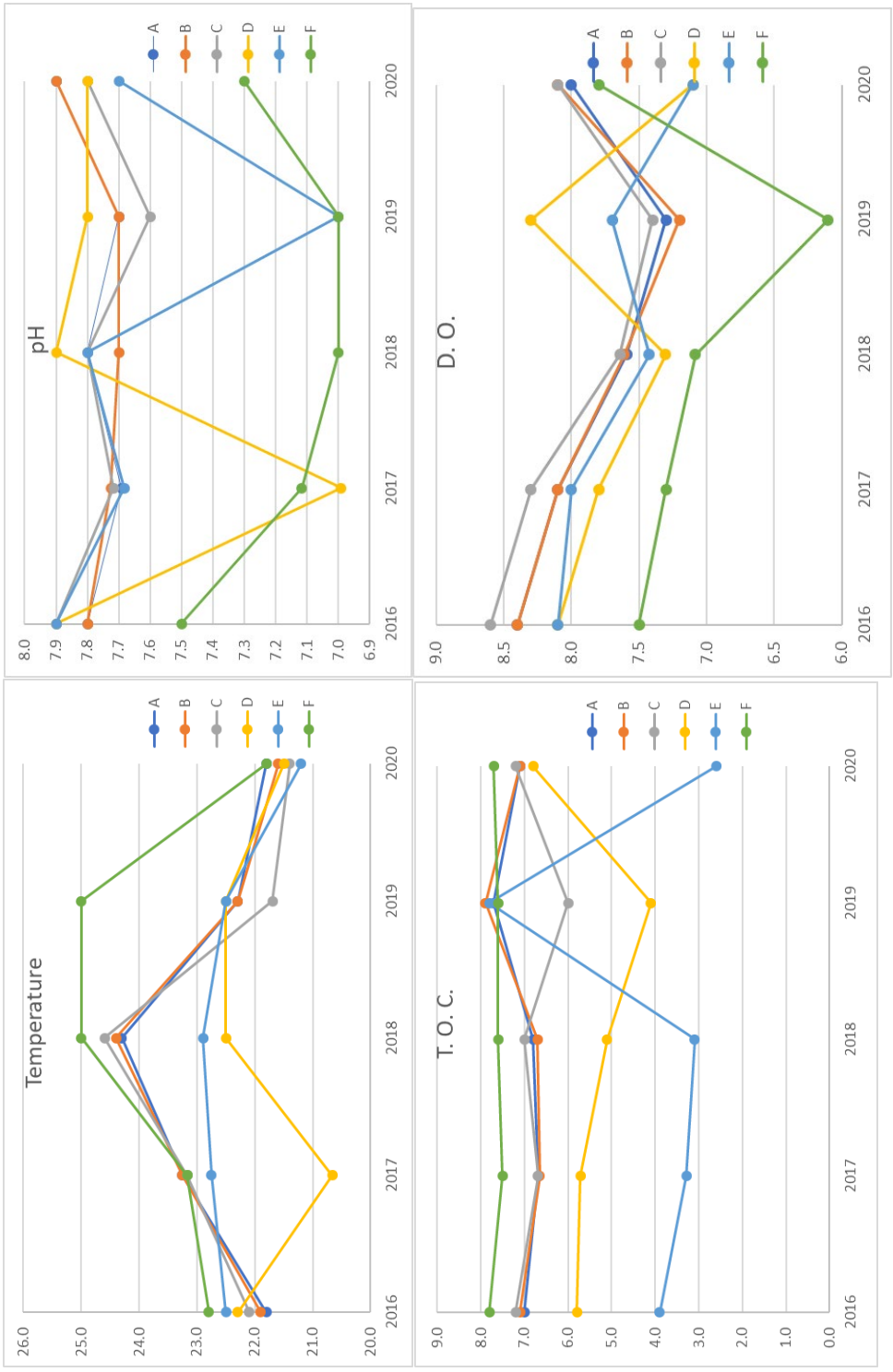
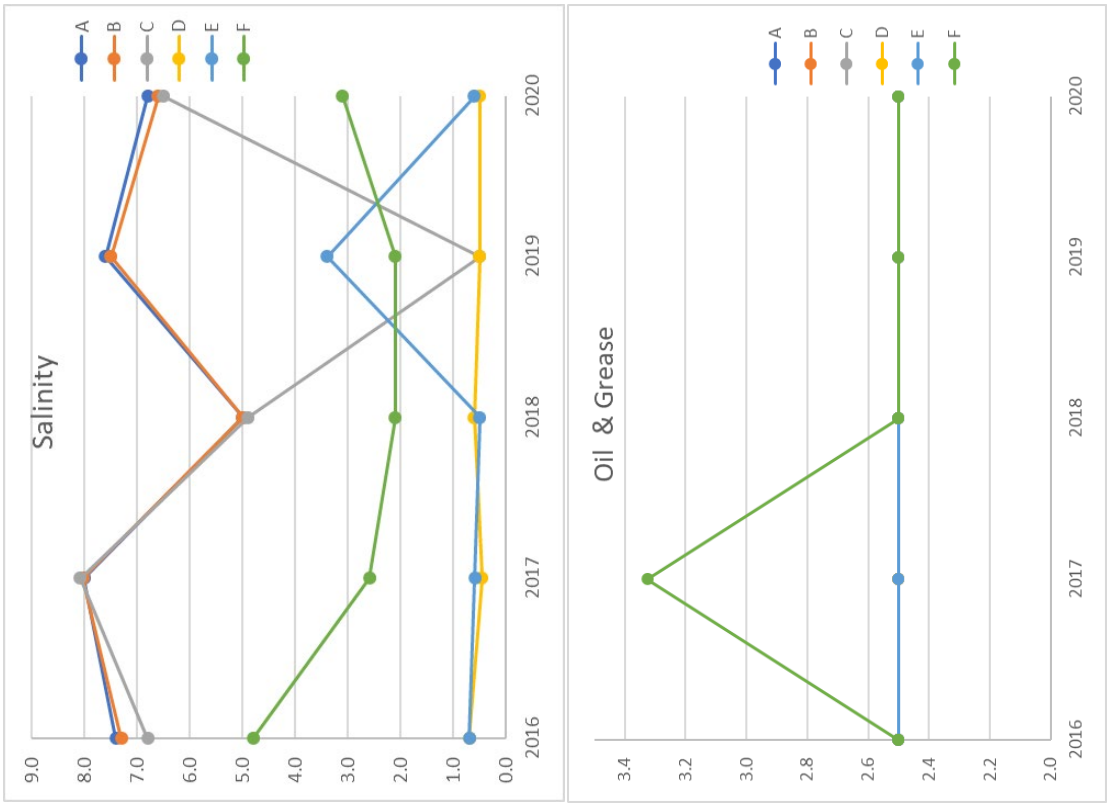


Figure D-8 5-Year Trending Data for West Hackberry Monitoring Stations (continued)



End of Appendix

Appendix E

QUALITY ASSURANCE

AUDITS DURING 2020

Laboratory Programs and Procedures Manual	**SITE: BC ☒ BH ☐ WH ☐ BM ☐**
Performance Objective: *Ensure that requirements of MSI7000.133 Version 4.0 "Laboratory Programs and Procedures Manual" and ASI7000.12 Version 3.0, Crude Oil Quality and Quantity Control Procedures," are being implemented and ensures compliance with permits, DOE Orders or other imposed requirements.*	**DATE: 2-09-2020** **AUDITOR: Paul Vellion**

	CRITERIA	DOCUMENT NO.	ACC	FINDING
1.	**Environmental Samples** At a minimum sample bottle labels should contain the following: Unique sample identifier (Sample Number) a. Unique laboratory identifier (sample #) b. Sample point name /location or description c. Date and time of sample collection d. Name and initial of the person who collected the sample d. Type of analysis to be performed	MSI700.133 version 4.0 section 5.2.1.1.1	☒	Click here to enter text.
2.	**Environmental Samples** Sample labels should meet the following conditions: a. Waterproof pen or marker must be used b. Labels and their adhesive must be made of material that does not dissolve or peel when exposed to moist conditions for an extended period. Clear plastic tape is suitable for this purpose.	MSI700.133 version 4.0 section 5.2.1.1.2	☒	

