U.S. DEPARTMENT OF ENERGY

Strategic Petroleum Reserve Annual Report for Calendar Year 2018

Report to Congress
January 2020

United States Department of Energy
Washington, DC 20585

Message from the Secretary

The Secretary of Energy is required by section 165 of the Energy Policy and Conservation Act (EPCA),[1] to report annually to the President and Congress on the activities of the Strategic Petroleum Reserve. Highlights of the Department's accomplishments are included in the Executive Summary of this report, the *Strategic Petroleum Reserve Annual Report for Calendar Year 2018*.

This report also includes details concerning the physical capacity, type, and quantity of petroleum in the Strategic Petroleum Reserve in 2018, as well as plans for upgrades and major maintenance. EPCA requires the Secretary to report information on the current withdrawal and distribution rates and capabilities of the Strategic Petroleum Reserve; the history and costs of petroleum acquisitions for the Strategic Petroleum Reserve; and the costs associated with operations, maintenance, management, and planned projects for the Strategic Petroleum Reserve.

This report is being provided to the President and the following members of Congress:

- **The Honorable Michael R. Pence**
  President of the Senate

- **The Honorable Nancy Pelosi**
  Speaker of the House of Representatives

- **The Honorable Richard C. Shelby**
  Chairman, Senate Committee on Appropriations

- **The Honorable Patrick Leahy**
  Vice Chairman, Senate Committee on Appropriations

- **The Honorable Michael B. Enzi**
  Chairman, Senate Committee on Budget

- **The Honorable Bernard Sanders**
  Ranking Member, Senate Committee on Budget

- **The Honorable Lamar Alexander**
  Chairman, Subcommittee on Energy and Water Development
  Senate Committee on Appropriations

[1] Pub. L. 94–163, 89 Stat. 871, enacted December 22, 1975 (42 U.S.C. § 6245), as amended.

- **The Honorable Dianne Feinstein**
  Ranking Member, Subcommittee on Energy and Water Development
  Senate Committee on Appropriations

- **The Honorable Lisa Murkowski**
  Chairman, Senate Committee on Energy and Natural Resources

- **The Honorable Joseph Manchin**
  Ranking Member, Senate Committee on Energy and Natural Resources

- **The Honorable Nita M. Lowey**
  Chairwoman, House Committee on Appropriations

- **The Honorable Kay Granger**
  Ranking Member, House Committee on Appropriations

- **The Honorable Marcy Kaptur**
  Chairwoman, Subcommittee on Energy and Water Development
  House Committee on Appropriations

- **The Honorable Mike Simpson**
  Ranking Member, Subcommittee on Energy and Water Development
  House Committee on Appropriations

- **The Honorable John Yarmuth**
  Chairman, House Committee on the Budget

- **The Honorable Steve Womack**
  Ranking Member, House Committee on the Budget

- **The Honorable Frank Pallone, Jr.**
  Chairman, House Committee on Energy and Commerce

- **The Honorable Greg Walden**
  Ranking Member, House Committee on Energy and Commerce

- **The Honorable Bobby L. Rush**
  Chairman, Subcommittee on Energy
  House Committee on Energy and Commerce

- **The Honorable Fred Upton**
  Ranking Member, Subcommittee on Energy
  House Committee on Energy and Commerce

If you have any questions or need additional information, please contact, Mr. Shawn Affolter, Deputy Assistant Secretary for Senate Affairs or Mr. Christopher J. Morris, Deputy Assistant Secretary for House Affairs, Office of Congressional and Intergovernmental Affairs, at (202) 586-5450; or Ms. Katy Donley, Deputy Director of External Coordination, Office of the Chief Financial Officer, at (202) 586-0176.

Sincerely,

Dan Brouillette

Executive Summary

Program Highlights and Status

The Strategic Petroleum Reserve (SPR) provides the United States with energy and economic security through its emergency stockpile of crude oil and refined petroleum products. Crude oil stocks are located at four storage-site facilities: Bryan Mound and Big Hill in Texas, and Bayou Choctaw and West Hackberry in Louisiana.

The SPR entered calendar year (CY) 2018 with 662.8 million barrels (MMbbl) of crude oil, and at the end of CY 2018 (as of December 31, 2018), the SPR held 649.1 MMbbl—an amount equivalent to approximately 113 days of net U.S. crude oil imports . The SPR's crude oil inventory decreased by 13.7 MMbbl from the previous year. The net decrease in crude oil inventory resulted from two congressionally-mandated sales and the removal of high-vapor pressure gases following degasification of SPR crude oil. During the degasification, the SPR processed 29.72 MMbbl of crude oil in CY 2018. The degasification started in August 2014 at the West Hackberry storage site and finished on October 10, 2018. The SPR completed degasification on 15 of 22 caverns at the West Hackberry storage site.

The SPR successfully carried out two congressionally-mandated crude oil sales. In April 2018, the SPR began crude oil sales in accordance with Section 404 of the Bipartisan Budget Act of 2015 (Pub. L. 114-74), and the Secretary authorized the SPR to draw down and sell an amount of crude oil not to exceed $350 million in fiscal year (FY) 2018. The sale proceeds were deposited in the Energy Security and Infrastructure Modernization (ESIM) Fund and will be used to fund the SPR Modernization Program's Life Extension 2 project. The FY 2018 SPR Modernization Program crude oil sale concluded in June 2018, with 4,744,978 barrels (bbl) delivered over 24 shipments. The SPR deposited $347,828,624 of revenue into the ESIM Fund.

In October 2018, the SPR began crude oil sales in accordance with Section 403 of the Bipartisan Budget Act of 2015 (Pub. L. 114-74) and Section 5010 of the 21st Century Cures Act of 2015 (Pub. L. 114-255) to meet the requirements for FY 2019. The combined sales concluded in December 2018, with 10,870,187 bbl delivered over 61 shipments. From the combined sales, the SPR deposited $721,600,233 of revenue into the General Fund of the Treasury with an additional $24,103,951 due from purchasers by January 20, 2019, for a total of $745,704,184.

In February 2018, the SPR received the remaining balance of 2,627,825 bbl of crude oil provided in emergency exchanges in response to impacts from Hurricane Harvey and subsequent oil shortages. The returns began in CY 2017, with 2,684,836 bbl of the 5,312,661 bbl exchanged.

Through the Consolidated Appropriations Act, 2018 (Pub. L. 115-141), the budget authority for the SPR was $252 million, with Congress directing $223 million for operating and maintaining the SPR, and $29 million for the continuation of the Northeast Gasoline Supply Reserve (NGSR) commercial storage leases. The SPR also received $8.4 million in the SPR Petroleum Account

for costs related to drawdown operations and supplemental disaster relief funding for damages associated with Hurricane Harvey in the amount of $8.716 million. Obligations for the SPR in FY 2018 totaled approximately $241.4 million. From this amount, the SPR obligated amounts of:

- $22.8 million for Federal program management;
- $198.2 million for contractual goods and services to operate and maintain the SPR and to conduct an emergency drawdown and sale, if required;
- $8.5 million for Hurricane Harvey repairs;
- $11.5 million for drawdown operations related to congressionally-mandated sales of SPR crude oil; and
- $408,209 for NGSR operations.

Changes to Performance Capabilities

Vapor Pressure Mitigation Program

The Vapor Pressure Mitigation Program continued in CY 2018. The use of deep underground solution-mined salt caverns for long-term storage of crude oil subjects the oil to geothermal heating and gas intrusion from the surrounding salt. That exposure tends to increase the crude oil vapor pressure. During a drawdown, oil that is delivered to storage tanks at terminals may contain toxic and flammable gases at levels that can present environmental and health risks to terminal personnel and the public. The SPR mitigates these risks by using a customized, portable degasification unit that reduces the crude oil vapor pressure in the caverns for safe crude oil delivery. The unit moves among the SPR sites every 2–5 years, as necessary, to degas caverns that show high levels of vapor pressure.

The degassing unit, which began in August 2014, completed its 5-year program as scheduled at the West Hackberry, Louisiana site on October 10, 2018. The total volume processed was 177.1 MMbbl. Once decommissioned, this plant will be retired. The Life Extension 2 Project will fund a smaller, more portable degassing unit, which will begin processing at the Bayou Choctaw, Louisiana site, tentatively scheduled to begin in June 2023 and end in October 2026.

Environment, Safety, and Health

During CY 2018, the SPR had a successful year in environmental, safety, and health performance, as it continued to improve safety and health systems throughout the complex. The SPR maintained a low SPR accident rate with a Total Recordable Case Rate of 1.12 and a Days Away/Restricted/Transferred rate of 0.45 for CY 2018. The SPR received recognition for its management of effective environmental and safety management systems.

In 2018, the Occupational Safety and Health Administration's (OSHA) Voluntary Protection Program (VPP) Region VI recognized all SPR sites as VPP sites. Big Hill and Bayou Choctaw completed CY 2018 qualifying for a VPP Star of Excellence award, whereas OSHA recognized Bryan Mound and West Hackberry as VPP sites. A Star of Excellence award requires the site to

have an incident rate of at least 90 percent below the national average. The VPP recognizes employers and workers in the private industry and Federal agencies who have implemented effective safety and health management systems and maintain injury and illness rates below the national Bureau of Labor Statistics' averages for their respective industries. In the VPP, management, labor, and OSHA work cooperatively and proactively to prevent fatalities, injuries, and illnesses, through a system focused on hazard prevention and control; worksite analysis; training; and management commitment and worker involvement. To participate, employers must submit an application to OSHA and undergo a rigorous onsite evaluation by a team of safety and health professionals. Additionally, a third-party auditor found the SPR's Environmental Management System to be in compliance with the 2015 version of the International Organization for Standardization's (ISO) 14001 standards.

STRATEGIC PETROLEUM RESERVE ANNUAL REPORT FOR CALENDAR YEAR 2018

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I. Legislative Language

The Energy Policy and Conservation Act (EPCA) (42 U.S.C. 6201 *et seq*.) was enacted on December 22, 1975 and authorizes the Strategic Petroleum Reserve (SPR) (Pub. L. 94-163). Since then, SPR has operated to reduce the impact of disruptions in oil supplies and to carry out obligations under the International Energy Program.

Section 165 of EPCA (42 U.S.C. § 6245), as amended, requires the Secretary of Energy to submit an annual report to the President and Congress on the activities of the SPR. Consistent with this statutory provision, this *Strategic Petroleum Reserve Annual Report for Calendar Year 2018* includes information on:

- The status of the physical capacity of the SPR and the type and quantity of petroleum products stored in the SPR;
- An estimate of the schedule and cost to complete planned equipment upgrades or capital investments in the SPR, including upgrades and investments carried out as part of operational maintenance or life extension activities;
- Identification of any life-limiting conditions or operational problems at any SPR facility, and proposed remedial actions including an estimate of the schedule and cost of implementing those remedial actions;
- A description of current withdrawal and distribution rates and capabilities, and an identification of any operational or other limitations on those rates and capabilities;
- A listing of petroleum product acquisitions made in the preceding year and planned in the following year, including quantity, price, and type of petroleum;
- A summary of the actions taken to develop, operate, and maintain the SPR;
- A summary of the financial status and financial transactions of the SPR and the SPR Petroleum Accounts for the year;
- A summary of expenses for the year, and the number of federal and contractor employees;
- The status of contracts for development, operation, maintenance, distribution, and other activities of the SPR;
- A summary of foreign oil storage agreements and their implementation status; and
- Any recommendations for supplemental legislation or policy or operational changes the Secretary considers necessary to implement EPCA as it pertains to the SPR.

II. Program Mission

Introduction

The SPR operates pursuant to the authority of EPCA (42 U.S.C. 6201, *et seq.*), as amended. Congress enacted EPCA in recognition of the vulnerability of the United States to disruptions in the world oil market. One of the purposes of EPCA was to create an SPR capable of reducing the impact of severe energy supply interruptions.

As of December 31, 2018, the SPR contained 649.1 million barrels (MMbbl) of crude oil. That inventory provides the equivalent of approximately 113 days of net crude imports, based on 2018 average net U.S. crude imports of 5.76 million barrels per day (MMbbl/d) or 277 days of net petroleum imports, based on 2018 average net U.S. petroleum imports of 2.34 MMbbl/d.

Legislative Activity

The following laws enacted by the end of calendar year (CY) 2018 directly impact the SPR program over the next decade and beyond:

Section 403 of the Bipartisan Budget Act of 2015 (Pub. L. 114-74) requires the Secretary of Energy (hereinafter "the Secretary") to draw down and sell a total of 58 MMbbl of crude oil from the SPR over eight consecutive years, commencing in fiscal year (FY) 2018 and continuing through FY 2025.

Section 404 of the Bipartisan Budget Act of 2015 authorized the Secretary to sell crude in an amount up to $2 billion for the period encompassing FYs 2017–2020. The sales were for the purposes of carrying out an SPR modernization program, to the extent provided in advance in Appropriations Acts. In FY 2017, Section 101 of the Further Continuing and Security Assistance Appropriations Act, 2017 (Pub. L. 114-254) requires the Secretary to draw down and sell amounts not exceeding $375.4 million of crude oil from the SPR.

Section 32204 of the Fixing America's Surface Transportation Act (the FAST Act) (Pub. L. 114-94) requires the Secretary to draw down and sell a total of 66 MMbbl of crude oil from the SPR over three consecutive years, commencing in FY 2023 and continuing through FY 2025.

Section 5010 of the 21st Century Cures Act of 2015 (Pub. L. 114-255) requires the Secretary to draw down and sell a total of 25 MMbbl of crude oil from the SPR over three consecutive years commencing in FY 2017 through 2019. The first portion of these sales was executed in spring 2017.

Section 20003 of the Tax Cuts and Jobs Act of 2017 (Pub. L. 115-97) requires the Secretary to draw down and sell a total of 7 MMbbl of crude oil from the SPR in FY 2026 and FY 2027.