Laboratory Programs and Procedures Manual	**SITE: BC ☒ BH ☐ WH ☐ BM ☐**
Performance Objective: *Ensure that requirements of MSI7000.133 Version 4.0 "Laboratory Programs and Procedures Manual" and ASI7000.12 Version 3.0, Crude Oil Quality and Quantity Control Procedures," are being implemented and ensures compliance with permits, DOE Orders or other imposed requirements.*	**DATE: 2-09-2020** **AUDITOR: Paul Vellion**

3.	**Crude Oil Samples** Does the following information appear on sample bottle labels? a. Complete and attach an "SPR Crude Oil Sample" label (Form Number OSF85-0141) on each sample bottle used (figure A-1). To protect the information on the label it is recommended to overlay the label with clear tape. b. Sample Number: Site (BC, BM) year (02,03 etc.) month (01-12), day (01-31) and chronological sequence (001-999) c. Sample From: (in line sampler, beginning, middle, end, grab, etc.) and Cav. 118, Tank 12A if applicable) d. Date: Date and time sample was collected e. Type of Crude: (Sweet, sour, slop) and Brent, Bingo Bongo, etc. if applicable) f. Name of personnel who collected the sample g. Disposition: Example (Retention, Site Lab analysis, Ship to NGMS,	ASI7000 version 3.0 section 3.1.5	☒	Click here to enter text.

Laboratory Programs and Procedures Manual	**SITE: BC ☒ BH ☐ WH ☐ BM ☐**
Performance Objective: *Ensure that requirements of MSI7000.133 Version 4.0 "Laboratory Programs and Procedures Manual" and ASI7000.12 Version 3.0, Crude Oil Quality and Quantity Control Procedures," are being implemented and ensures compliance with permits, DOE Orders or other imposed requirements.*	**DATE: 2-09-2020** **AUDITOR: Paul Vellion**

	vendor lab, date the minimum retention period expires, and sample can be returned to the crude oil stream. h. Requirements/Comments Section • Cargo number if applicable • Purpose of sample as example: (10-year opportunity, STE, RPX, cavern to cavern) • Sample if Results (if known)			
	CRITERIA	**DOCUMENT NO.**	**ACC**	**FINDING**
4.	**<u>Environmental Media Chain of Custody Documentation: Ensure the following actions are take:</u>** • 2.3.1 Record the Chain of Custody Record number in the Master Sample Log according to 6.2.3. • 2.3.2 Ensure that the original (white copy) of the form stays with the sample. The original (white copy) will be	ASR7000.115 version 3.0, Section 2.3.1-2.3.4	☒	

	returned to the custodian once the analysis is complete. If not, then an electronic copy of the form should be received from the responsible party. • 2.3.3 If necessary, inform succeeding custodians to keep the sample and form together. • 2.3.4 Maintain a file of all Chain of Custody Record yellow copies until the return of the original; then file the original and the yellow copy may either be maintained or discarded.			
5.	**<u>Crude Oil Chain of Custody</u>** Is the "Crude Oil Quality and Quality Control Procedures Manual" (ASI7000.12) available and followed in the laboratory? Crude Oil Sample Custody Form (Form Number OSF88-0109)	MSI700.133 version 4.0, Section 2.1.3.2 ASI1700.12 version 3.0 Section 3.16	☒	Click here to enter text.

Laboratory Programs and Procedures Manual	**SITE: BC ☒ BH ☐ WH ☐ BM ☐**
Performance Objective: *Ensure that requirements of MSI7000.133 Version 4.0 "Laboratory Programs and Procedures Manual" and ASI7000.12 Version 3.0, Crude Oil Quality and Quantity Control Procedures," are being implemented and ensures compliance with permits, DOE Orders or other imposed requirements.*	**DATE: 2-09-2020** **AUDITOR: Paul Vellion**

	Note: If information required below is recorded into COSMOS (see 3.16) it is not necessary to complete subject form. a. The form is to be filled out as soon as site operations (cavern engineer or workover operations specialist for 10-Year sampling) or other parties who collect a sample. b. The form is to accompany any samples sent to the WH, BC, BM, BH, or contract labs. c. The total form is to be sent along with samples and distribution made upon destination, except for the goldenrod copy that should be forwarded to Site Operations and a copy made and retained by the originator (if other than Operations). d. The site property department sending a sample(s) will notify, by the most expeditious means, the contract lab advising of the sample shipment. e. The site laboratory or contract lab will immediately upon sample receipt fax a copy of the white page to the sending site property department.			

Laboratory Programs and Procedures Manual	**SITE: BC ☒ BH ☐ WH ☐ BM ☐**
Performance Objective: *Ensure that requirements of MSI7000.133 Version 4.0 "Laboratory Programs and Procedures Manual" and ASI7000.12 Version 3.0, Crude Oil Quality and Quantity Control Procedures," are being implemented and ensures compliance with permits, DOE Orders or other imposed requirements.*	**DATE: 2-09-2020** **AUDITOR: Paul Vellion**

6.	**Calibration** • Are calibration data maintained in laboratory logbooks? • Are calibration certifications	MSI700.133 version 4.0, Section 6	☒	
7.	Are routine calibration checks, in the range of interest using a set of class "1" weights, performed daily when an Analytical Balance is being used?	MSI700.133 version 4.0, Section 6.1	☒	Click here to enter text.
8.	Is the "true weight" and "observed weight" noted and documented in the laboratory's balance log book?	MSI700.133 version 4.0, Section 6.1	☒	Click here to enter text.
9.	Are Automatic Pipettors calibrated and checked every 6 months and recorded in the laboratory's maintenance log book?	MSI700.133 version 4.0, Section 6.2	☐	DO NOT USE THESE
10.	Are ovens, water baths, refrigerators and incubators monitored by using NIST traceable certified thermometers and temperatures documented daily in the laboratory appliance log?	MSI700.133 version 4.0, Section 6.3	☒	Click here to enter text.
11.	Are Hydrometers examined for damage and verified by comparison to a primary standard NIST certified hydrometer before initial use?	MSI700.133 version 4.0, Section 6.4	☒	
12.	Are Thermometers certified against a NIST traceable primary standard before initial use and annually thereafter?	MSI700.133 version 4.0, Section 6.6	☒	

Laboratory Programs and Procedures Manual	**SITE: BC ☒ BH ☐ WH ☐ BM ☐**
Performance Objective: *Ensure that requirements of MSI7000.133 Version 4.0 "Laboratory Programs and Procedures Manual" and ASI7000.12 Version 3.0, Crude Oil Quality and Quantity Control Procedures," are being implemented and ensures compliance with permits, DOE Orders or other imposed requirements.*	**DATE: 2-09-2020** **AUDITOR: Paul Vellion**

13.	Are Volumetric Ware used for volumetric measurements rated as Class A or conform to Class A standards (NBC Circular 434 or ATM Special Publication 148-H)	MSI700.133 version 4.0, Section 6.7	☒	Click here to enter text.
14.	All Instruments and equipment calibration activities are recorded in the appropriate records in accordance with the current work instruction MSW7000.700?	MSI700.133 version 4.0, Section 6.9	☒	
15.	**STANDARDS, REAGENTS AND CHEMICALS** When standards, chemicals, materials, or reagents are received into the laboratory are the following actions accomplished: • Date of receipt written on the bottle or container label and documented into the appropriate log book? • Is the material name, manufacture, lot number, and expiration date recorded in the appropriate logbook? • Once the container is opened and placed into service the date and expiration date is recorded	MSI700.133 version 4.0, Section 9.3	☒	Click here to enter text.