Section 30204 of the Bipartisan Budget Act of 2018 (Pub. L. 115-123) requires the Secretary to draw down and sell a total of 100 MMbbl of crude oil from the SPR in FY 2022 through FY 2027, by selling a total of 30 MMbbl combined in FY 2022 through FY 2025, 35 MMbbl in FY 2026, and 35 MMbbl in FY 2027.

Section 501 of the Consolidated Appropriations Act of 2018 (Pub. L. 115-141) requires the Secretary to draw down and sell a total of 10 MMbbl of crude oil from the SPR in FY 2026 and FY 2027 combined.

Section 3009 of the America's Water Infrastructure Act of 2018 (Pub. L. 115–270) requires the Secretary to draw down and sell a total of 5 MMbbl of crude oil from the SPR in FY 2028. The proceeds from this sale will be deposited into the U.S. Treasury General Fund.

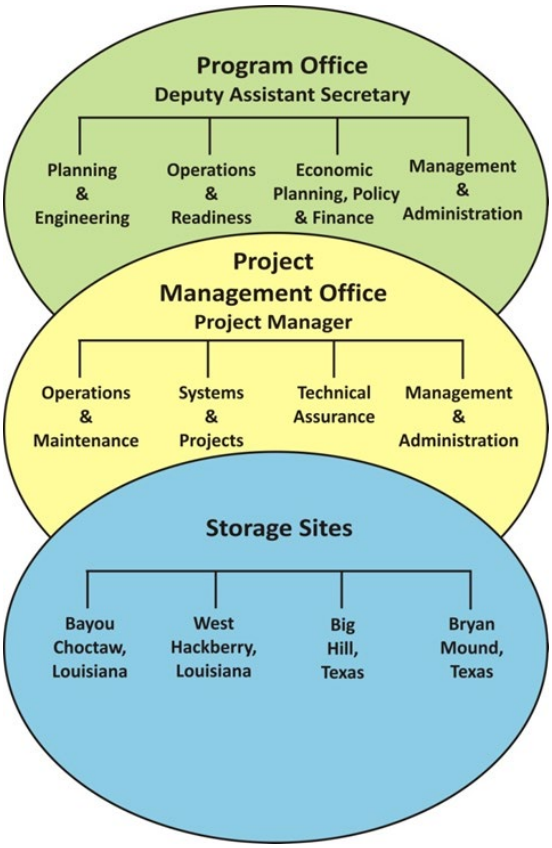
III. Program Management

Organization

The Assistant Secretary for Fossil Energy (ASFE) at the U.S. Department of Energy (DOE) in Washington, DC, has overall program responsibility for carrying out the mission of the SPR and for monitoring the SPR's operational readiness capability. The ASFE delegates this responsibility to the Deputy Assistant Secretary for Petroleum Reserves who exercises it through the Program Office in Washington, DC, and the SPR Project Management Office (PMO) in New Orleans, Louisiana. As of December 31, 2018, the Program Office staff included 24 Federal employees and 10 contractor employees, while SPR PMO staff includes 91 Federal employees and 667 contractor employees with direct DOE contracts. **Figure 1** depicts the SPR's organizational structure.

Figure 1

Strategic Petroleum Reserve Organizational Structure



Contractual Support

PMO is responsible for the design, development, operation, and maintenance of the SPR. Fluor Federal Petroleum Operations (FFPO) serves as the maintenance and operations (M&O) contractor, providing management and personnel to operate and maintain the SPR facilities and related systems. The period of performance for this contract is five years. It began on April 1, 2014, with one 5-year option. On August 15, 2018, the SPR exercised the 5-year option period, extending the period of performance to March 31, 2024.

Vali Cooper International, a Service-Disabled Veteran-Owned Small Business architectural and engineering (A&E) firm, is under contract to provide design services for the four storage facilities. The period of performance is five years, which began August 15, 2014.

DOE's Sandia National Laboratories provided geotechnical support that included analysis of the salt domes, cavern integrity, vapor pressure, crude oil quality, and new cavern development.

Several support services contracts exist for management, technical, and computer support. The SPR's largest support service contractor is Infinity Technology, a certified 8(a) Small Disadvantaged Business that provides management and technical support. The SPR entered into this contract on November 1, 2016. It has a 2-year base period with three 1-year option periods.

Other support contractors that provided support to the Program Office in Washington, DC, in 2018, included Core Laboratories, L.P.; AOC Petroleum Support Services, LLC; and Cyborg, Inc. Additionally, Oak Ridge National Laboratory provided economic and analytical support and model development.

The SPR purchased power for the four storage sites from Engie Resources and Entergy Louisiana, LLC.

During CY 2018, the SPR executed new contracts with two commercial facilities that provide terminal services for the fill, drawdown, and storage of crude oil. The SPR entered into a new contract with Sunoco Partners Marketing & Terminals, L.P. with a 5-year term that runs through September 2023. The new Sunoco Partners Marketing & Terminals, L.P., contract has five 1-year option periods that can be exercised after the initial 5-year term. The SPR's connection agreement with Phillips 66 was executed in November 2018 and will run for 5 years through November 2023. The SPR's M&O contractor also continued its agreement with Seaway Crude Pipeline Company for terminal services. This agreement with Seaway commenced on December 2, 2016, and will conclude on November 30, 2021.

IV. Crude Oil Storage Program

Strategic Petroleum Reserve Storage Facilities

The SPR currently operates and maintains four major oil storage facilities in the Gulf Coast region of the United States. All oil stored in the SPR's facilities is in large underground caverns that have been created in salt dome formations. Salt dome storage technology provides maximum security and safety for the Nation's stockpile of crude oil, and it is also the lowest-cost technology for large-scale petroleum storage projects. The average operations cost for FY 2018 was $0.247 per barrel for management, staffing, operations and maintenance, and security of the SPR. This cost is substantially less than industry storage costs and all foreign petroleum oil reserves.

The SPR has two sites in Texas (Bryan Mound and Big Hill), and two sites in Louisiana (West Hackberry and Bayou Choctaw). The four SPR sites have a combined storage capacity of 714 MMbbl and a maximum sustained drawdown capability of 4.415 MMbbl/d.[2] **Table 1** shows

[2] Current SPR maximum drawdown capability is reduced to 4.25 MMbbl/d due to a damaged floating pan in Tank 2 at Bryan Mound.

the authorized storage capacity and sustained drawdown capability of each SPR site as of December 31, 2018.

Table 1: Authorized Storage Capacity and Sustained Drawdown Capability (As of December 31, 2018)

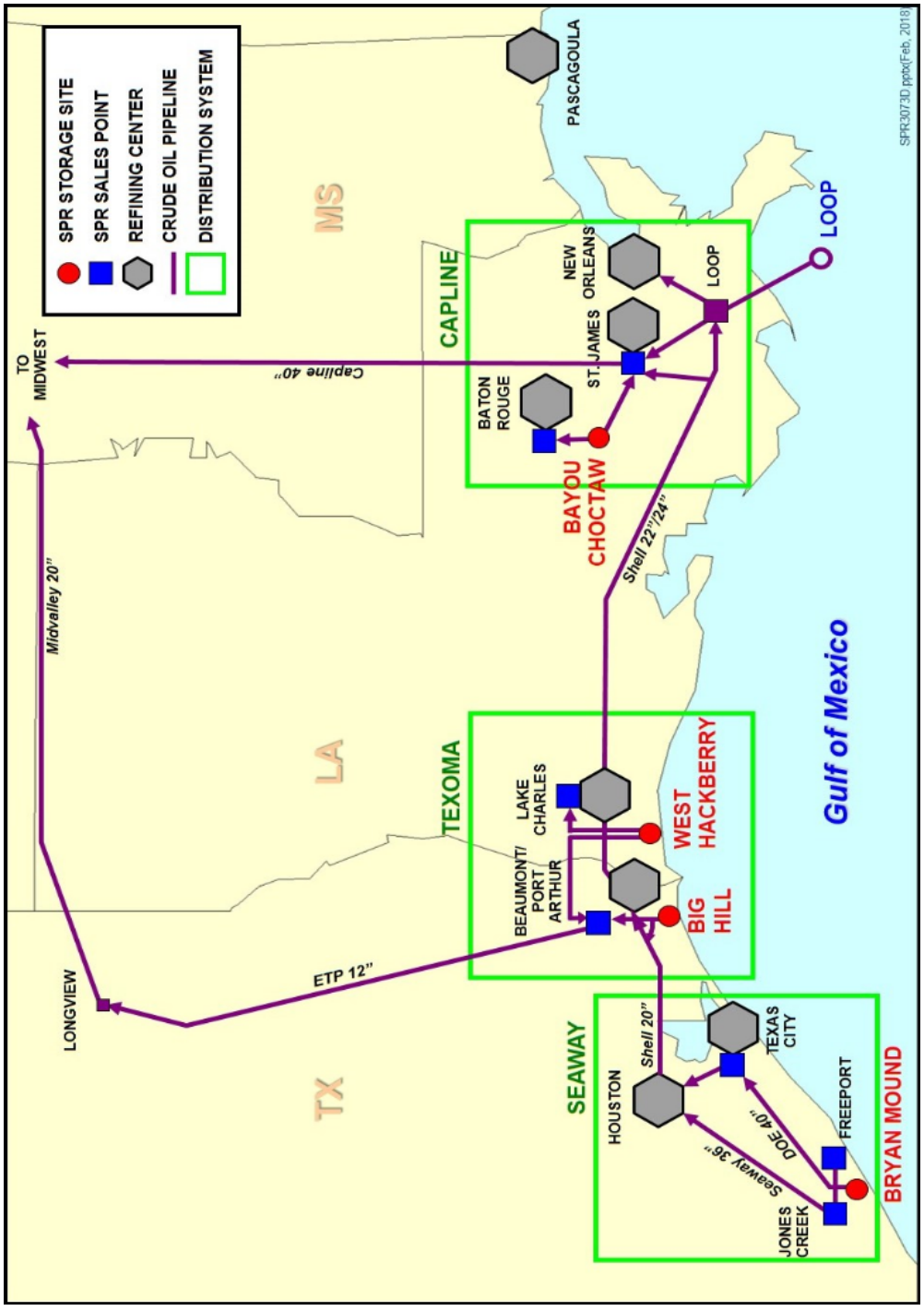
CURRENT SITE CAPABILITY			
Storage Facility	**Authorized Storage Capacity (MMbbl)**	**Crude Mix Sweet/Sour (MMbbl)**	**Sustained Drawdown Capability (MMbbl/d)**
Bryan Mound	**247.0**	**71/176**	**1.5***
West Hackberry	**221.0**	**108/113**	**1.3**
Big Hill	**170.0**	**72/98**	**1.1**
Bayou Choctaw	**76.0**	**24/52**	**0.515**
Total Program	**714.0**	**275/439 (39%/61%)**	**4.415[2]**

Sweet = Sulfur content not exceeding 0.5 percent
Sour = Sulfur content greater than 0.5 percent
MMbbl = Million Barrels
MMbbl/d = Million Barrels Per Day

*Current Bryan Mound maximum sustained drawdown capability is reduced to 1.350 MMbbl/d due to needed repair to above ground storage tank.

The SPR's oil storage facilities are grouped into three geographical pipeline distribution systems in the Gulf Coast: Seaway, Texoma, and Capline. Each of these pipelines systems has access to one or more major refining centers, interstate crude oil pipelines, and marine terminals for crude oil distribution. **Figure 2** shows the locations of the SPR storage sites and their respective distribution systems.

Figure 2: Storage Sites and Distribution System



Cavern Integrity

During 2018, due to process improvements and increasing efficiencies, the availability of crude oil inventory increased steadily across the SPR; it currently averages greater than 97 percent. A total of 11 well workovers, including repairs to brine disposal wells, and one cavern well remediation were completed. The SPR leased a second rig to augment the DOE-owned rig to accelerate well repairs and increase inventory availability. In addition, another cavern well was repaired by injecting a polymer sealant, saving DOE more than $2 million compared to a conventional rig-based remediation. The SPR completed a project to purge the Bayou Choctaw site brine disposal wells of accumulated sand and mineral scale under budget and ahead of schedule to prepare for the receipt of oil exchanged with refiners in response to Hurricane Harvey. The SPR also made standard-setting improvements to the mechanical integrity test (MIT) process for cavern wells and documented them in revisions made to the MIT Manual, as well as in MIT reports and a presentation at an industry conference. As part of an expansion of the Life Extension 2 program, the SPR initiated planning to drill 17 new cavern wells and two new brine disposal wells.

Bryan Mound Site Status

The Bryan Mound storage site is in Brazoria County, Texas, approximately three miles southwest of Freeport, Texas. As of December 31, 2018, the site had 19 operational storage caverns with a total authorized storage capacity of 247.1 MMbbl, and a cavern inventory of 234.8 MMbbl. During 2018, the site drawdown rate was reduced by 150,000 barrels per day (bbl/d) pending conversion of a crude oil storage tank used for drawdown from an internal floating roof to an external floating roof tank. A second crude oil storage tank, which also requires conversion to an external floating roof tank, was out of service for 2018. It will undergo the conversion during the upcoming SPR Modernization Program – Life Extension 2 Project.

Big Hill Site Status

The Big Hill storage site is located in Jefferson County, Texas, approximately 26 miles southwest of Beaumont, Texas. As of December 31, 2018, the site had 14 operational storage caverns, with a combined authorized storage capacity of 170.0 MMbbl, and a cavern inventory of 149.0 MMbbl.

West Hackberry Site Status

The West Hackberry storage site is located in Cameron Parish, Louisiana, approximately 25 miles southwest of Lake Charles, Louisiana. As of December 31, 2018, the site had 21 operational storage caverns with a combined authorized storage capacity of 220.9 MMbbl, and a cavern inventory of 195.2 MMbbl.