Laboratory Programs and Procedures Manual	**SITE: BC ☒ BH ☐ WH ☐ BM ☐**
Performance Objective: *Ensure that requirements of MSI7000.133 Version 4.0 "Laboratory Programs and Procedures Manual" and ASI7000.12 Version 3.0, Crude Oil Quality and Quantity Control Procedures," are being implemented and ensures compliance with permits, DOE Orders or other imposed requirements.*	**DATE: 2-09-2020** **AUDITOR: Paul Vellion**

	on the container label and in the appropriate logbook?			
16.	**DOCUMENTATION** Is laboratory data recorded in ink in a bound notebook with sequentially numbered pages, initialed and dated by the applicable analysts?	MSI700.133 version 4.0, Section 10.1.1	☒	Click here to enter text.
17.	Are erroneous entries crossed through once, initialed and dated in a manner that permits the incorrect entry to remain legible?	MSI700.133 version 4.0, Section 10.1.1	☒	Click here to enter text.
18.	Is a chemical inventory (listing all chemicals stored and or used in or by the laboratory that "belongs" to the laboratory) completed quarterly?	MSI700.133 version 4.0, Section 10.3.1	☒	Click here to enter text.
19.	Does the chemical inventory list the quantities, container type and location?	MSI700.133 version 4.0, Section 10.3.1	☒	Click here to enter text.
20.	Is the chemical inventory provided to the site ES&H department and a copy printed and filed with laboratory MSDS file, and is the copy updated on a quarterly basis within the MSDS file?	MSI700.133 version 4.0, Section 10.3.1	☒	Click here to enter text. SDS instead of MSDS
21.	Is there evidence of weekly waste inspection on the weekly waste inspection form?	MSI700.133 version 4.0, Section 10.3.3	☒	Click here to enter text.
22.	Is there evidence of monthly waste inventory being conducted?	MSI700.133 version 4.0, Section 10.3.4		

Laboratory Programs and Procedures Manual	**SITE: BC ☒ BH ☐ WH ☐ BM ☐**
Performance Objective: *Ensure that requirements of MSI7000.133 Version 4.0 "Laboratory Programs and Procedures Manual" and ASI7000.12 Version 3.0, Crude Oil Quality and Quantity Control Procedures," are being implemented and ensures compliance with permits, DOE Orders or other imposed requirements.*	**DATE: 2-09-2020** **AUDITOR: Paul Vellion**

23.	**LABORATORY SAFETY AND SECURITY** Is the following Protective Equipment used as identified in section 13.2?	MSI700.133 version 4.0, Section 13.2	☒	Click here to enter text.
24.	**Laboratory Training** Have laboratory personnel received the specific training activities as identified in table 11.1-1 Typical training requirements for laboratory personnel?	MSI700.133 version 4.0, Section 14	☒	
25.	Are the following Chemical Hygiene Plan general rules followed: • No eating, drinking, smoking or applying cosmetics in the laboratory and in chemical storage or use areas? • No storing, handling, or consuming food or beverages in storage areas, refrigerators, glassware, or utensils that are used for lab operations? • Do not use mouth suction for pipetting or starting a siphon? • Confine long hair and loose clothing?	MSI700.133 version 4.0, Appendix A	☒	Click here to enter text.

Laboratory Programs and Procedures Manual	**SITE: BC ☒ BH ☐ WH ☐ BM ☐**
Performance Objective: *Ensure that requirements of MSI7000.133 Version 4.0 "Laboratory Programs and Procedures Manual" and ASI7000.12 Version 3.0, Crude Oil Quality and Quantity Control Procedures," are being implemented and ensures compliance with permits, DOE Orders or other imposed requirements.*	**DATE: 2-09-2020** **AUDITOR: Paul Vellion**

	• Know the location of fire extinguishers, showers, exits, and eyewash fountains/stations? • Do not use or handle any chemical until you have read and understood the label and SDS for that chemical? • Wash areas of exposed skin with soap and water upon any instance of chemical contact. Do not wash with solvents? • Limit chemicals stored at the lab bench or other work areas to those amounts necessary for daily operation. The container size shall be the minimum convenient? • Avoid skin contact with all chemicals. • Avoid inhalation of chemicals; do not perform "sniff" tests? • Use all laboratory equipment only for its intended purpose? • Floors, aisles, and exits shall be kept clean, dry, and free of obstructions. • Fire extinguishing equipment, eyewashes, showers, electrical			

Laboratory Programs and Procedures Manual	**SITE: BC ☒ BH ☐ WH ☐ BM ☐**
Performance Objective: *Ensure that requirements of MSI7000.133 Version 4.0 "Laboratory Programs and Procedures Manual" and ASI7000.12 Version 3.0, Crude Oil Quality and Quantity Control Procedures," are being implemented and ensures compliance with permits, DOE Orders or other imposed requirements.*	**DATE: 2-09-2020** **AUDITOR: Paul Vellion**

	disconnects, and other emergency equipment shall remain unobstructed • Never work alone in a laboratory or chemical storage area if possible If not possible, arrange to have you on a periodic and frequent basis • When working with flammable chemicals, arrange the work area such that no sources of ignition are near enough to cause a fire or explosion, in case of a vapor release or liquid spill?			

Laboratory Programs and Procedures Manual	**SITE: BC ☐ BH ☒ WH ☐ BM ☐**
Performance Objective: *Ensure that requirements of MSI7000.133 Version 4.0 "Laboratory Programs and Procedures Manual" and ASI7000.12 Version 3.0, Crude Oil Quality and Quantity Control Procedures," are being implemented and ensures compliance with permits , DOE Orders or other imposed requirements.*	**DATE: 2-2-2020** **AUDITOR: Alex Lewis**

	CRITERIA	DOCUMENT NO.	ACC	FINDING
1.	**Environmental Samples** At a minimum sample bottle labels should contain the following: Unique sample identifier (Sample Number) a. Unique laboratory identifier (sample #) b. Sample point name /location or description c. Date and time of sample collection d. Name and initial of the person who collected the sample d. Type of analysis to be performed	MSI700.133 version 4.0 section 5.2.1.1.1	☒	Click here to enter text.
2.	**Environmental Samples** Sample labels should meet the following conditions: a. Waterproof pen or marker must be used b. Labels and their adhesive must be made of material that does not dissolve or peel when exposed to moist conditions for an extended period. Clear plastic tape is suitable for this purpose.	MSI700.133 version 4.0 section 5.2.1.1.2	☒	

Laboratory Programs and Procedures Manual	**SITE: BC ☐ BH ☒ WH ☐ BM ☐**
Performance Objective: *Ensure that requirements of MSI7000.133 Version 4.0 "Laboratory Programs and Procedures Manual" and ASI7000.12 Version 3.0, Crude Oil Quality and Quantity Control Procedures," are being implemented and ensures compliance with permits , DOE Orders or other imposed requirements.*	**DATE: 2-2-2020** **AUDITOR: Alex Lewis**

3.	**<u>Crude Oil Samples</u>** Does the following information appear on sample bottle labels? a. Complete and attach an "SPR Crude Oil Sample" label (Form Number OSF85-0141) on each sample bottle used (figure A-1). To protect the information on the label it is recommended to overlay the label with clear tape. b. Sample Number: Site (BC, BM) year (02,03 etc.) month (01-12), day (01-31) and chronological sequence (001-999) c. Sample From: (in line sampler, beginning, middle, end, grab, etc.) and Cav. 118, Tank 12A if applicable) d. Date: Date and time sample was collected e. Type of Crude: (Sweet, sour, slop) and Brent, Bingo Bongo, etc. if applicable) f. Name of personnel who collected the sample g. Disposition: Example (Retention, Site Lab analysis, Ship to NGMS,	ASI7000 version 3.0 section 3.1.5	☒	Click here to enter text.

Laboratory Programs and Procedures Manual	**SITE: BC ☐ BH ☒ WH ☐ BM ☐**
Performance Objective: *Ensure that requirements of MSI7000.133 Version 4.0 "Laboratory Programs and Procedures Manual" and ASI7000.12 Version 3.0, Crude Oil Quality and Quantity Control Procedures," are being implemented and ensures compliance with permits , DOE Orders or other imposed requirements.*	**DATE: 2-2-2020** **AUDITOR: Alex Lewis**

	vendor lab, date the minimum retention period expires, and sample can be returned to the crude oil stream. h. Requirements/Comments Section • Cargo number if applicable • Purpose of sample as example: (10-year opportunity, STE, RPX, cavern to cavern) • Sample if Results (if known)			
	CRITERIA	**DOCUMENT NO.**	**ACC**	**FINDING**
4.	**<u>Environmental Media Chain of Custody Documentation: Ensure the following actions are take:</u>** • 2.3.1 Record the Chain of Custody Record number in the Master Sample Log according to 6.2.3. • 2.3.2 Ensure that the original (white copy) of the form stays with the sample. The original (white copy) will be returned to the custodian	ASR7000.115 version 3.0, Section 2.3.1-2.3.4	☒	

	once the analysis is complete. If not, then an electronic copy of the form should be received from the responsible party. • 2.3.3 If necessary, inform succeeding custodians to keep the sample and form together. • 2.3.4 Maintain a file of all Chain of Custody Record yellow copies until the return of the original; then file the original and the yellow copy may either be maintained or discarded.			
5.	**<u>Crude Oil Chain of Custody</u>** Is the "Crude Oil Quality and Quality Control Procedures Manual" (ASI7000.12) available and followed in the laboratory? Crude Oil Sample Custody Form (Form Number OSF88-0109)	MSI700.133 version 4.0, Section 2.1.3.2 ASI1700.12 version 3.0 Section 3.16	☒	Click here to enter text.

Laboratory Programs and Procedures Manual	**SITE: BC ☐ BH ☒ WH ☐ BM ☐**
Performance Objective: *Ensure that requirements of MSI7000.133 Version 4.0 "Laboratory Programs and Procedures Manual" and ASI7000.12 Version 3.0, Crude Oil Quality and Quantity Control Procedures," are being implemented and ensures compliance with permits , DOE Orders or other imposed requirements.*	**DATE: 2-2-2020** **AUDITOR: Alex Lewis**

	Note: If information required below is recorded into COSMOS (see 3.16) it is not necessary to complete subject form. a. The form is to be filled out as soon as site operations (cavern engineer or workover operations specialist for 10-Year sampling) or other parties who collect a sample. b. The form is to accompany any samples sent to the WH, BC, BM, BH, or contract labs. c. The total form is to be sent along with samples and distribution made upon destination, except for the goldenrod copy that should be forwarded to Site Operations and a copy made and retained by the originator (if other than Operations). d. The site property department sending a sample(s) will notify, by the most expeditious means, the contract lab advising of the sample shipment. e. The site laboratory or contract lab will immediately upon sample receipt fax a copy of the white page to the sending site property department.			

Laboratory Programs and Procedures Manual	**SITE: BC ☐ BH ☒ WH ☐ BM ☐**
Performance Objective: *Ensure that requirements of MSI7000.133 Version 4.0 "Laboratory Programs and Procedures Manual" and ASI7000.12 Version 3.0, Crude Oil Quality and Quantity Control Procedures," are being implemented and ensures compliance with permits , DOE Orders or other imposed requirements.*	**DATE: 2-2-2020** **AUDITOR: Alex Lewis**

6.	**Calibration** • Are calibration data maintained in laboratory logbooks? • Are calibration certifications	MSI700.133 version 4.0, Section 6	☒	
7.	Are routine calibration checks, in the range of interest using a set of class "1" weights, performed daily when an Analytical Balance is being used?	MSI700.133 version 4.0, Section 6.1	☒	Click here to enter text.
8.	Is the "true weight" and "observed weight" noted and documented in the laboratory's balance log book?	MSI700.133 version 4.0, Section 6.1	☒	Click here to enter text.
9.	Are Automatic Pipettors calibrated and checked every 6 months and recorded in the laboratory's maintenance log book?	MSI700.133 version 4.0, Section 6.2	☒	Click here to enter text.
10.	Are ovens, water baths, refrigerators and incubators monitored by using NIST traceable certified thermometers and temperatures documented daily in the laboratory appliance log?	MSI700.133 version 4.0, Section 6.3	☒	Click here to enter text.
11.	Are Hydrometers examined for damage and verified by comparison to a primary standard NIST certified hydrometer before initial use?	MSI700.133 version 4.0, Section 6.4	☐	Not used in lab
12.	Are Thermometers certified against a NIST traceable primary standard before initial use and annually thereafter?	MSI700.133 version 4.0, Section 6.6	☒	**M&TE annual calibration schedule**

Laboratory Programs and Procedures Manual	**SITE: BC ☐ BH ☒ WH ☐ BM ☐**
Performance Objective: *Ensure that requirements of MSI7000.133 Version 4.0 "Laboratory Programs and Procedures Manual" and ASI7000.12 Version 3.0, Crude Oil Quality and Quantity Control Procedures," are being implemented and ensures compliance with permits , DOE Orders or other imposed requirements.*	**DATE: 2-2-2020** **AUDITOR: Alex Lewis**

13.	Are Volumetric Ware used for volumetric measurements rated as Class A or conform to Class A standards (NBC Circular 434 or ATM Special Publication 148-H)	MSI700.133 version 4.0, Section 6.7	☒	Click here to enter text.
14.	All Instruments and equipment calibration activities are recorded in the appropriate records in accordance with the current work instruction MSW7000.700?	MSI700.133 version 4.0, Section 6.9	☒	
15.	**STANDARDS, REAGENTS AND CHEMICALS** When standards, chemicals, materials, or reagents are received into the laboratory are the following actions accomplished: • Date of receipt written on the bottle or container label and documented into the appropriate log book? • Is the material name, manufacture, lot number, and expiration date recorded in the appropriate logbook? • Once the container is opened and placed into service the date and expiration date is recorded	MSI700.133 version 4.0, Section 9.3	☒	Click here to enter text.

Laboratory Programs and Procedures Manual	**SITE: BC ☐ BH ☒ WH ☐ BM ☐**
Performance Objective: *Ensure that requirements of MSI7000.133 Version 4.0 "Laboratory Programs and Procedures Manual" and ASI7000.12 Version 3.0, Crude Oil Quality and Quantity Control Procedures," are being implemented and ensures compliance with permits , DOE Orders or other imposed requirements.*	**DATE: 2-2-2020** **AUDITOR: Alex Lewis**

	on the container label and in the appropriate logbook?			
16.	**DOCUMENTATION** Is laboratory data recorded in ink in a bound notebook with sequentially numbered pages, initialed and dated by the applicable analysts?	MSI700.133 version 4.0, Section 10.1.1	☒	Click here to enter text.
17.	Are erroneous entries crossed through once, initialed and dated in a manner that permits the incorrect entry to remain legible?	MSI700.133 version 4.0, Section 10.1.1	☒	Click here to enter text.
18.	Is a chemical inventory (listing all chemicals stored and or used in or by the laboratory that "belongs" to the laboratory) completed quarterly?	MSI700.133 version 4.0, Section 10.3.1	☒	Click here to enter text.
19.	Does the chemical inventory list the quantities, container type and location?	MSI700.133 version 4.0, Section 10.3.1	☒	Click here to enter text.
20.	Is the chemical inventory provided to the site ES&H department and a copy printed and filed with laboratory MSDS file, and is the copy updated on a quarterly basis within the MSDS file?	MSI700.133 version 4.0, Section 10.3.1	☒	Click here to enter text.
21.	Is there evidence of weekly waste inspection on the weekly waste inspection form?	MSI700.133 version 4.0, Section 10.3.3	☒	Click here to enter text.
22.	Is there evidence of monthly waste inventory being conducted?	MSI700.133 version 4.0, Section 10.3.4		