Bayou Choctaw Site Status

The Bayou Choctaw storage site is located in Iberville Parish, Louisiana, approximately 12 miles northwest of Baton Rouge, Louisiana. As of December 31, 2018, the site had six storage caverns, an authorized storage capacity of 76.0 MMbbl, and a cavern inventory of 70.8 MMbbl.

St. James Marine Terminal Status

The SPR owns a marine terminal on the Mississippi River in St. James, Louisiana. The facility was constructed in the late 1970s and began operations in early 1980. The facility was designed to support fill and drawdown of the Weeks Island (which was decommissioned in November 1999) and Bayou Choctaw SPR sites. The St. James marine terminal has six aboveground storage tanks with a total storage capacity of approximately 2 MMbbl. The SPR has a lease agreement for the St. James marine terminal with Shell Oil Products U.S., which expired on December 31, 2019. A new lease agreement with Exxon Mobil Pipeline Company has been executed. Under the lease agreement, Exxon Mobil will provide all normal operations and maintenance of the terminal, and it must support the SPR as a sales and distribution point in the event of an SPR drawdown.

The St. James marine terminal, in addition to its ability to support marine transfer operations, has pipeline connections that allow crude oil to be distributed to local area markets for further distribution. Direct connections to the Louisiana Capline, LOCAP terminal, and Plains facilities enhance the SPR's emergency distribution capabilities by enabling unencumbered crude oil distribution.

DOE will lease the St. James marine terminal through a competitive process to ensure the best value to the Federal Government. The U.S. Government, acting by and through the Secretary of Energy, under the authority of Section 646 of the DOE Organization Act (42 U.S.C. § 7256) and Section 159(f)(4) of the EPCA (42 U.S.C. § 6239(f)(4)) and applicable rules, orders, and regulations, represented herein by having determined that the St. James marine terminal is not excess property as defined by Section 3(e) of the Federal Property and Administrative Services Act of 1949, as amended (40 U.S.C. § 102), and that the leasing thereof will be advantageous to the United States Government and in the public interest.

V. Bryan Mound Cavern 2 Transfer Project

In 2014, access to the sweet crude oil inventory in Bryan Mound Cavern 2 was considered at risk. Cavern 2 is a two-well configuration cavern. Both Well 2 and 2A failed a MIT in 2013.

Because of this well history and the associated risk, the decision was made to empty Cavern 2 of crude oil. After the cavern is empty, geotechnical analysis and well stabilization will occur. Crude oil removal out of Cavern 2 began March 1, 2015, as a single closed-loop, cavern-to-

cavern movement. Oil was transferred from Cavern 2 to additional receiving caverns within the site. This site will continue to meet regulatory requirements during this inventory withdrawal period.

As of December 31, 2018, all pumpable inventory has been removed from the cavern. Operations will continue to transfer low volumes of any residual crude migrating to the wellhead. Once this phase is complete, activities related to a permanent closure of the cavern will commence.

VI. SPR Modernization Program – Life Extension 2 Project

In 2015, the SPR commenced a program that will replace or upgrade site equipment and facilities that are approaching or have exceeded their 25-year life span with the signing of Critical Decision-0 Mission Need, in accordance with DOE Order 413.3C, Acquisition of Capital Assets. Critical Decision 1 Analysis of Alternatives was approved in December 2016, with a cost range of $750 million to $1.4 billion. In 2017, Life Extension Phase 2 efforts continued with the award of the A&E contract by the M&O contractor. The Life Extension 2 Project will upgrade the four SPR storage sites.

In 2018, the SPR's major accomplishments included the approval of Long Lead Time Procurement Equipment Authority (CD-3A/3B) in November and completion of the FY 2018 SPR Modernization crude oil sale, with $347.8 million sales revenue deposited to the Energy Security and Infrastructure Modernization Fund.

VII. Oil Acquisition Market Assessments

The *Procedures for the Acquisition of Petroleum for the SPR* (10 CFR Part 626) establish the rules and processes for acquiring SPR crude oil. These procedures require a comprehensive market assessment before the initiation or continuation of any oil fill activities to ensure that SPR acquisition activities will not unduly affect the current market conditions.

Crude Oil Exchanges

In 2017, Hurricane Harvey's effects on the Gulf of Mexico resulted in a 20 percent reduction in offshore oil production over seven days (August 25 through August 31). Areas of Louisiana and Texas affected by coastal flooding and hurricane conditions also affected onshore crude oil production. Additionally, the major commercial crude oil pipelines bringing oil into the Gulf Coast were offline because the major crude oil import ports were closed to vessel traffic. Ten major refineries in the region were completely

offline, and other refiners in the Gulf Coast had significantly reduced capacity. In fact, estimates suggest more than 2 MMbbl/d of capacity were offline at one point. An estimate of total reduction in fuel refining capacity was approximately 20 percent of U.S. capacity.

Sections 159 and 160 of EPCA authorized the Secretary of Energy to exchange SPR petroleum products and acquire petroleum products by exchange for storage in the SPR. The Secretary of Energy has previously exercised this legal authority to conduct emergency exchanges in response to natural disasters, including Hurricane Isaac in 2012 (1 MMbbl), Hurricanes Gustav and Ike in 2008 (5.4 MMbbl), Hurricane Katrina in 2005 (9.8 MMbbl), Hurricane Ivan in 2004 (5.4 MMbbl), and Hurricane Harvey in 2017 (5.2 MMbbl). In response to national impacts from Hurricane Harvey, the Secretary of Energy authorized the SPR to negotiate and execute an emergency oil exchange with four companies that had significant market supply shortages—Marathon, Phillips 66, Placid, and Valero. The SPR provided crude oil in more than 30 deliveries made to various delivery points. Both the Bayou Choctaw and West Hackberry sites participated in this activity, which began on August 30, 2017, and ended on September 28, 2017. The companies returned the barrels to the SPR beginning in October 2017 and ending February 2018 for a grand total of 5.3 MMbbl (5.23 MMbbl and a premium of 0.088 MMbbl).

Crude Oil Inventory Status

As of December 31, 2018, the SPR's crude oil inventory was 649.1 MMbbl, a decrease of 13.7 MMbbl from the previous year. The net decrease resulted primarily from congressionally-mandated sales and small quantities related to degassing (20,578 barrels [bbl] in CY 2018) to remove impurities from the crude oil, which was partially offset by crude oil deliveries that were returned to the SPR in January and February 2018 from Hurricane Harvey emergency exchanges.

Fill of Reserve

Detailed information about the SPR's fill program since 1977 can be found in the following:

- **Table 2** lists year-end inventories and average daily fill rates for the years 1977–2018 (by FY and CY);
- **Table 3** lists crude oil receipts by country of origin since 1977;
- **Table 4** identifies the location of the inventory by storage site; and
- **Figure 3** illustrates the cumulative oil fill by year.

Table 2: Year-End Inventories and Oil Fill History

	FISCAL YEAR		CALENDAR YEAR	
	Year-End Inventory (MMbbl)	Average Daily Fill Rate[1] (Mbbl/d)	Year-End Inventory (MMbbl)	Average Daily Fill Rate[1] (Mbbl/d)
1977	1.1	3	7.2	20
1978	49.1	131	68.5	168
1979	91.2	115	91.7	64
1980	92.8	4	107.8	44
1981	199.2	292	230.3	336
1982	277.9	215	293.8	174
1983	361.0	228	379.1	234
1984	431.1	191	450.5	195
1985	489.3	159	493.3	119
1986	506.4	47	511.6	51
1987	533.9	75	540.6	80
1988	554.7	57	559.5	52
1989	577.1	62	579.9	56
1990	589.6	34	585.7	27
1991	568.5	(58)	568.5	(47)
1992	571.4	8	574.7	17
1993	585.7	39	587.1	34
1994	591.7	16	591.7	13
1995	591.7	*[2]	591.6	*[2]
1996	573.6	(49)	565.8	(70)
1997	563.4	(28)	563.4	(7)
1998	563.4	*[2]	561.1	(6)[3]
1999	564.9	4	567.0	16
2000	570.3	15	540.7	(72)[4]
2001	544.8	(70)[4]	550.2	26
2002	587.2	116	599.1	134
2003	624.4	102	638.4	108
2004	670.3	126[5]	675.6	102[5]
2005	693.7	64[6]	684.5	25[6]
2006	687.8	(16)[7]	688.6	11[7]
2007	692.8	14	696.9	23
2008	702.4	26[8]	701.8	13[8]
2009	725.1	62.2	726.6	67.9
2010	726.5	3.8	726.5	(0.2)[9]
2011	695.9	(84)[10]	695.9	(84)[10]
2012	694.9	(3)[11]	695.3	(2)[11]
2013	696.0	3	696.0	2
2014	691.0	(13.6)[12]	691.0	(13.6)[12]
2015	695.1	11.2	695.1	11.2
2016	695.1	0	695.1	0
2017	673.8	(58.4) [13]	662.8	(88.5) [14]
2018	660.0	(37.8) [15]	649.1	(37.53)

MMbbl = Million Barrels Mbbl/d = Thousand Barrels per Day ( ) = Denotes a Reduction

1. Fill rates adjusted for oil sales
2. Fill suspended during this period
3. Decrease due to Maya exchange
4. Net decrease due to Exchange 2000
5. Net Hurricane Ivan deliveries and receipts
6. Net Hurricane Ivan receipts & Katrina deliveries and receipts
7. Net Hurricane Katrina exchange and drawdown sales
8. Net Hurricanes Gustav & Ike deliveries
9. West Hackberry/Bayou Choctaw Exchange oil costs and degas loss
10. Drawdown 2011
11. Hurricane Isaac Exchange
12. Test Sale 2014
13. FY17 21st Century Cures, FY17 SPR Modernization, Hurricane Harvey Exchange
14. FY18 Mandatory Sale, Harvey Exchange
15. FY18 Mandatory Sale, FY18 Modernization Sale, Harvey Exchange Returns

Table 3: Crude Oil Receipts since 1977 (As of December 31, 2018)

Source Country	Cumulative (MMbbl)	Percent of Total (%)
Mexico	266.3	30.7
United Kingdom	193.9	22.4
United States*	118.7	13.7
Saudi Arabia	28.3	3.3
Libya	27.5	3.2
Venezuela	25.3	2.9
Angola	25.1	2.9
Russia	25.1	2.9
Iran****	20.0	2.3
United Arab Emirates	19.3	2.2
Nigeria	16.3	1.9
Algeria	15.7	1.8
Cameroon	15.1	1.7
Equatorial Guinea	15.1	1.7
Norway	14.0	1.6
Oman	12.9	1.5
Egypt	8.9	1.0
Ecuador	6.2	0.7
Iraq	3.4	0.4
Gabon	2.4	0.3
Qatar	2.3	0.3
Azerbaijan	2.1	0.2
Columbia	1.2	0.1
Argentina	0.4	0.0
Ivory Coast	0.4	0.0
Peru	0.4	0.0
Total**	866.3***	100.0

MMbbl = Million Barrels

* Included receipts from offshore Gulf of Mexico.

** Totals do not add due to rounding.

*** Cumulative total receipts unadjusted for sales and operational gains and losses.

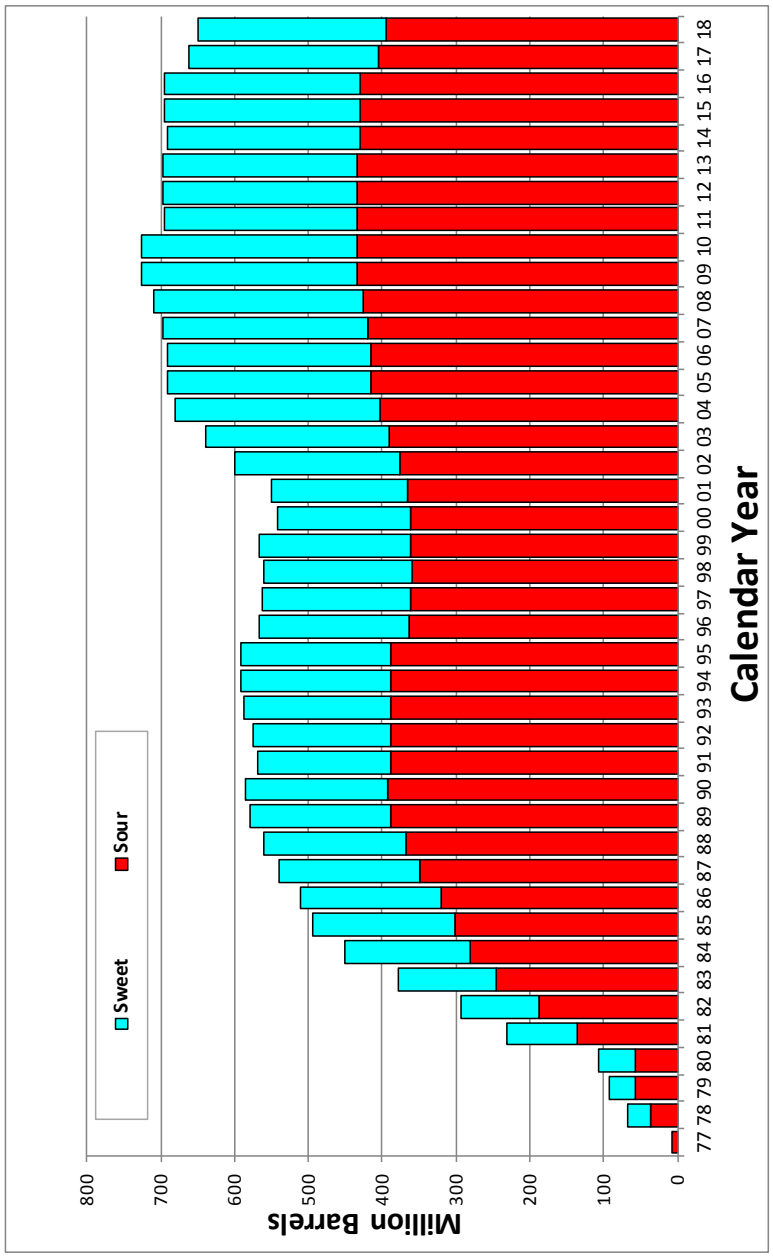
**** Prior to 1995

Table 4: Crude Oil Inventory (As of December 31, 2018)

Storage Site	Inventory (MMbbl)		
	Sweet*	Sour**	Total***
Bryan Mound, Brazoria County, Texas	67.8	164.6	232.4
Big Hill, Jefferson County, Texas	63.8	85.2	149.0
West Hackberry, Cameron Parish, Louisiana	103.0	93.0	196
Bayou Choctaw, Iberville Parish, Louisiana	18.9	51.8	70.8
Subtotal Underground Inventory	253.8	394.1	647.9
Tanks and Pipelines	0.666	0.381	1.0
Total Inventory	254.6	394.6	649.1
Total Accounts Receivable	0.0	0.0	0.0
Total SPR Book Inventory	254.4	394.6	649.1

MMbbl = Million Barrels
* Sulfur content not exceeding 0.5 percent
** Sulfur content greater than 0.5 percent
*** Totals do not add due to rounding

Figure 3: Cumulative Oil Fill



IX. Emergency Response Capabilities

Sale of Oil

Section 161 of the EPCA (42 U.S.C. § 6241) gives authority to the President under specified conditions to direct the Secretary of Energy to conduct a public sale of oil from the SPR. Contracts are awarded to the highest qualified offerors.