Laboratory Programs and Procedures Manual	**SITE: BC ☐ BH ☒ WH ☐ BM ☐**
Performance Objective: *Ensure that requirements of MSI7000.133 Version 4.0 "Laboratory Programs and Procedures Manual" and ASI7000.12 Version 3.0, Crude Oil Quality and Quantity Control Procedures," are being implemented and ensures compliance with permits , DOE Orders or other imposed requirements.*	**DATE: 2-2-2020** **AUDITOR: Alex Lewis**

23.	**LABORATORY SAFETY AND SECURITY** Is the following Protective Equipment used as identified in section 13.2?	MSI700.133 version 4.0, Section 13.2	☒	Click here to enter text.
24.	**Laboratory Training** Have laboratory personnel received the specific training activities as identified in table 11.1-1 Typical training requirements for laboratory personnel?	MSI700.133 version 4.0, Section 14	☒	
25.	Are the following Chemical Hygiene Plan general rules followed: • No eating, drinking, smoking or applying cosmetics in the laboratory and in chemical storage or use areas? • No storing, handling, or consuming food or beverages in storage areas, refrigerators, glassware, or utensils that are used for lab operations? • Do not use mouth suction for pipetting or starting a siphon? • Confine long hair and loose clothing?	MSI700.133 version 4.0, Appendix A	☒	Click here to enter text.

Laboratory Programs and Procedures Manual	**SITE: BC ☐ BH ☒ WH ☐ BM ☐**
Performance Objective: *Ensure that requirements of MSI7000.133 Version 4.0 "Laboratory Programs and Procedures Manual" and ASI7000.12 Version 3.0, Crude Oil Quality and Quantity Control Procedures," are being implemented and ensures compliance with permits , DOE Orders or other imposed requirements.*	**DATE: 2-2-2020** **AUDITOR: Alex Lewis**

	• Know the location of fire extinguishers, showers, exits, and eyewash fountains/stations? • Do not use or handle any chemical until you have read and understood the label and SDS for that chemical? • Wash areas of exposed skin with soap and water upon any instance of chemical contact. Do not wash with solvents? • Limit chemicals stored at the lab bench or other work areas to those amounts necessary for daily operation. The container size shall be the minimum convenient? • Avoid skin contact with all chemicals. • Avoid inhalation of chemicals; do not perform "sniff" tests? • Use all laboratory equipment only for its intended purpose? • Floors, aisles, and exits shall be kept clean, dry, and free of obstructions. • Fire extinguishing equipment, eyewashes, showers, electrical disconnects, and other emergency			

Laboratory Programs and Procedures Manual	**SITE: BC ☐ BH ☒ WH ☐ BM ☐**
Performance Objective: *Ensure that requirements of MSI7000.133 Version 4.0 "Laboratory Programs and Procedures Manual" and ASI7000.12 Version 3.0, Crude Oil Quality and Quantity Control Procedures," are being implemented and ensures compliance with permits , DOE Orders or other imposed requirements.*	**DATE: 2-2-2020** **AUDITOR: Alex Lewis**

	equipment shall remain unobstructed • Never work alone in a laboratory or chemical storage area if possible If not possible, arrange to have you on a periodic and frequent basis • When working with flammable chemicals, arrange the work area such that no sources of ignition are near enough to cause a fire or explosion, in case of a vapor release or liquid spill?			

Laboratory Programs and Procedures Manual	**SITE: BC ☐ BH ☐ WH ☐ BM ☒**
Performance Objective: *Ensure that requirements of MSI7000.133 Version 4.0 "Laboratory Programs and Procedures Manual" and ASI7000.12 Version 3.0, Crude Oil Quality and Quantity Control Procedures," are being implemented and ensures compliance with permits , DOE Orders or other imposed requirements.*	**DATE: 2-01-2020** **AUDITOR: Angela Coale**

	CRITERIA	DOCUMENT NO.	ACC	FINDING
1.	**Environmental Samples** At a minimum sample bottle labels should contain the following: Unique sample identifier (Sample Number) a. Unique laboratory identifier (sample #) b. Sample point name /location or description c. Date and time of sample collection d. Name and initial of the person who collected the sample d. Type of analysis to be performed	MSI700.133 version 4.0 section 5.2.1.1.1	☒	Click here to enter text.
2.	**Environmental Samples** Sample labels should meet the following conditions: a. Waterproof pen or marker must be used b. Labels and their adhesive must be made of material that does not dissolve or peel when exposed to moist conditions for an extended period. Clear plastic tape is suitable for this purpose.	MSI700.133 version 4.0 section 5.2.1.1.2	☒	

Laboratory Programs and Procedures Manual	**SITE: BC ☐ BH ☐ WH ☐ BM ☒**
Performance Objective: *Ensure that requirements of MSI7000.133 Version 4.0 "Laboratory Programs and Procedures Manual" and ASI7000.12 Version 3.0, Crude Oil Quality and Quantity Control Procedures," are being implemented and ensures compliance with permits , DOE Orders or other imposed requirements.*	**DATE: 2-01-2020** **AUDITOR: Angela Coale**

3.	**<u>Crude Oil Samples</u>** Does the following information appear on sample bottle labels? a. Complete and attach an "SPR Crude Oil Sample" label (Form Number OSF85-0141) on each sample bottle used (figure A-1). To protect the information on the label it is recommended to overlay the label with clear tape. b. Sample Number: Site (BC, BM) year (02,03 etc.) month (01-12), day (01-31) and chronological sequence (001-999) c. Sample From: (in line sampler, beginning, middle, end, grab, etc.) and Cav. 118, Tank 12A if applicable) d. Date: Date and time sample was collected e. Type of Crude: (Sweet, sour, slop) and Brent, Bingo Bongo, etc. if applicable) f. Name of personnel who collected the sample g. Disposition: Example (Retention, Site Lab analysis, Ship to NGMS,	ASI7000 version 3.0 section 3.1.5	☒	Click here to enter text.

Laboratory Programs and Procedures Manual	**SITE: BC ☐ BH ☐ WH ☐ BM ☒**
Performance Objective: *Ensure that requirements of MSI7000.133 Version 4.0 "Laboratory Programs and Procedures Manual" and ASI7000.12 Version 3.0, Crude Oil Quality and Quantity Control Procedures," are being implemented and ensures compliance with permits , DOE Orders or other imposed requirements.*	**DATE: 2-01-2020** **AUDITOR: Angela Coale**

	vendor lab, date the minimum retention period expires, and sample can be returned to the crude oil stream. h. Requirements/Comments Section • Cargo number if applicable • Purpose of sample as example: (10-year opportunity, STE, RPX, cavern to cavern) • Sample if Results (if known)			
	CRITERIA	**DOCUMENT NO.**	**ACC**	**FINDING**
4.	**<u>Environmental Media Chain of Custody Documentation: Ensure the following actions are take:</u>** • 2.3.1 Record the Chain of Custody Record number in the Master Sample Log according to 6.2.3. • 2.3.2 Ensure that the original (white copy) of the form stays with the sample. The original (white copy) will be returned to the custodian	ASR7000.115 version 3.0, Section 2.3.1-2.3.4	☒	

Laboratory Programs and Procedures Manual	**SITE: BC ☐ BH ☐ WH ☐ BM ☒**
Performance Objective: *Ensure that requirements of MSI7000.133 Version 4.0 "Laboratory Programs and Procedures Manual" and ASI7000.12 Version 3.0, Crude Oil Quality and Quantity Control Procedures," are being implemented and ensures compliance with permits , DOE Orders or other imposed requirements.*	**DATE: 2-01-2020** **AUDITOR: Angela Coale**

	once the analysis is complete. If not, then an electronic copy of the form should be received from the responsible party. • 2.3.3 If necessary, inform succeeding custodians to keep the sample and form together. • 2.3.4 Maintain a file of all Chain of Custody Record yellow copies until the return of the original; then file the original and the yellow copy may either be maintained or discarded.			
5.	**<u>Crude Oil Chain of Custody</u>** Is the "Crude Oil Quality and Quality Control Procedures Manual" (ASI7000.12) available and followed in the laboratory? Crude Oil Sample Custody Form (Form Number OSF88-0109)	MSI700.133 version 4.0, Section 2.1.3.2 ASI1700.12 version 3.0 Section 3.16	☒	Click here to enter text.