Competitive Sales Procedures

DOE regulations in Title 10 of the Code of Federal Regulations Part 625 govern the process for price-competitive sales from the SPR, including the establishment of Standard Sales Provisions for the sale of SPR crude oil. The first step in the process is to issue a Notice of Sale identifying the volume, characteristics, and location of the petroleum for sale. Further, the Notice of Sale provides delivery dates and the requirements to successfully submit offers; it also describes measures required for ensuring performance and financial responsibilities.

During a drawdown, the SPR may issue multiple Notices of Sale using a web-based automated oil sales and evaluation system, which includes a triple redundancy backup system. Each Notice of Sale covers a sales period of one to two months. Offerors may have five days or less from the date a Notice of Sale is issued until offers are due. Delivery of oil could commence as soon as 13 days after the President calls for a drawdown of the SPR. Subsequent sale periods, if necessary, will correlate with standard industry delivery periods. Because of the possibly short initial lead-time, DOE maintains a registry of prospective offerors who will receive electronic notification of all Notices of Sale.

The second step in the sales process is for prospective purchasers to submit offers, as specified in the Notice of Sale. Offerors must unconditionally accept all terms and conditions in the Notice of Sale and submit an offer guarantee of 5 percent of the maximum potential contract amount, or $10 million—whichever is less. The structure of the offer evaluation process is so that the offerors bidding the highest prices will determine the transportation methods, up to the limits of the distribution system. Negotiations for specific delivery arrangements occur later in the process.

Within five business days of notification, all "apparently successful offerors" are required to provide a Letter of Credit equal to 100 percent of the contract amount as a guarantee of performance and payment of amounts due under the contract. Upon timely receipt of the financial guarantees, and a final determination by the Contracting Officer that offers are responsive and selected offerors are financially responsible, the SPR will issue Notices of Award. Deliveries to the purchasers then begin, consistent with the purchasers' arrangements for commercial pipeline or marine vessel transportation.

Following delivery, the purchaser is invoiced for actual barrels received at a price that reflects the market indexed contract award price, plus any adjustments for quality differentials, delivery mode, or location changes. Payment is due in the month following the delivery.

Drawdown Capabilities[3]

The crude oil acquired for the SPR is commingled in caverns at the storage sites, creating various distinct crude oil streams available for release. **Table 5** identifies these crude oil streams, delivery modes, and locations.

Based on its sustained drawdown rate, the SPR can draw down crude oil at an initial sustainable rate of 4.415 MMbbl/d [4] for a period of 90 days. After this period, the drawdown rate gradually decreases as site inventories are depleted and the declining number of caverns containing crude oil becomes a constraint.

Table 5: Crude Oil Streams (As of December 31, 2018)

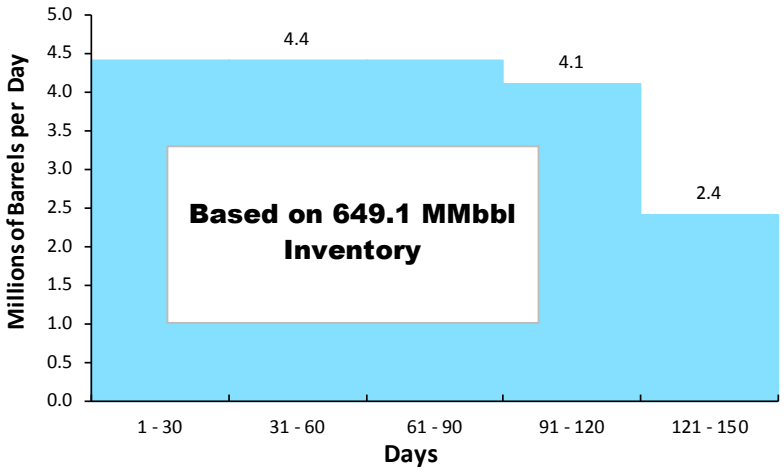
Crude Oil Stream	Gravity (°API)	Sulfur Content (Mass %)	Delivery Mode and Location
Seaway System			
Bryan Mound (Sweet)	36.4	0.38	Pipeline at Jones Creek Tank Farm, Jones Creek, Texas; Tankship at Seaway (Enterprise Products) Terminals, Freeport and Texas City, Texas; Genesis Terminal, Texas City, Texas
Bryan Mound (Sour)	33.3	1.401	
Texoma System			
West Hackberry (Sweet)	36.7	0.34	Pipeline, tankship, or barge at Sun Partners Marketing & Terminals LP, Nederland, Texas; Pipeline at Zydeco-22"/DOE connection, Lake Charles, Louisiana
West Hackberry (Sour)	33.0	1.52	
Big Hill (Sweet)	35.6	0.41	Pipeline, tankship, or barge at Sun Partners Marketing & Terminals LP, Nederland, Texas; Pipeline or tankship at Phillips 66 Terminal, Nederland, Texas; Pipeline at Zydeco-20"/DOE connection, Winnie, Texas
Big Hill (Sour)	30.8	1.43	
Capline System			
Bayou Choctaw (Sweet)	35.4	0.42	Pipeline at Capline, Plains Marketing, or Louisiana Capline Terminals, St. James, Louisiana; Tankship at Sugarland St. James Terminal, St. James, Louisiana; 24-inch site connection to Red Stick Pipeline, Iberville Parish, Louisiana
Bayou Choctaw (Sour)	31.9	1.46	

[3] Drawdown capabilities refers to the ability to displace oil out of the SPR caverns without considering whether the downstream distribution of the oil to SPR customers would accommodate that much oil being pumped out of the SPR caverns.

[4] Current sustained drawdown capability is reduced to 4.25 MMbbl/d due to the unavailability of Bryan Mound Tank 2, pending repairs.

Figure 4 illustrates the SPR's sustained drawdown capabilities during 2018, with an inventory of 649.1 MMbbl.

Figure 4: Sustained Drawdown Capability (As of December 31, 2018)*



* Sustained drawdown capability is temporarily reduced to 4.25 MMbbl/D due to unavailability of a storage tank at Bryan Mound that is used during drawdown.

Drawdown Readiness Activities

The SPR performed the following drawdown readiness assurance activities during CY 2018:

- The Drawdown Readiness Review Program requires and monitors quarterly drawdown readiness. The SPR conducted four reviews in 2018, confirming that all sites and systems were prepared for an SPR crude oil drawdown or exchange.
- As a part of the Drawdown Readiness Review Program, Readiness and Capability (RECAP) and SPR Exchange Readiness and Capability (SPREX-RECAP) Reports are published quarterly, along with an update to Drawdown Configuration charts.
- The Systems Test Exercise (STE) Program determines the drawdown readiness of an SPR site's equipment, procedures, systems, and personnel, and it collects data to further ensure readiness status. The STE Program involves a tabletop exercise at each site every year and a dynamic site test performed when directed. In 2018, the STE Program conducted tabletop exercises at the Big Hill and Bayou Choctaw sites, and the program performed dynamic oil movement exercises at the Bryan Mound and West Hackberry sites.

The bullets below further explain these exercises:

- The Recovery Program conducted an administrative tabletop exercise at Big Hill on September 25, 2018. This exercise simulated a drawdown to demonstrate the SPR

Recovery Program's ability to restore all drawdown critical systems to above 85 percent of the site's full drawdown capability within 15 calendar days. The simulated scenario started on August 28, 2018, and continued for 30 days at a rate of 850 thousand barrels per day (Mbbl/d).

- DOE approved using a single oil sale movement as a dynamic exercise for the Bryan Mound and West Hackberry 2018 STE requirement. This movement provided a realistic exercise for the demonstration of capability to meet a 13-day notice for emergency drawdown. The oil sale that was used for the Bryan Mound exercise delivered 288 thousand barrels (Mbbl) of crude oil sold to British Petroleum (BP) and delivered to Freeport Dock II to load the American Phoenix vessel. The oil sale used for the West Hackberry exercise delivered 175 Mbbl of crude oil to the Lake Charles Meter Station for sale to Marathon Petroleum Corporation.
- The Bayou Choctaw site personnel conducted an administrative tabletop exercise on April 24, 2018. This exercise simulated a drawdown with the following two delivery groups: 1.5 MMbbl of sour crude oil delivered to Placid in 300 Mbbl batches at a rate of 192 Mbbl/d during 15 days, April 24–May 8; and 3 MMbbl of sour crude oil delivered to St. James marine terminal in 500 Mbbl batches at a rate of 480 Mbbl/d during 15 days, May 8–May 22.

Distribution Capabilities

The substantial increase in both Canadian and U.S. domestic production has had a significant impact on both the magnitude and spatial disposition of crude oil supply over the past decade. Several other regions of the country have emerged as significant supply centers, although the Gulf Coast remains a major refining and trans-shipment destination for crude oil. As a result, there have been significant changes in the use of oil distribution infrastructure. Through 2011, most major pipelines originated in the Gulf Coast region and provided crude oil to local refineries and Midwest refiners. Since then, several major pipelines have reversed direction and are now flowing crude to the U.S. Gulf Coast refining centers, thereby reducing imports.

Consequently, in 2012, the SPR lost connectivity to 10 refineries in the central part of the United States when the Seaway Pipeline's flow direction reversed. The Seaway Pipeline now flows from Cushing, Oklahoma, to Freeport, Texas. In December 2013, Shell reversed a section of one of its pipeline systems, now referred to as the Zydeco Pipeline, to flow eastbound from Houston, Texas, to the Louisiana Offshore Oil Port's terminal in Clovelly, Louisiana. As a result, the SPR's Big Hill site lost connectivity to Houston area refineries, reducing the number of potential buyers that can receive SPR oil by pipeline. However, the flow of oil eastward now allows the SPR to connect to refineries previously unable to receive pipeline deliveries from the SPR. Refineries along the Mississippi River, comprising Shell St. Rose, Shell Norco, Valero, Norco, Phillips 66 Belle Chasse, Valero Meraux and PBF Chalmette, Alliance can now receive pipeline deliveries from the SPR.

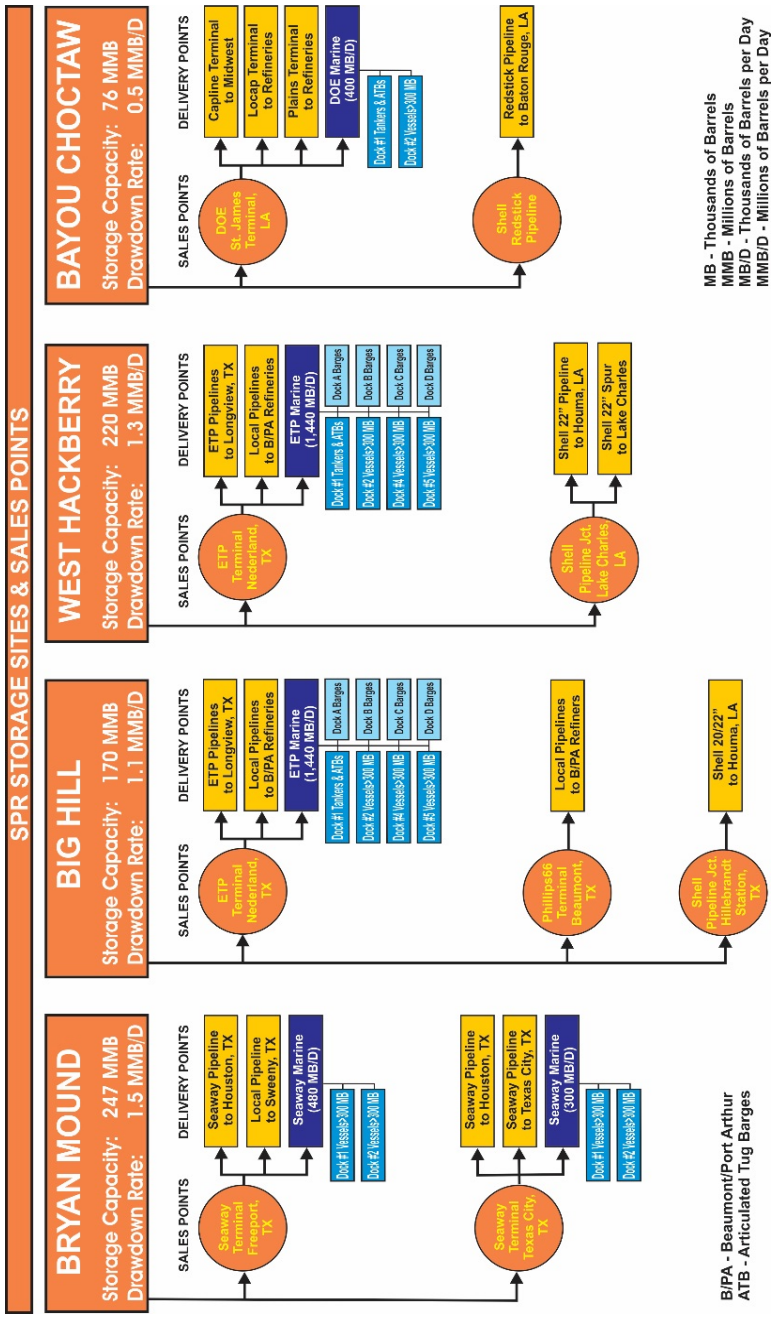
As of the beginning of CY 2018, the SPR was connected by commercial pipeline systems to about 56 percent of the refining capacity in the United States. That connection covers

45 refineries, which processed approximately 58 percent of crude oil imports to the United States during 2017 (**final 2018 data will not be available until the summer of 2019**). Remarkably, SPR connections to refineries have not changed much despite the reversal of the pipelines. Prior to the pipeline reversals in 2012, the SPR had connection to 49 refineries, which processed 58 percent of the crude oil imports.

SPR is also connected to three marine terminals that have a combined contracted marine distribution capacity of 2.220 MMbbl/d, and it owns one marine terminal (currently leased to Shell) with a distribution capacity of 0.400 MMbbl/d. These marine terminals are: Seaway Terminal (Enterprise Products), Freeport, Texas; Seaway Terminal (Enterprise Products), Texas City, Texas; Sunoco Logistics Terminal, Nederland, Texas; and Shell Sugarland, St. James Terminal, St. James, Louisiana, respectively. Additionally, by means of a Connection Agreement, the SPR has a fourth marine terminal connection: the Phillips 66 Beaumont Terminal, Nederland, Texas. **Figure 5** illustrates the SPR's pipeline and marine distribution capabilities.

The crude oil pipeline from Bryan Mound to Seaway Terminal (Jones Creek) is out of commission due to undermining that occurred at the Brazos River crossing during Hurricane Harvey in August–September 2017. Repairs to replace the river crossing are expected to be completed by FY 2020.

Figure 5: Pipeline and Marine Design Distribution Capabilities



Distribution Assessment

SPR performs an annual assessment based on its established technical and performance criteria. The assessment evaluates SPR's crude oil distribution system capabilities to: a) ensure that there are adequate connections to the commercial distribution systems, and b) identify the need for any remedial plans. The 2018 distribution assessment evaluated the SPR's theoretical capability at its sustained drawdown rate to replace oil imported in the base year (2017) and for future years (2020, 2025, 2030, 2035, and 2040). This report does not intend to model distribution capability during an actual emergency oil disruption event.

Established Level I Technical and Performance Criteria for the SPR's distribution capabilities require that the physical distribution system infrastructure—both DOE-owned and commercial—are capable of meeting distribution rates exceeding 120 percent of the combined site drawdown rates to provide sufficient allowances for terminal operational delays and commercial demand variances. The Distribution Capability performance measure is calculated as the ratio of the SPR physical distribution capability (defined as interstate pipeline non-Canadian crude oil import demand plus locally connected refinery non-Canadian crude oil import demand plus SPR marine terminal capacity), divided by the SPR Drawdown rate. This performance measure can be calculated for the entire SPR distribution system or by the three individual distribution systems. The performance measure can also be calculated at various points in time.

The distribution assessment and the results summarized below are based on a study of the physical distribution capacity, which is the total capacity of all physical connections from SPR storage sites to commercial pipelines and marine terminals, including the DOE-owned St. James marine terminal. It assumes that, during a commercial supply disruption, the SPR is capable of utilizing 100 percent of its contractual terminal services to move oil from the DOE pipeline to vessels loading at the St. James marine terminal's dock or to third-party pipelines or tankage via the contractor's existing connections. As stated previously, such an assumption is unlikely to reflect actual distribution capability during an emergency oil disruption event.

Base-Year Assessment

The base-year assessment indicates that only one of the three SPR crude oil distribution systems (the Capline System) was compliant with Level I Technical and Performance Criteria. The Level I Technical and Performance Criteria for the Texoma System has remained below 120 percent for five years in a row, as a result of petroleum infrastructure additions, pipeline reversals, and the resulting marine terminal and pipeline congestions.

Table 6 provides the performance measures for the base year.

Table 6: Base-Year Distribution Assessment

System	Sustained Drawdown Rate (Mbbl/D)	Physical Distribution Capability (Mbbl/D) As of 12/31/2017	Performance Measure As of 12/31/2017	Performance Measure As of 12/31/2016
Seaway	**1,500**	**1,591**	**106%**	**103%**
Texoma	**2,400**	**2,364**	**99%**	**92%**
Capline	**515**	**727**	**141%**	**163%**
Total	**4,415**	**4,682**	**106**	**104%**

Mbbl/d = Thousand Barrels per Day

Future Year Assessments

For future years 2020, 2025, 2030, 2035, and 2040, the SPR performed an assessment from the 2017 perspective using the U.S. petroleum refining supply and demand projections from the U.S. Energy Information Administration's *Annual Energy Outlook 2018*. The future-year assessment assumes the design drawdown rate does not change from base-year levels and assumes no infrastructure changes to the SPR. Based on the *Annual Energy Outlook 2018* projections of declining (and eventual relative flattening) of U.S. petroleum imports, the Distribution Assessment calculated that the forecasted SPR Distribution Capability performance measures fall below the Level I Technical and Performance Criteria during the outer years with the current infrastructure in place for the Seaway and Texoma systems. **Table 7** provides the performance measures by the system for each forecast period.

Table 7: Base and Future Years
Forecasted Performance Measures

System	2020	2025	2030	2035	2040
Seaway	**92%**	**75%**	**65%**	**67%**	**67%**
Texoma	**66%**	**71%**	**61%**	**63%**	**63%**
Capline	**129%**	**99%**	**106%**	**116%**	**118%**
Total	**82%**	**76%**	**68%**	**71%**	**71%**

Physical Distribution Capability

The assessment discussed above focuses exclusively on the SPR's physical distribution capability, which is distinct from the SPR's distribution capability. The former focuses on the actual connections that the SPR maintains to physical assets. Meanwhile, the distribution capability is the rate that SPR crude oil can be incrementally added to the market and is dependent upon: oil market activity; the utilization of commercial pipelines and commercial terminals at the time of drawdown; and the magnitude and geographic location of the oil supply disruption.

Recently, the ability of the SPR to distribute incremental oil without disrupting domestic and Canadian crude flows has been diminished due to congestion of commercial facilities in the SPR's Gulf Coast distribution region. The changing geography of U.S. oil production has led to major changes in the domestic oil refining and distribution systems. New patterns of oil supply and demand among U.S. oil producers and refineries, along with associated changes in the U.S. midstream transportation sector, such as pipeline reversals, have significantly reduced the ability of the SPR to distribute incremental volumes of oil during possible future oil supply interruptions. The ability to move SPR oil to Midwest refineries—a historical pattern—would be reduced during a petroleum supply disruption, as non-Canadian imports and Gulf Coast supplies into this refining complex have essentially disappeared. The U.S. pipeline distribution system, along with other modes of oil transport, is instead moving large volumes of oil to the Gulf Coast, especially from U.S. shale oil and from Canada. This new geography of U.S. oil production and energy exports has also increased commercial traffic at U.S. Gulf Coast marine loading facilities.

While SPR has throughput contracts for dock space utilization at five marine terminals within SPR distribution system, the use of these docks for the distribution of SPR crude oil could cause displacement of domestically produced oil and Canadian-imported oil. The changing patterns of U.S. oil imports mean that the magnitude and geographic location of an international oil supply disruption can affect: a) the capacity of the SPR to deliver oil to its customers and b) the ability of the United States to meet its international energy program (IEP) obligations in the event of an International Energy Agency (IEA) collective action in response to a global supply disruption. If the SPR cannot load oil onto barges and tankers without disrupting commercial shipments, SPR sales could be offset by a corresponding decrease in domestic crude oil shipments or exports of domestically produced petroleum products. For these reasons—the evolution of global oil markets, the participation of the United States in those markets, the changed geography and volume of U.S. oil supplies, reduced oil imports, and congestion of commercial facilities in the SPR's distribution region—an effective SPR release will increasingly depend on the ability to load *incremental* SPR oil onto marine vessels.

International Energy Program Requirements

The United States, as a member of the IEA, is obligated to maintain stocks of crude oil and products in reserves that are equivalent to 90 days of net oil imports. Computations of member nations' stockpile requirements are based on both publicly and privately held stocks, and net imports are defined as the average daily level in the previous year.

In the event of a severe petroleum supply interruption, the IEA Governing Board may choose to collectively release oil stocks to respond to the crisis. In a coordinated IEA response, each member country is responsible for a share of the total release that is proportionate to their share of total IEA oil consumption. For the United States, this share was 42.9 percent in 2018.

X. Commercial Activities

Commercial Leases

SPR has commercialized its under-utilized crude oil distribution facilities to be more cost-effective, and it currently has leased three crude oil pipelines and a marine terminal to private industry. The contracts for these leases require that the facilities be maintained in good condition, and, in the event of a Presidentially-ordered emergency drawdown, use of the leased facilities will be returned to DOE within five days' notice. Receipts from the leases are deposited to the U.S. Treasury.

Bayou Choctaw Pipeline: In the early 1990s, the SPR determined that leasing the Bayou Choctaw pipeline would be advantageous to the United States Government and in the public's interest because it would eliminate operating costs for the government and provide a means to generate revenue. Through a competitive bid process, the SPR leased the pipeline to Shell Pipeline Company LP on May 1, 1997, on a revenue-sharing basis. The lease payments were based on a percentage of Shell's gross revenue with a minimum of $11,000 a month. Revenue earned from May 1997 through December 2018, totaled $5.4 million, with a maintenance cost avoidance of $500,000 per year. Revenues for January through December 2018, are $218,619. The initial term of the lease was through April 13, 1998, with automatic annual lease renewals thereafter until December 2018. The lease agreement term was extended through December 31, 2019. DOE and Shell are conducting an assessment and operate an ongoing remedial program to return the pipeline back to an acceptable operating condition. The SPR has begun the competitive bid process for a new leasing agreement to be in place on January 1, 2020, after the current lease expires on December 31, 2019.

Bryan Mound Pipelines: January 2018 to December 2018 lease revenues totaled $2,669,007. Two of the three Bryan Mound pipelines were leased to ExxonMobil Pipeline Company on January 14, 1999. ExxonMobil began using the pipelines in June 2000 as part of its onshore distribution system for the Diana-Hoover production in the Gulf of Mexico. This lease was extended May 31, 2018, for a term of ten (10) years, to include two 5-year

option periods. The second 5-year option period will begin May 31, 2023 and continue through May 31, 2028. The extension will allow the Lessee time to repair and replace the Bryan Mound to Jones Creek damaged pipeline segment and mitigate any potential loss of revenue.

St. James Marine Terminal: In 2018, St. James Marine Terminal lease revenues were $2 million. The terminal was leased to Shell Pipeline Corporation (now Equilon Enterprises LLC, "doing business as" Shell Oil Products U.S.) on January 31, 1997 on a revenue-sharing basis. In 2017, the contract was renegotiated for a period of two years in the amount of $2 million per year through December 31, 2019. A new lease agreement with Exxon Mobil Pipeline Company has been executed. DOE and Shell conducted an assessment and had an ongoing remedial program to return the pipeline back to an acceptable operating condition. The SPR executed a new lease agreement with Exxon Mobil Pipeline Company, which was effective January 1, 2020.

Commercial Revenues

During CY 2018, receipts to the General Fund of the U.S. Treasury from the commercial leases of the SPR's distribution facilities and pipelines totaled $4,887,626. **Table 8** summarizes actual commercial revenues from 1996–2018.

Table 8: Summary of Commercial Revenues
(As of December 31, 2018)

Calendar Year	Bryan Mound Pipelines (Actual $)	Big Hill Pipeline (Actual $)	Bayou Choctaw Pipeline (Actual $)	St. James Terminal Lease (Actual $)	Total Revenue Generated (Actual $)
1996	102,606	472,809	0	0	575,415
1997	0	429,824	0	133,300	563,124
1998	12,500	402,525	0	481,010	896,035
1999	679,393	400,000	163,030	546,125	1,788,548
2000	652,146	493,359	217,573	748,986	2,112,064
2001	1,054,297	33,104	212,738	1,227,021	2,527,160
2002	1,468,613	0	249,708	1,285,183	3,003,504
2003	1,647,828	0	168,718	1,863,060	3,679,606
2004	1,546,121	0	174,338	1,700,000	3,420,459
2005	1,132,668	0	730,542	1,700,000	3,563,210
2006	1,091,799	0	337,949	1,700,000	3,129,748
2007	1,128,340	0	218,912	1,700,000	3,047,252
2008	1,211,171	0	321,799	1,700,000	3,232,970
2009	1,141,228	0	232,374	1,700,000	3,073,602
2010	1,091,494	0	169,541	1,700,000	2,961,035
2011	2,124,218	0	318,183	1,700,000	4,142,401
2012	5,838,356	0	312,481	1,700,000	7,850,837
2013	17,270,421	0	274,481	1,975,000	19,519,902
2014	6,513,476	0	188,695	2,000,000	8,703,171
2015	11,243,574	0	236,583	2,000,000	13,480,157
2016	3,902,442	0	360,500	2,000,000	6,262,942
2017	2,564,390	0	462,525	2,000,000	5,026,915
2018	2,669,007	0	218,619	2,000,000	4,887,626

XI. Budget and Finance

With enactment of the Consolidated Appropriations Act, 2018 (Pub. L. 115-141), Congress appropriated $252 million for the SPR, directing $223 million for operating and maintaining the SPR and $29 million for the continuation of the NGSR. Additionally, $8.4 million was appropriated in the SPR Petroleum Account to fund drawdown operations.