Laboratory Programs and Procedures Manual	**SITE: BC ☐ BH ☐ WH ☐ BM ☒**
Performance Objective: *Ensure that requirements of MSI7000.133 Version 4.0 "Laboratory Programs and Procedures Manual" and ASI7000.12 Version 3.0, Crude Oil Quality and Quantity Control Procedures," are being implemented and ensures compliance with permits , DOE Orders or other imposed requirements.*	**DATE: 2-01-2020** **AUDITOR: Angela Coale**

	Note: If information required below is recorded into COSMOS (see 3.16) it is not necessary to complete subject form. a. The form is to be filled out as soon as site operations (cavern engineer or workover operations specialist for 10-Year sampling) or other parties who collect a sample. b. The form is to accompany any samples sent to the WH, BC, BM, BH, or contract labs. c. The total form is to be sent along with samples and distribution made upon destination, except for the goldenrod copy that should be forwarded to Site Operations and a copy made and retained by the originator (if other than Operations). d. The site property department sending a sample(s) will notify, by the most expeditious means, the contract lab advising of the sample shipment. e. The site laboratory or contract lab will immediately upon sample receipt fax a copy of the white page to the sending site property department.			

Laboratory Programs and Procedures Manual	**SITE: BC ☐ BH ☐ WH ☐ BM ☒**
Performance Objective: *Ensure that requirements of MSI7000.133 Version 4.0 "Laboratory Programs and Procedures Manual" and ASI7000.12 Version 3.0, Crude Oil Quality and Quantity Control Procedures," are being implemented and ensures compliance with permits , DOE Orders or other imposed requirements.*	**DATE: 2-01-2020** **AUDITOR: Angela Coale**

6.	**Calibration** • Are calibration data maintained in laboratory logbooks? • Are calibration certifications	MSI700.133 version 4.0, Section 6	☒	
7.	Are routine calibration checks, in the range of interest using a set of class "1" weights, performed daily when an Analytical Balance is being used?	MSI700.133 version 4.0, Section 6.1	☒	Click here to enter text.
8.	Is the "true weight" and "observed weight" noted and documented in the laboratory's balance log book?	MSI700.133 version 4.0, Section 6.1	☒	Reviewed log book
9.	Are Automatic Pipettors calibrated and checked every 6 months and recorded in the laboratory's maintenance log book?	MSI700.133 version 4.0, Section 6.2	☒	Reviewed log book
10.	Are ovens, water baths, refrigerators and incubators monitored by using NIST traceable certified thermometers and temperatures documented daily in the laboratory appliance log?	MSI700.133 version 4.0, Section 6.3	☒	Click here to enter text.
11.	Are Hydrometers examined for damage and verified by comparison to a primary standard NIST certified hydrometer before initial use?	MSI700.133 version 4.0, Section 6.4	☒	Not used but calibrated annually
12.	Are Thermometers certified against a NIST traceable primary standard before initial use and annually thereafter?	MSI700.133 version 4.0, Section 6.6	☒	**Calibrated annually with M&TE**

Laboratory Programs and Procedures Manual	**SITE: BC ☐ BH ☐ WH ☐ BM ☒**
Performance Objective: *Ensure that requirements of MSI7000.133 Version 4.0 "Laboratory Programs and Procedures Manual" and ASI7000.12 Version 3.0, Crude Oil Quality and Quantity Control Procedures," are being implemented and ensures compliance with permits , DOE Orders or other imposed requirements.*	**DATE: 2-01-2020** **AUDITOR: Angela Coale**

13.	Are Volumetric Ware used for volumetric measurements rated as Class A or conform to Class A standards (NBC Circular 434 or ATM Special Publication 148-H)	MSI700.133 version 4.0, Section 6.7	☒	Click here to enter text.
14.	All Instruments and equipment calibration activities are recorded in the appropriate records in accordance with the current work instruction MSW7000.700?	MSI700.133 version 4.0, Section 6.9	☒	
15.	**STANDARDS, REAGENTS AND CHEMICALS** When standards, chemicals, materials, or reagents are received into the laboratory are the following actions accomplished: • Date of receipt written on the bottle or container label and documented into the appropriate log book? • Is the material name, manufacture, lot number, and expiration date recorded in the appropriate logbook? • Once the container is opened and placed into service the date and expiration date is recorded	MSI700.133 version 4.0, Section 9.3	☒	Click here to enter text.

Laboratory Programs and Procedures Manual	**SITE: BC ☐ BH ☐ WH ☐ BM ☒**
Performance Objective: *Ensure that requirements of MSI7000.133 Version 4.0 "Laboratory Programs and Procedures Manual" and ASI7000.12 Version 3.0, Crude Oil Quality and Quantity Control Procedures," are being implemented and ensures compliance with permits , DOE Orders or other imposed requirements.*	**DATE: 2-01-2020** **AUDITOR: Angela Coale**

	on the container label and in the appropriate logbook?			
16.	**DOCUMENTATION** Is laboratory data recorded in ink in a bound notebook with sequentially numbered pages, initialed and dated by the applicable analysts?	MSI700.133 version 4.0, Section 10.1.1	☒	Click here to enter text.
17.	Are erroneous entries crossed through once, initialed and dated in a manner that permits the incorrect entry to remain legible?	MSI700.133 version 4.0, Section 10.1.1	☒	Click here to enter text.
18.	Is a chemical inventory (listing all chemicals stored and or used in or by the laboratory that "belongs" to the laboratory) completed quarterly?	MSI700.133 version 4.0, Section 10.3.1	☒	Click here to enter text.
19.	Does the chemical inventory list the quantities, container type and location?	MSI700.133 version 4.0, Section 10.3.1	☒	Click here to enter text.
20.	Is the chemical inventory provided to the site ES&H department and a copy printed and filed with laboratory MSDS file, and is the copy updated on a quarterly basis within the MSDS file?	MSI700.133 version 4.0, Section 10.3.1	☒	Click here to enter text.
21.	Is there evidence of weekly waste inspection on the weekly waste inspection form?	MSI700.133 version 4.0, Section 10.3.3	☒	Click here to enter text.
22.	Is there evidence of monthly waste inventory being conducted?	MSI700.133 version 4.0, Section 10.3.4		

Laboratory Programs and Procedures Manual	**SITE: BC ☐ BH ☐ WH ☐ BM ☒**
Performance Objective: *Ensure that requirements of MSI7000.133 Version 4.0 "Laboratory Programs and Procedures Manual" and ASI7000.12 Version 3.0, Crude Oil Quality and Quantity Control Procedures," are being implemented and ensures compliance with permits , DOE Orders or other imposed requirements.*	**DATE: 2-01-2020** **AUDITOR: Angela Coale**

23.	**LABORATORY SAFETY AND SECURITY** Is the following Protective Equipment used as identified in section 13.2?	MSI700.133 version 4.0, Section 13.2	☒	Click here to enter text.
24.	**Laboratory Training** Have laboratory personnel received the specific training activities as identified in table 11.1-1 Typical training requirements for laboratory personnel?	MSI700.133 version 4.0, Section 14	☒	
25.	Are the following Chemical Hygiene Plan general rules followed: • No eating, drinking, smoking or applying cosmetics in the laboratory and in chemical storage or use areas? • No storing, handling, or consuming food or beverages in storage areas, refrigerators, glassware, or utensils that are used for lab operations? • Do not use mouth suction for pipetting or starting a siphon? • Confine long hair and loose clothing?	MSI700.133 version 4.0, Appendix A	☒	Click here to enter text.