Appropriations through Fiscal Year 2018

Over the history of the SPR, a total amount of $24.8 billion, net of sales and transfers, has been appropriated for the SPR through FY 2018. The distribution of these annual appropriations are described in **Table 9**.

Table 9: Appropriations for Storage Facilities
Operations and Management and Petroleum Account* (As of December 31, 2018)

Fiscal Year	Oil Account ($000)	Facilities ($000)	Management ($000)	Expansion ($000)	Total ($000)	Defense SPR ($000)
1976	0	300,000	13,975		313,975	
1977	440,000	0	7,824		447,824	
1978	2,703,469	463,933	14,704		3,182,106	
Total 1979 Appropriations*	2,356,456	632,504	18,111		3,007,071	
Total 1980 Appropriations*	(2,022,272)	0	22,272			
Total 1981 Appropriations*	3,205,094	108,168	19,391		3,332,653	
Total 1982 Appropriations*	3,679,700	175,656	20,076		3,875,432	
1983	2,074,060	222,528	19,590		2,316,178	
1984	650,000	142,357	16,413		808,770	
1985	2,049,550	441,300	17,890		2,508,740	
Total 1986*	(12,964)	106,979	13,518		107,533	
1987	0	134,021	13,412		147,433	
1988	438,744	151,886	12,276		602,906	
1989	242,000	160,021	13,400		415,421	
1990	371,916	179,530	12,953		564,399	
1991	566,318	187,728	12,846		766,892	
1992	88,413	171,678	13,384		273,475	
1993	(125,625)	161,940	14,227		50,542	
DOD Transfer (non-add)	124,925	700	0		125,625	125,625
1994	0	191,035	15,775		206,810	
1995	(107,764)	226,938	16,780		135,954	
1996 transfer from SPR Petro Acct	(187,000)	170,173	16,827		0	
1996 Weeks Island Oil Sale	(97,114)	97,114	0		0	
1996 deficit reduction oil sale	(227,000)	0	0		(227,000)	
1996 Total	(511,114)	267,287	16,827		(227,000)	
1997 Total*	(220,000)	193,000	16,000		(11,000)	
1998	0	191,500	16,000		207,500	
1999	0	145,120	14,805		159,925	
2000	0	144,000	15,000		159,000	
2001	0	140,672	15,965		156,637	
2002	0	154,009	16,871		170,880	
2003	1,955	157,823	13,909		173,687	
2004	0	155,044	15,904		170,948	
2005*	43,000	109,946	16,764		169,710	
2006*	(43,000)	190,510**	16,830		207,340	
2007	0	146,950	17,491		164,441	
2008		143,980	18,004	24,773	186,757	
2009	(21,586)	176,255***	18,824	31,507	226,586	
2010	0	199,732	19,091	25,000	243,823	
2011	0	186,873	22,568	0	209,441	
2012*	0	172,914	19,790	0	192,704	
2013*	0	162,975	19,650	0	182,625	
2014*	0	167,514	21,846		189,360	
2015		174,999	25,001		200,000	
2016	0	186,870	25,130		212,000	
2017	0	195,646	27,354	0	223,000	
2018	8,400	232,630****	28,086		269,116	

Note: FY 1991 SPR Petroleum Account of $566,318 includes proceeds of $122,681 from the Test Sale recorded as additional budget authority, rather than reductions to obligations, costs, and outlays. It also includes $315,425 in Desert Storm Drawdown proceeds from January 1991, and $19,755, from FY 1991 Naval Petroleum Reserve excess receipts. Thus, the cumulative budget authority is "gross" and not related directly to the inventory of oil on hand. * Includes reprogramming, rescission and transfer actions. **Includes the return of $43,000,000 from the SPR Petroleum Account. *** Includes $21,586 from the SPR Petroleum Account for site maintenance activities. **** Includes $29,000 for the NGSR and $8,716 for disaster recovery.

Strategic Petroleum Reserve Account

The SPR account funds: the development, operation, and maintenance of facilities; the salaries and expenses necessary to plan and manage the program, including the operation of the SPR PMO in New Orleans, Louisiana; and the activities pertinent to major issues concerning the development and use of the SPR.

Obligations for the SPR account in FY 2018 totaled approximately $229.5 million. From this amount, $22.8 million was obligated for federal program management, $198.2 million was obligated for contractual goods and services to operate and maintain the SPR, and $12,000 was obligated for NGSR support costs. In addition, $8.5 million of disaster recovery funding was obligated for necessary repairs resulting from Hurricane Harvey.

SPR Petroleum Account

The SPR Petroleum Account funds: the acquisition and withdrawal of oil for the SPR; the associated costs for transportation and terminal expenses, U.S. customs duties, Superfund and Oil Spill Liabilities Trust Fund taxes; and other miscellaneous costs.

During an emergency drawdown and sale, as well as congressionally-mandated sales, the SPR Petroleum Account is the source of funding for the costs of withdrawing oil from the storage caverns and transporting it to the point where purchasers take title. Receipts from the congressionally-mandated sales of crude oil are deposited into the U.S. Treasury (except for crude oil sales conducted in accordance with Section 404 of the Bipartisan Budget Act of 2015, which are deposited in the Energy Security and Infrastructure Modernization (ESIM) Fund, as mandated by law). Obligations in the SPR Petroleum Account relating to drawdown operations totaled $11.5 million in FY 2018.

On April 15, 2014, the Secretary of Energy authorized establishment of the Northeastern Regional Refined Petroleum Product Reserve, now identified as the NGSR, as a component of the SPR. The purpose of the NGSR is to mitigate gasoline supply disruptions in the Northeast. In June 2014, the Office of Management and Budget apportioned $235.6 million from receipts from an SPR test sale to establish the NGSR. Obligations in the SPR Petroleum Account for NGSR support costs totaled $396,209 in FY 2018.

Through use of a Royalty-in-Kind (RIK) program, established by the U.S. Department of the Interior (DOI) from April 1999 through December 2009, the cumulative dollar value of the exchange barrels provided to the SPR by contractors who received royalty oil from DOI totaled $6.1 billion. The value of the RIK oil transferred from DOI to DOE through 2009, the last year of the program, is shown by FY in **Table 10**.

Table 10: Value of Royalty-in-Kind Transferred by the Department of the Interior

Fiscal Year	Royalty-in-Kind Transfer * Total Barrels (Source: DOE)	Reconciled Royalty-in-Kind Transfer Total Barrels* (Source: DOE)	Department of the Interior** Forgone Receipts - ($000) (Source: DOI)
1999	11,928,981	8,135,603	***
2000	15,105,558	18,898,937	560,521
2001	1,568,220	1,568,220	61,654
2002	10,575,379	10,575,378	262,752
2003	34,742,046	34,852,185	1,044,350
2004	35,506,135	35,599,310	1,191,284
2005	25,185,527	25,184,519	1,194,618
2006	0	0	0
2007	8,742,829	4,425,911	306,191
2008	15,943,421	15,943,421	1,600,027
2009	4,493,099	6,798,713	268,537
Total	163,791,195	161,982,197	6,489,934

* In coordination with Minerals Management Service, DOE completed a total DOE-RIK program reconciliation (1999–2009) in CY 2009, requiring net figure adjustments to prior years.

** Net figures that include DOI preliminary volumes and adjustments to prior years.

*** DOI data not available.

Performance Measurement

In FY 2018, the SPR tracked 19 measures that are indicative of how the SPR pursued strategic goals and objectives. They are consistent with the SPR Strategic Plan, which provides a framework for implementing the program's mission by setting a course for the program and guiding decisions about the effective use of resources. Of the tracked measures, 17 met or exceeded the performance measure, while two measures did not meet the performance measure target during this period. Specifically, the measures that missed the target were:

- "Distribution Capability as a Percentage of Drawdown Rate"— This target was missed due to an increased domestic crude production, resulting in an offsetting reduction in locally connected refinery imports and interstate pipeline imports. The aggregate total SPR physical distribution capability decreased to such a level that the ratio of the physical distribution capability to the current design drawdown rate is below the target.
- "90 Day Sustainable Drawdown Rate"— The final 90-day drawdown rate for FY 2018 was 4.11 MMbbl/d, narrowly missing the 90-day drawdown target of 4.13 MMbbl/d. The program failed to meet its 90-day drawdown target for the following reasons: 1) two caverns at Big Hill were out of service for 8 days in November; 2) a raw water pipeline at Bryan Mound was out of service for 3 days in January; 3) two caverns at Bryan Mound were out of service for 5 days in August; 4) a raw water intake structure suffered a leak at West Hackberry for 6 days in September; and 5) a 42-inch pipeline that runs from the West Hackberry site to the Sun terminal suffered an outage for 12

days in September bringing the drawdown rate for the month of September down to 3.58 MMbbl/d.

In FY 2018, the Critical Few Performance Measures were again incorporated into the SPR Annual Operating Plan, in accordance with the Under Secretary of Energy's direction. This ensures integration of these critical few performance measures into the planning process and enables tracking of their performance. A complete accounting of the Office of Petroleum Reserves' performance measures is reflected in **Table 11**.

Table 11: Performance Measures

Performance Measures	FY 2017Actual Performance	FY 2018 Target Output	FY 2018 Actual Performance
Oil Inventory, Drawdown Readiness, and Distribution			
90-day sustainable drawdown rate	4.17 MMbbl/D	4.13 MMbbl/D	4.11 MMbbl/D
Number of days to commence crude oil drawdown	13 days	13 days	13 days
Number of days to complete heating oil drawdown	13 days	13 days per drawdown	13 days
Distribution capability as a percentage of drawdown rate	105%	≥120% of drawdown ate	104%
Calculated site availability	97.3%	≥95%	97.75%
Calculated maintenance performance appraisal report rating	97.6%	≥95 out of a possible 100 points SPR-wide average	98.1
Percent of site security survey Ratings that are satisfactory	100%	100%	100%
Number of barrels of crude oil degassed	44.02 MMbbl	35.00 MMbbl	39.69 MMbbl
Well integrity compliance with state regulations	100%	100%	100%
Customer Knowledge and Focus			
Percentage of key customers visited	N/A	N/A	N/A
Operational Effectiveness, Efficiency, and Knowledge Management/Fiscal Responsibility and Budgetary Control			
Information system availability	100%	≥97%	100%
Operating cost per barrel of storage capacity	$0.248	≤$0.30 per barrel	$0.247
NEHHOR Operating Cost – Negotiate best possible commercial storage rates per the Federal Acquisition Regulation (FAR) System	N/A	N/A	N/A
NSGR Operating Cost – Negotiate best possible commercial storage rates per the FAR System	N/A	N/A	N/A
Dynamic Teamwork: Continuous Improvement			
ISO 9001-2015 Certification	October 26, 2016	September 15, 2018	December 18, 2017
Partnerships			
Number of partnerships arrangements with federal, state, and local agencies	NA	N/A	N/A
Memorandum of understanding/agreements (MOA) with federal, state, and local agencies to minimize life safety and environmental risks to the sites and community	13	13	13
Local Community Support/Environment, Safety, and Health			
Maintain or apply for OSHA VPP Star Status through completion of an annual self-evaluation or application for each SPR storage fixed site	February 15, 2017[1]	September 30, February 15, 2018	February 15, 2018[2,3]
Number of cited environmental violations received	0	0	0
Number of reportable releases to the environment annually	2	≤4	3
Maintain certification of the SPR EMS within the ISO 14001 Standard	April 11, 2017	April 30, 2018	April 30, 2018
Site Sustainability Plan submittal	November 23, 2016	December 15, 2017	December 12, 2017
Employee Development and Quality of Life			
Employee Individual Development Plans	100%	95%	96%

[1]February 15, 2017 is the application date for evaluation of performance in CY 2018

[2]February 15, 2018 is the application date for evaluation of performance in CY 2018

[3]August 10, 2018 Big Hill had their on-site assessment and September 20, 2018 Big Hill completed theirs. The OSHA teams stated that both sites would be recommended for continuing Star status.

XII. Other Program Activities

Congressionally-Mandated SPR Crude Oil Sales

The SPR successfully carried out two sales in 2018 as provided for by various congressional mandates. While both sales were conducted during CY 2018, one was directed by FY 2018 requirements and the other was directed by FY 2019 requirements.

In 2018, the SPR initiated crude oil deliveries in accordance with Section 404 of the Bipartisan Budget Act of 2015 (Pub. L. 114-74). Section 404 authorizes the Secretary of Energy to draw down and sell crude in an amount up to $2 billion during FYs 2017–2020 to carry out the SPR Modernization Program, based on an authorized annual appropriation. In FY 2017, Section 101 of the Further Continuing and Security Assistance Appropriations Act, 2017 (Pub. L. 114-254) authorized the Secretary to draw down and sell an amount not to exceed $350 million of crude oil from the SPR.

A Notice of Sale was issued for the FY 2018 SPR Modernization Program Crude Oil Sales on March 8, 2018 and resulted in 51 bids from 17 companies. After a thorough analysis of the bids, nine bids were accepted from five companies for a total volume of 6.4 MMbbl. Deliveries commenced on April 18, 2018 and were completed on June 10, 2018. The SPR provided a total of 5,194,898 bbl over 24 deliveries. The SPR deposited $347,828,624 of revenue into the ESIM Fund.

In May 2017, the SPR initiated crude oil deliveries in accordance with Section 5010 of the 21st Century Cures Act of 2015 (Pub. L. 114-255), which directs the Secretary of Energy to draw down and sell a total of 25 MMbbl of crude oil from the SPR over three consecutive years commencing with 10 MMbbl in FY 2017. The proceeds from the sales are required to be deposited into the General Fund of the U.S. Treasury.

A Notice of Sale was issued for the combined Bipartisan Budget Act of 2015 and 21st Century Cures Act requirements as the FY 2019 mandatory sales on August 20, 2018 and resulted in 119 bids from 13 companies. After a thorough analysis of the bids, the SPR accepted 61 bids from 6 companies for a total volume of 11 MMbbl. The SPR commenced deliveries on October 1, 2018 and completed them on December 14, 2018. A total of 10,870,187 bbl was provided in 61 deliveries. The SPR deposited $721,600,233 of revenue into the General Fund of the Treasury, with an additional $24,103,951 deposited in January 2019, for a total of $745,704,184.

Northeast Gasoline Supply Reserve

The Northeast Gasoline Supply Reserve (NGSR) consists of contracted storage at multiple facilities in the New York Harbor, greater Boston, Massachusetts, and greater Portland, Maine areas. SPR does not own storage facilities suitable for the storage of refined petroleum products. It was determined that the benefits of contracting the storage of up to 1 MMbbl of

refined petroleum products pursuant to the authority granted by Section 171 of EPCA (42 U.S.C. § 6249) are comparable to the benefits from a similar action undertaken under Title I, Part B of the statute. It was determined that the availability of funds in the SPR Petroleum Account would enable the creation of a refined petroleum product reserve in time for the 2014 hurricane season. Placing the refined product reserve within the normal supply chain also ensured higher product quality, because unlike crude oil, refined products require periodic turnover to ensure that the products remain within strict quality specifications.

Three storage service contracts were executed to support the establishment of a regional product reserve in the Northeast. The Northeast region of the United States heavily depends on product supplies from the Gulf Coast, as well as local refining and imports. While, the crude oil stored in SPR sites along the Gulf Coast is well suited to mitigate impacts of crude oil supply to refineries, vulnerabilities elsewhere in the supply chain could still result in significant regional disruptions. The establishment of a regional product reserve closer to the point of consumption can alleviate the impact of short-term disruptions, while issues with the larger supply chain (from crude oil refining through product distribution to consumers) are resolved. However, the current Administration has proposed to disestablish the NGSR because it is expensive to maintain and is ineffective, given that the entire NGSR inventory is less than 1 day of gasoline demand in the Northeast.

DOE provides operational oversight of the NGSR, which includes: managing the contracts; providing independent product quality and quantity assurance certifications; performing annual audits; establishing a sales procedure and platform; and coordinating with each of the storage contractors to ensure availability of and accessibility to the government-owned product.

The storage contractors are responsible for maintaining both the quantity and quality of the refined product, including any seasonal changeover of products to comply with EPA Clean Air Act requirements. Additionally, the contractors are obligated to ensure that their specific facility is available in the event that a release is required, including the ability to meet the government's release requirements in the aftermath of an event without commercial electric power. Moreover, the contractors are required to provide detailed information on inventories, activities, and distribution capabilities at the request of DOE if conditions exist for a potential release.

As of the date of this report the NGSR has not been used for intended purpose, namely to supplement gasoline supplies to consumers affected by supply disruptions in the Northeast US.

Quality and Performance Assurance

The SPR conducted oversight activities per DOE procedural requirements. These activities included on-site management appraisals, technical assessments, and quarterly reviews of the M&O contractor's Contractor Assurance System (CAS).

The CAS covers four oversight areas mandated by DOE Order 226.1B, *Implementation of DOE Oversight Policy*. These categories are: 1) Environment, Safety, and Health (including Quality Assurance and Integrated Safety Management); 2) Safeguards and Security; 3) Cyber Security; and 4) Emergency Management. Additionally, CAS has been expanded to cover LE2, Finance, Human Resources, Property and Facilities, Procurement, Cavern Integrity, Data Systems, M&O, Engineering, and Internal Audit. In 2018, the Quality and Performance Assurance Division (QPAD), at the SPR PMO, conducted technical assessments on key areas within the M&O contractor's organization. The key areas assessed are as follows:

- The Cavern Workover Program, which evaluated the contractor's ability to fulfill the requirements outlined in the DOE and FFPO programmatic control documents.
- The contractor's Document Control Program, which evaluated the contractor's adherence to ISO 9001:2015 standards.
- The contractor's Procurement Quality Assurance Program, which evaluated the contractor's ability to meet the requirements of Criterion 7 of DOE O 414.1D, *Quality Assurance*.

QAPD personnel performed 16 inspections or site surveillances in 2018 that were documented in Technical Assurance Surveillance Reports. These included inspections at the SPR sites and supplier/vendor facilities. These inspections were done to ensure all activities and procedures were conducted according to contractual requirements.

QPAD personnel coordinated the oversight management process for the SPR. Six elements including the Project Manager, General Counsel, Management and Administration, Maintenance and Operations, Systems and Projects, and Technical Assurance developed annual Oversight Management Plans for FY 2018. Each organization performed oversight activities in accordance with these plans. Oversight activities were reported quarterly, and QPAD personnel conducted an analysis and provided a roll-up status report to the Project Manager each quarter.

During FY 2018, there were 16 objective critical performance measures. The assessment of each measure was conducted by a subject matter expert to ensure that the contractor's performance was measured against their objectives, appropriately monitored, documented, and verified. In accordance with SPR PMO Order 210.2B, *SPR PMO Performance Measurement* Order, QPAD then performed an independent assessment to validate the subject matter expert's due diligence. Both positive and negative results were submitted to the Performance Fee Board via the board secretary. Once the assessment results were completed and documented, a summary report was submitted to the Project Manager and the Performance Fee Board chairperson to determine the appropriate fee distribution.

Additionally, the SPR's Quality Council monitored the activities of three process improvement teams. The first team worked to identify methods to capture the unique knowledge and experiences of SPR personnel. The second team: evaluated industry practices for sampling, analyzing, and reporting the SPR's crude oil hydrogen sulfide (H_2S) content; suggested how H_2S

information should be reported; recommended the establishment of an H_2S mitigation plan, should one be needed; and developed a plan to facilitate sampling at SPR storage sites. The third team evaluated ways to make the On-Site Management Appraisal process more user friendly. The Quality council formed to review and evaluate the accuracy and effectiveness of on site management appraisals, and how the best practices and discrepancies are captured and integrated into the appraisal program to maximize productivity.

Vapor Pressure Mitigation

Reassembly and commissioning of the portable degasification plant (that had been stored at the Bryan Mound facility since 2011) was completed at the West Hackberry site in 2014. Operation of the West Hackberry degas plant started August 27, 2014 and completed October 10, 2018. Fifteen (15) of the 22 West Hackberry caverns were degassed with a total process volume of 177.1 MMbbl of crude oil; 29.72 MMbbl of crude oil were degassed in CY 2018. Once decommissioned, this plant will be retired. A smaller, more portable degassing unit will be funded through LE2, and it will begin processing at the Bayou Choctaw, Louisiana site. The new degassing unit is tentatively scheduled to begin processing in June 2023, and due to end in October 2026.

The need for a continuous vapor pressure-mitigation program was recognized in 1992 through routine oil sampling of the caverns. Long-term storage of crude oil in salt caverns results in gradual geothermal heating that raises the temperature of the oil in some caverns from approximately 80°F at the time of injection into the cavern, to a range between 110°F and 130°F over time. In addition, because of operational activities that include occasional injection of raw water into the cavern, gases encapsulated in the salt are released and absorbed into the oil while stored. Naturally occurring methane gas may also migrate into the cavern through the salt matrix discontinuities. Under certain drawdown conditions, increased vapor pressure results in gas being released into the atmosphere in amounts that may pose environmental, safety, and health risks.

The degas plant removes excess gases from the crude oil so that it can be sold and distributed to customers with a greatly reduced potential for emission of volatile organic compound (VOC) ozone precursors, benzene, and H_2S. The degas plant reduces the VOCs in the vapors from the treated oil by 97 percent. The reduction of 77,000 tons of VOC emissions from degassing 5 full drawdowns (with 1 drawdown assumed to be the removal of 90 percent of crude oil in each cavern) far exceeds the small amounts (about 2 tons per year for a 25-year life cycle) emitted during the operation of the degassing plant.

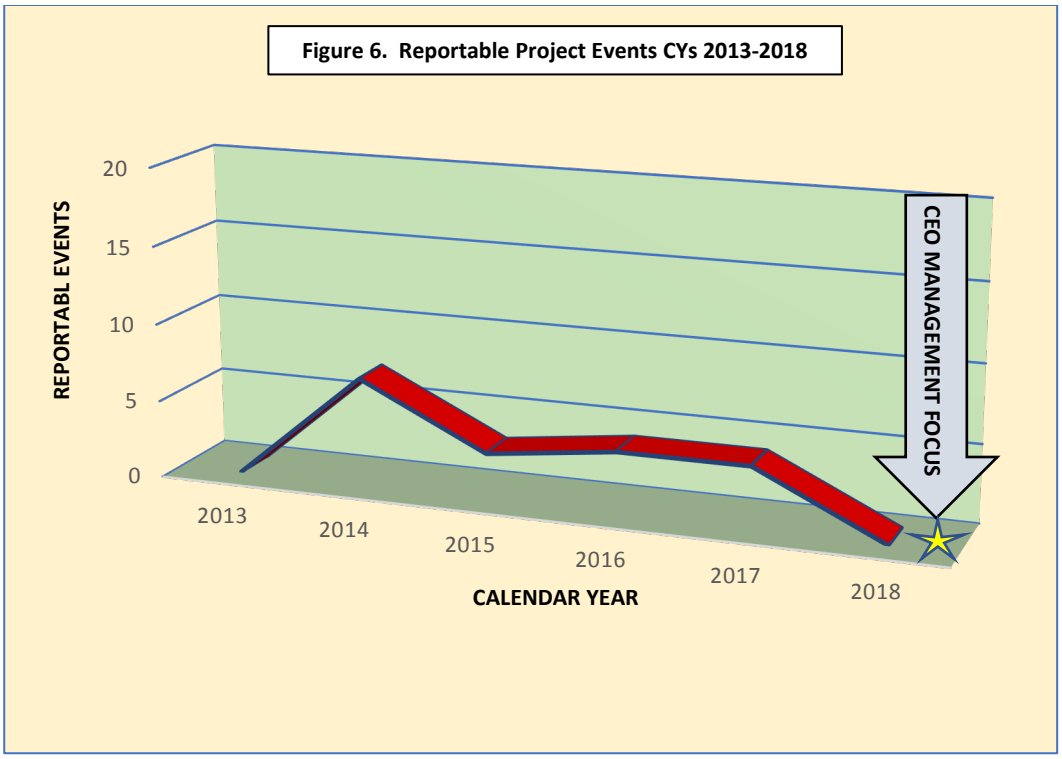
International Organization for Standardization (ISO) 14001

In May 2000, the SPR became the first bulk petroleum storage organization, public or private, to receive an ISO 14001, Environmental Management System certification. In 2018, the SPR successfully was certified to ISO 14001-2015 certification by means of a third-party recertification audit. This certification was granted in April 2018.

Environment, Safety, and Health

SPR is accountable to the public for the safe delivery of crude oil during a national energy emergency and for good stewardship of the environment. In 2018, all SPR sites were recognized by OSHA VPP Region VI as VPP sites. Big Hill and Bayou Choctaw completed CY 2018 qualifying for a VPP Star of Excellence award, whereas Bryan Mound and West Hackberry will be recognized as VPP sites. A Star of Excellence award requires the site to have an incident rate of at least 90 percent below the national average. The VPP recognizes employers and workers in both private industries and federal agencies who have implemented effective safety and health management systems and maintained injury and illness rates below the national Bureau of Labor Statistics averages for their respective industries. In the VPP, management, labor, and OSHA work cooperatively and proactively to prevent fatalities, injuries, and illnesses through a system focused on hazard prevention and control, worksite analysis, training, and management commitment and worker involvement. To participate in the VPP, employers must submit an application to OSHA and undergo a rigorous onsite evaluation by a team of safety and health professionals.

- **Figure 6** shows the SPR's performance for reportable environmental incidents from 2013–2018. During CY 2018, there were zero reportable project events at the SPR and zero reportable releases to the environment. M&O's senior management team took steps to educate and reform work practices at the site level. With a focus on prevention, employees were educated on the effects of spills and motivated to comply with permit requirements and minimize releases to the environment. Work practices include the use of Preliminary Hazard Assessments to capture potential spill concerns, improved job planning, and operations management tracking of all non-reportable spills on a monthly basis.



Pollution Prevention

The SPR strives to reduce waste and achieve minimal adverse impact on air, water, and land through environmental practices. Waste minimizations practices implemented at the SPR include: eliminate product need, procure and use only enough product to complete the task; select the appropriate package sizes to prevent excess; and reuse products until they are completely spent. Waste generated at the SPR is diverted from landfills through recycling and reuse opportunities. The SPR sets fiscal year diversion goals for non-hazardous solid waste and construction and demolition (C&D) waste generated at its sites.

Hazardous Waste

Although there are no specific goals established for hazardous waste generation or diversion, the SPR continued with its effort to recycle this waste stream whenever possible. During CY 2018, the SPR diverted 99.8 percent of the hazardous waste generated.

Non-Hazardous Waste

The SPR continued its efforts to successfully reduce municipal solid waste by diverting 78.8 percent of non-hazardous solid waste during FY 2018. The SPR exceeded its goal of at least 50 percent diversion of non-hazardous solid waste in FY 2018. In FY 2018, the SPR continued its efforts to reduce municipal solid waste sent to landfills, which in turn helps achieve DOE greenhouse as reduction targets.