Laboratory Programs and Procedures Manual	**SITE: BC ☐ BH ☐ WH ☐ BM ☒**
Performance Objective: *Ensure that requirements of MSI7000.133 Version 4.0 "Laboratory Programs and Procedures Manual" and ASI7000.12 Version 3.0, Crude Oil Quality and Quantity Control Procedures," are being implemented and ensures compliance with permits , DOE Orders or other imposed requirements.*	**DATE: 2-01-2020** **AUDITOR: Angela Coale**

	• Know the location of fire extinguishers, showers, exits, and eyewash fountains/stations? • Do not use or handle any chemical until you have read and understood the label and SDS for that chemical? • Wash areas of exposed skin with soap and water upon any instance of chemical contact. Do not wash with solvents? • Limit chemicals stored at the lab bench or other work areas to those amounts necessary for daily operation. The container size shall be the minimum convenient? • Avoid skin contact with all chemicals. • Avoid inhalation of chemicals; do not perform "sniff" tests? • Use all laboratory equipment only for its intended purpose? • Floors, aisles, and exits shall be kept clean, dry, and free of obstructions. • Fire extinguishing equipment, eyewashes, showers, electrical disconnects, and other emergency			

Laboratory Programs and Procedures Manual	**SITE: BC ☐ BH ☐ WH ☐ BM ☒**
Performance Objective: *Ensure that requirements of MSI7000.133 Version 4.0 "Laboratory Programs and Procedures Manual" and ASI7000.12 Version 3.0, Crude Oil Quality and Quantity Control Procedures," are being implemented and ensures compliance with permits , DOE Orders or other imposed requirements.*	**DATE: 2-01-2020** **AUDITOR: Angela Coale**

	equipment shall remain unobstructed • Never work alone in a laboratory or chemical storage area if possible If not possible, arrange to have you on a periodic and frequent basis • When working with flammable chemicals, arrange the work area such that no sources of ignition are near enough to cause a fire or explosion, in case of a vapor release or liquid spill?			

Laboratory Programs and Procedures Manual	**SITE: BC ☐ BH ☐ WH ☒ BM ☐**
Performance Objective: *Ensure that requirements of MSI7000.133 Version 4.0 "Laboratory Programs and Procedures Manual" and ASI7000.12 Version 3.0, Crude Oil Quality and Quantity Control Procedures," are being implemented and ensures compliance with permits , DOE Orders or other imposed requirements.*	**DATE: 2-6-2020** **AUDITOR: Hershel Watson**

	CRITERIA	DOCUMENT NO.	ACC	FINDING
1.	**Environmental Samples** At a minimum sample bottle labels should contain the following: Unique sample identifier (Sample Number) a. Unique laboratory identifier (sample #) b. Sample point name /location or description c. Date and time of sample collection d. Name and initial of the person who collected the sample d. Type of analysis to be performed	MSI700.133 version 4.0 section 5.2.1.1.1	☒	All sample bottles viewed contain unique sample identifiers. .
2.	**Environmental Samples** Sample labels should meet the following conditions: a. Waterproof pen or marker must be used b. Labels and their adhesive must be made of material that does not dissolve or peel when exposed to moist conditions for an extended period. Clear plastic tape is suitable for this purpose.	MSI700.133 version 4.0 section 5.2.1.1.2	☒	

Laboratory Programs and Procedures Manual	**SITE: BC ☐ BH ☐ WH ☒ BM ☐**
Performance Objective: *Ensure that requirements of MSI7000.133 Version 4.0 "Laboratory Programs and Procedures Manual" and ASI7000.12 Version 3.0, Crude Oil Quality and Quantity Control Procedures," are being implemented and ensures compliance with permits , DOE Orders or other imposed requirements.*	**DATE: 2-6-2020** **AUDITOR: Hershel Watson**

3.	**Crude Oil Samples** Does the following information appear on sample bottle labels? a. Complete and attach an "SPR Crude Oil Sample" label (Form Number OSF85-0141) on each sample bottle used (figure A-1). To protect the information on the label it is recommended to overlay the label with clear tape. b. Sample Number: Site (BC, BM) year (02,03 etc.) month (01-12), day (01-31) and chronological sequence (001-999) c. Sample From: (in line sampler, beginning, middle, end, grab, etc.) and Cav. 118, Tank 12A if applicable) d. Date: Date and time sample was collected e. Type of Crude: (Sweet, sour, slop) and Brent, Bingo Bongo, etc. if applicable) f. Name of personnel who collected the sample g. Disposition: Example (Retention, Site Lab analysis, Ship to NGMS,	ASI7000 version 3.0 section 3.1.5	☒	Click here to enter text.

Laboratory Programs and Procedures Manual	**SITE: BC ☐ BH ☐ WH ☒ BM ☐**
Performance Objective: *Ensure that requirements of MSI7000.133 Version 4.0 "Laboratory Programs and Procedures Manual" and ASI7000.12 Version 3.0, Crude Oil Quality and Quantity Control Procedures," are being implemented and ensures compliance with permits , DOE Orders or other imposed requirements.*	**DATE: 2-6-2020** **AUDITOR: Hershel Watson**

	vendor lab, date the minimum retention period expires, and sample can be returned to the crude oil stream. h. Requirements/Comments Section • Cargo number if applicable • Purpose of sample as example: (10-year opportunity, STE, RPX, cavern to cavern) • Sample if Results (if known)			
	CRITERIA	**DOCUMENT NO.**	**ACC**	**FINDING**
4.	**<u>Environmental Media Chain of Custody Documentation: Ensure the following actions are take:</u>** • 2.3.1 Record the Chain of Custody Record number in the Master Sample Log according to 6.2.3. • 2.3.2 Ensure that the original (white copy) of the form stays with the sample. The original (white copy) will be	ASR7000.115 version 3.0, Section 2.3.1-2.3.4	☒	Environmental Media Chain of Custody Documentation reviewed and found to be within the requirements of ASR7000.115 Ver 3.0 Section 2.3.1 -2.3.4.

	returned to the custodian once the analysis is complete. If not, then an electronic copy of the form should be received from the responsible party. • 2.3.3 If necessary, inform succeeding custodians to keep the sample and form together. • 2.3.4 Maintain a file of all Chain of Custody Record yellow copies until the return of the original; then file the original and the yellow copy may either be maintained or discarded.			
5.	**<u>Crude Oil Chain of Custody</u>** Is the "Crude Oil Quality and Quality Control Procedures Manual" (ASI7000.12) available and followed in the laboratory? Crude Oil Sample Custody Form (Form Number OSF88-0109)	MSI700.133 version 4.0, Section 2.1.3.2 ASI1700.12 version 3.0 Section 3.16	☒	Crude Oil Quality Control Procedures is available in lab. Required information entered into the COSMOS.

Laboratory Programs and Procedures Manual	**SITE: BC ☐ BH ☐ WH ☒ BM ☐**
Performance Objective: *Ensure that requirements of MSI7000.133 Version 4.0 "Laboratory Programs and Procedures Manual" and ASI7000.12 Version 3.0, Crude Oil Quality and Quantity Control Procedures," are being implemented and ensures compliance with permits , DOE Orders or other imposed requirements.*	**DATE: 2-6-2020** **AUDITOR: Hershel Watson**

	Note: If information required below is recorded into COSMOS (see 3.16) it is not necessary to complete subject form. a. The form is to be filled out as soon as site operations (cavern engineer or workover operations specialist for 10-Year sampling) or other parties who collect a sample. b. The form is to accompany any samples sent to the WH, BC, BM, BH, or contract labs. c. The total form is to be sent along with samples and distribution made upon destination, except for the goldenrod copy that should be forwarded to Site Operations and a copy made and retained by the originator (if other than Operations). d. The site property department sending a sample(s) will notify, by the most expeditious means, the contract lab advising of the sample shipment. e. The site laboratory or contract lab will immediately upon sample receipt fax a copy of the white page to the sending site property department.			

Laboratory Programs and Procedures Manual	**SITE: BC ☐ BH ☐ WH ☒ BM ☐**
Performance Objective: *Ensure that requirements of MSI7000.133 Version 4.0 "Laboratory Programs and Procedures Manual" and ASI7000.12 Version 3.0, Crude Oil Quality and Quantity Control Procedures," are being implemented and ensures compliance with permits , DOE Orders or other imposed requirements.*	**DATE: 2-6-2020** **AUDITOR: Hershel Watson**

6.	**Calibration** • Are calibration data maintained in laboratory logbooks? • Are calibration certifications	MSI700.133 version 4.0, Section 6	☒	
7.	Are routine calibration checks, in the range of interest using a set of class "1" weights, performed daily when an Analytical Balance is being used?	MSI700.133 version 4.0, Section 6.1	☒	Click here to enter text.
8.	Is the "true weight" and "observed weight" noted and documented in the laboratory's balance log book?	MSI700.133 version 4.0, Section 6.1	☒	Click here to enter text.
9.	Are Automatic Pipettors calibrated and checked every 6 months and recorded in the laboratory's maintenance log book?	MSI700.133 version 4.0, Section 6.2	☒	Click here to enter text.
10.	Are ovens, water baths, refrigerators and incubators monitored by using NIST traceable certified thermometers and temperatures documented daily in the laboratory appliance log?	MSI700.133 version 4.0, Section 6.3	☒	Appliance Log verified.
11.	Are Hydrometers examined for damage and verified by comparison to a primary standard NIST certified hydrometer before initial use?	MSI700.133 version 4.0, Section 6.4	☒	Hydrometer are not used during Oil & Environmental Analysis.
12.	Are Thermometers certified against a NIST traceable primary standard before initial use and annually thereafter?	MSI700.133 version 4.0, Section 6.6	☒	

Laboratory Programs and Procedures Manual	**SITE: BC ☐ BH ☐ WH ☒ BM ☐**
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13.	Are Volumetric Ware used for volumetric measurements rated as Class A or conform to Class A standards (NBC Circular 434 or ATM Special Publication 148-H)	MSI700.133 version 4.0, Section 6.7	☒	
14.	All Instruments and equipment calibration activities are recorded in the appropriate records in accordance with the current work instruction MSW7000.700?	MSI700.133 version 4.0, Section 6.9	☒	
15.	**STANDARDS, REAGENTS AND CHEMICALS** When standards, chemicals, materials, or reagents are received into the laboratory are the following actions accomplished: • Date of receipt written on the bottle or container label and documented into the appropriate log book? • Is the material name, manufacture, lot number, and expiration date recorded in the appropriate logbook? • Once the container is opened and placed into service the date and expiration date is recorded	MSI700.133 version 4.0, Section 9.3	☒	Different log books areused for each chemical, material or regent entering the lab.

Laboratory Programs and Procedures Manual	**SITE: BC ☐ BH ☐ WH ☒ BM ☐**
Performance Objective: *Ensure that requirements of MSI7000.133 Version 4.0 "Laboratory Programs and Procedures Manual" and ASI7000.12 Version 3.0, Crude Oil Quality and Quantity Control Procedures," are being implemented and ensures compliance with permits , DOE Orders or other imposed requirements.*	**DATE: 2-6-2020** **AUDITOR: Hershel Watson**

	on the container label and in the appropriate logbook?			
16.	**DOCUMENTATION** Is laboratory data recorded in ink in a bound notebook with sequentially numbered pages, initialed and dated by the applicable analysts?	MSI700.133 version 4.0, Section 10.1.1	☒	Click here to enter text.
17.	Are erroneous entries crossed through once, initialed and dated in a manner that permits the incorrect entry to remain legible?	MSI700.133 version 4.0, Section 10.1.1	☒	Click here to enter text.
18.	Is a chemical inventory (listing all chemicals stored and or used in or by the laboratory that "belongs" to the laboratory) completed quarterly?	MSI700.133 version 4.0, Section 10.3.1	☒	This information is kept in the lab MSDS booklet.
19.	Does the chemical inventory list the quantities, container type and location?	MSI700.133 version 4.0, Section 10.3.1	☒	Click here to enter text.
20.	Is the chemical inventory provided to the site ES&H department and a copy printed and filed with laboratory MSDS file, and is the copy updated on a quarterly basis within the MSDS file?	MSI700.133 version 4.0, Section 10.3.1	☒	Click here to enter text.
21.	Is there evidence of weekly waste inspection on the weekly waste inspection form?	MSI700.133 version 4.0, Section 10.3.3	☐	Weekly waste inspections are not performed
22.	Is there evidence of monthly waste inventory being conducted?	MSI700.133 version 4.0, Section 10.3.4	X	

Laboratory Programs and Procedures Manual	**SITE: BC ☐ BH ☐ WH ☒ BM ☐**
Performance Objective: *Ensure that requirements of MSI7000.133 Version 4.0 "Laboratory Programs and Procedures Manual" and ASI7000.12 Version 3.0, Crude Oil Quality and Quantity Control Procedures," are being implemented and ensures compliance with permits , DOE Orders or other imposed requirements.*	**DATE: 2-6-2020** **AUDITOR: Hershel Watson**

23.	**LABORATORY SAFETY AND SECURITY** Is the following Protective Equipment used as identified in section 13.2?	MSI700.133 version 4.0, Section 13.2	☒	Click here to enter text.
24.	**Laboratory Training** Have laboratory personnel received the specific training activities as identified in table 11.1-1 Typical training requirements for laboratory personnel?	MSI700.133 version 4.0, Section 14	☒	
25.	Are the following Chemical Hygiene Plan general rules followed: • No eating, drinking, smoking or applying cosmetics in the laboratory and in chemical storage or use areas? • No storing, handling, or consuming food or beverages in storage areas, refrigerators, glassware, or utensils that are used for lab operations? • Do not use mouth suction for pipetting or starting a siphon? • Confine long hair and loose clothing?	MSI700.133 version 4.0, Appendix A	☒	Click here to enter text.

Laboratory Programs and Procedures Manual	**SITE: BC ☐ BH ☐ WH ☒ BM ☐**
Performance Objective: *Ensure that requirements of MSI7000.133 Version 4.0 "Laboratory Programs and Procedures Manual" and ASI7000.12 Version 3.0, Crude Oil Quality and Quantity Control Procedures," are being implemented and ensures compliance with permits , DOE Orders or other imposed requirements.*	**DATE: 2-6-2020** **AUDITOR: Hershel Watson**

	• Know the location of fire extinguishers, showers, exits, and eyewash fountains/stations? • Do not use or handle any chemical until you have read and understood the label and SDS for that chemical? • Wash areas of exposed skin with soap and water upon any instance of chemical contact. Do not wash with solvents? • Limit chemicals stored at the lab bench or other work areas to those amounts necessary for daily operation. The container size shall be the minimum convenient? • Avoid skin contact with all chemicals. • Avoid inhalation of chemicals; do not perform "sniff" tests? • Use all laboratory equipment only for its intended purpose? • Floors, aisles, and exits shall be kept clean, dry, and free of obstructions. • Fire extinguishing equipment, eyewashes, showers, electrical			

Laboratory Programs and Procedures Manual	**SITE: BC ☐ BH ☐ WH ☒ BM ☐**
Performance Objective: *Ensure that requirements of MSI7000.133 Version 4.0 "Laboratory Programs and Procedures Manual" and ASI7000.12 Version 3.0, Crude Oil Quality and Quantity Control Procedures," are being implemented and ensures compliance with permits , DOE Orders or other imposed requirements.*	**DATE: 2-6-2020** **AUDITOR: Hershel Watson**

	disconnects, and other emergency equipment shall remain unobstructed • Never work alone in a laboratory or chemical storage area if possible If not possible, arrange to have you on a periodic and frequent basis • When working with flammable chemicals, arrange the work area such that no sources of ignition are near enough to cause a fire or explosion, in case of a vapor release or liquid spill?			