Construction and Demolition Debris (C&D)

The FY 2018 goal was to divert at least 50 percent of C&D waste generated. The SPR exceeded that goal by diverting 64.7 percent.

Exploration and Production Waste

Although there are no specific goals established for exploration and production (E&P) waste generation or diversion, the SPR continued with its effort to recycle this waste stream whenever possible. During FY 2018, 71 percent of E&P waste was diverted. The generated E&P waste included crude oil-contaminated plastic and absorbents, crude oil-contaminated solids, workover wastes, off-specification crude oil mixtures, and drill cutting wastes.

Environmental Improvement Measures

The SPR sites continued to maintain acreage for habitat enhancement for the benefit of both native wildlife and resident and migratory birds.

The sites perform periodic avian inventories, which are uploaded into the Cornell Laboratory of Ornithology database. A presentation of the best photographs taken of the wildlife that year is a highlight of the Environmental, Safety & Health (ES&H) Summit and broadens awareness of the program.

The SPR recognized the 49th Anniversary of Earth Day in 2018 as an opportunity for employees to enhance awareness and strive to make commitments to environmental sustainability and a global green economy. Activities included an Earth Day-themed crossword puzzle, an Earth Day message from the FFPO Project Manager to all SPR employees, and an Earth Day-themed decorated cake for employees. The sites also held activities.

The SPR has continued to host Environmental Advisory Committee (EAC) meetings as part of community outreach efforts. The EAC comprises environmental experts and community representatives. EAC meetings were held at the West Hackberry site January 29–30, 2018 and at the New Orleans PMO on July 30-31, 2018.

In 2018, the M&O contractors resumed participation in the Lake Pontchartrain Basin Foundation's Beach Sweep after a two-year hiatus. The SPR had 18 volunteers participate. In total 59,000 pounds of trash were collected in a sweep that covered 68 miles.

Security and Emergency Operations

The SPR mitigated risk by ensuring the capability to effectively respond to any emergency during day-to-day operations and severe weather conditions. The Continuity of Operations Plan (COOP), Emergency Command Vehicle, communication vehicles, and Emergency Communications Network are the cornerstones for continuing essential work functions under catastrophic conditions. Emergency response team members are assisted by protection force personnel as "support responders" for emergency conditions.

The SPR built the infrastructure for applying and maintaining a robust Homeland Security Presidential Directive 12-credentialing program that includes training and maintenance. In 2018, the SPR completed and executed its Strategic Plan to secure drawdown capability, the protection of people, resources, and classified information.

During 2018, the SPR completed four announced and four unannounced oil spill response drills in support of the Oil Pollution Act of 1990. Each storage site successfully executed two oil boom containment deployments and exercised command and control response and recovery activities.

The SPR strengthens its protection strategy by building relationships with the local community law enforcement and emergency response agencies and personnel. The SPR conducts exercises with these local agencies and personnel, and it supports local community events.

Safety and Health Improvement Areas

Safety and Health Maintains Best Practice Performance

SPR continued to enhance safety and health systems throughout the complex during 2018. The lockout/tag out process was completely revised by a performance improvement team to improve ease of use, ensure energy control, and maintain consistency between the sites. A lockout/tag out effectiveness audit was then conducted finding the program to be protective of employees and in compliance with requirements. The lockout/tag out audit also identified opportunities for improvement, such as standardizing forms used, clarifying the use of tags and locks, and improving specific energy control procedures.

The Management in Action program, initiated in 2015, is designed to promote collaboration and communication between management and the field, and to help increase one-to-one conversations related to safety and health. This program's initial focus was on creating contacts between managers and employees. However, in 2016, it was expanded to include first-line supervisors. Because of this program, in CY 2018 management observed and documented as many as 2,000 safety attributes. In total, 1,157 Management in Action observations were performed in FY 2018.

The automated Job Hazard Analysis (JHA) process initiated in 2016 continued to improve the quality and consistency of the JHAs. The automated JHA uses drop down prompts that aid users in identifying hazards and controls for a specific task. This drives consistency across the SPR in identifying hazards and implementing controls.

During CY 2018, enhancements in the Industrial Hygiene (IH) program continued across all sites. Significant resources were invested in new IH equipment and in training of Site Safety Specialists to conduct IH monitoring at the technician level. A full IH baseline assessment was completed across all sites by the second quarter of FY 2018. The DOE initiated IH corrective action plan was closed and all actions were completed within the assigned timeframe. These corrective actions included the completion of the baseline assessment.

Additional improvements, unrelated to the corrective actions from DOE findings, were also made to the IH program. New direct reading instruments, capable of assessing benzene exposure, were integrated across all sites. Site Safety Specialists were initially trained on the new direct reading instruments and they facilitated the training for necessary site personnel on these new instruments. Site Safety Specialists performed exposure monitoring in accordance with an IH quarterly sampling schedule developed by the PMO IH department. The Ergonomics Program continued to progress, performing multiple ergonomics assessments. Additional personnel completed the Certified Behavioral-Based Ergonomics Specialist training. A new Accident Prevention Manual (APM) section was created to comply with the new OSHA Respirable Crystalline Silica standard. Initial training and implementation of the new respirable crystalline silica APM has been completed.

DOE and Occupational Safety & Health Administration's Voluntary Protection Program

The SPR participates in the OSHA VPP and the DOE VPP. Each SPR site must submit a candid self-evaluation to OSHA and DOE each year demonstrating their continued improvement of the safety and health management system. The self-evaluation also includes 20 or more answers to very specific questions about their Process Safety Management System. Recommendations for improvements made during each of the OSHA on-site assessments must be replicated at all the sites. In 2018, all four sites maintained their VPP certification. Bryan Mound and Big Hill successfully hosted their on-site OSHA assessments for continued acceptance in the VPP program. West Hackberry will have an on-site assessment in 2019.

Accident Rates for the SPR

The SPR continued to improve the safety and health systems throughout the complex during CY 2018 and had another successful year with regards to safety. The SPR succeeded in maintaining low SPR accident rates with a Total Recordable Case Rate of 1.12 and a Days Away/Restricted or Job Transfer Rate of 0.45 for CY 2018.

Integrated Safety Management

The SPR completed its annual Integrated Safety Management (ISM) System validation and documented its performance in the *ISM System Annual Review and Update Report of 2018*. This report summarized the results of all audits and assessments conducted during the FY and provided senior management with qualitative and quantitative data verifying that the ISM System performed effectively. In 2018, the SPR continued improving the ISM System Description and Annual Report focusing on performance metrics, leading indicators, and the inclusion of program information. Each ISM Core Function was analyzed to identify areas in which enhancements could be made to the system. The Annual Report is briefed to a joint audience of DOE and M&O contractor personnel.

Annual Safety Summit and Tripartite Safety Council

The SPR held their annual ES&H Summit in CY 2018. The ES&H Summit included briefings by the safety, health, and environmental departments of the M&O contractor, as well as the security contractor. Subject matter experts from the SPR PMO and sites gave presentations. Current issues were briefed and discussed in the open forum.

The Tripartite Safety Council meets semi-annually. It is comprised of the Project Managers from across the SPR complex to the everyday site worker. This Council allows for the open discussion of ES&H topics that site employees may have with the highest levels of management. The purpose of these council meetings is to give all SPR contractors' representatives an opportunity to directly address with the SPR Project Manager any safety issues that have not been resolved through normal channels. Each SPR site, the security contractor, and the A&E contractor had representatives at the meetings. Action items from these council meetings are tracked through closure.

In 2018, the M&O contractor held a Health, Safety, and Environment Week (first held in 2015), conducting events at each of the SPR sites during the first week of May. After a kick-off by senior management, which was video teleconferenced from the PMO in New Orleans, each of the sites conducted daily activities highlighting some environmental or safety topic with excellent employee participation. The PMO also participated in lunch time activities to discuss ES&H topics and other presentations.

Business Process Re-Engineering

The SPR information technology function is a national leader in the execution and implementation of re-engineering business processes utilizing a combination of Microsoft SharePoint and K2 workflow engine. Currently, the SPR has developed and deployed more than 65 automated business processes to ensure the timely and consistent completion of tasks. The following is a list of some of the workflow categories currently in use: Project Control (Milestone Control), Contract Management (Contract Consent, Work Authorization Directive, Project Orders, PEMP, and STRIPES PR Request), Human Resource Management (Employee On-

Boarding/Off-Boarding, With-In Grade Approval, and Telework Certification), IT Management, and Physical Security Management.

Data Security, Accessibility, and Resiliency

In 2018, the SPR's Alternate Data Center was expanded to include a security enhancement that requires a Personal Identification Verification badge, based on a two-factor authentication to access the SPR network environment. The enhanced recovery capabilities allow for remotely accessible infrastructure, a significant number of portable computers and Smartphones, and robust backup communications to provide reliable performance in an emergency so that essential work can be performed remotely. Comprehensive mobile device management for laptops, smartphones, and tablets is in place to improve user access to SPR data. Additionally, a secure extranet is in place to significantly improve collaboration with partners and external customers.

In addition, efforts continue in the deployment of a wireless network infrastructure at the SPR storage sites to allow site users to participate in SPR automated business processes and have untethered access to SPR data. The SPR implemented a strong cyber security program, using innovative approaches, tailored controls, and monitoring of the SPR operational environment. A cloud computing study was completed to determine how to best, and most cost-effectively use cloud services to improve accessibility and resiliency. The SPR uses Microsoft Office 365 to leverage cloud services for email and Microsoft Office capabilities. The main objective is to increase the availability of email for SPR mobile users. Cyber security controls were extended to the cloud email services through use of a Cloud Access Security Broker (CASB) to better secure SPR email. The CASB provides enhanced protection from email phishing attacks as well as data loss prevention (DLP) capabilities. Additional CASB security enhancements are planned for 2019 to cover other cloud services and to secure access to these services while working remotely.

Awards and Certifications

The SPR received the following awards for performance during 2018:

- OSHA Region VI Star of Excellence – Big Hill and Bayou Choctaw
- OSHA Region VI Star Among Stars – Bryan Mound and West Hackberry

The Stars Program is an award program that only involves agencies who have qualified as a VPP site. The Stars Program is a way to encourage continuous improvement among all of the VPP sites in Region VI, by awarding different levels of Stars to those sites who have exceeded performance. The program has three levels: a facility with a single-year injury incident rate at least 50 percent below its industry average is a "star among stars;" a site that is 75 percent below the national average is a "super-star among stars;" and the most exalted level, a facility that is 90 percent below the national average is a "star of excellence."

International Organization for Standardization 9001 Quality Management System

During 2018, FFPO maintained their ISO 9001 and 14001 certifications and updated their Environmental Management System to be in compliance with the ISO 14001:2015 version.

Customer Service

The SPR's Customer Service Team met with several refiners, traders, pipeline companies, and other customers during the 2018 American Fuel and Petrochemical Manufacturers annual meeting in New Orleans, Louisiana, during the second week of March. Additional meetings were held at the SPR offices in Washington, D.C., and at some of the customers' corporate offices. Meetings with customers always have two primary functions: 1) to gather customer information to improve the SPR's response capabilities and 2) to update those customers on SPR activities. The customers provided valuable feedback and reported that the overall experience was excellent.

To maintain an accurate and current list of customer contacts, each customer was asked to review his or her contact information and to provide updates on refinery activities, such as expansion plans and any planned or actual changes to their crude oil inputs. Customers were also encouraged to discuss any operational or administrative issues they have encountered when dealing with the SPR so that those issues may be addressed.

The Customer Service Team provided updates to the customers regarding the status of the SPR and welcomed questions from the customers. Customers provided the team with updates on refinery closings, shutdowns, and hurricane upgrades.

Real Estate Actions

During 2018:

- Modification 93 to Interagency Agreement (IA) No. DE-AI96-78PO02816 was executed, to extend the agreement's period of performance through September 30, 2019. The purpose of IA No. DE-AI96-PO02816 is for the Corps of Engineers to provide realty services for the acquisition of port facilities, pipeline rights-of-way and storage sites. The services include, but are not limited to planning, mapping and surveying, appraising, and acquisition. The agreement is extended annually based upon active/continued being performed or anticipated services to be requested by the Corps of Engineers.

- Occupancy Agreement ALA03906 between the General Service Administration and DOE commenced August 8, 2017, for the lease of 39,951 square feet of useable space located at 521 Elmwood Park Boulevard, Harahan, Louisiana. The space is being used as

the general-purpose warehouse with eight permanent contract employees. The current agreement expires August 7, 2022 and has one 5-year option renewable option.

- Fluor Property Section and DOE's Real Property Office conducted Facilities Information Management System validations of all buildings, trailers, and other structures & facilities, and DOE-owned land in June 2018. The SPR scored GREEN on all three validation scorecards.
- The Department of Justice reached a settlement agreement with the owners of the property condemned to acquire the Bayou Choctaw 102 wellsite.
- Modification M030 to Lease No. DE-RL96-08PO92907 between Elmwood Office Park, LLC and DOE was executed to exercise the second 5-year option period for lease of the 850 and 900 office space in New Orleans through April 30, 2023. In addition, the base rent was reduced via this modification from $23.75 per square foot to $22.00 per square foot as supported by market data.
- Modification M036 to Lease No. DE-RL96-97PO70011 between Shell Pipeline Company, LP and DOE was executed to settle throughput charges for SPR oil movements on the Bayou Choctaw 36" pipeline (currently leased to Shell) during the September 2017 Hurricane Harvey Oil Exchange.
- Modification M034 to Lease No. DE-RL96-99PO900001 between Exxon Pipeline Company and DOE was executed to: fund Exxon to develop a Horizontal Directional Drill design; secure all necessary permits; and remove, repair and replace the damaged portion of the Brazos River crossing section of the 30" Bryan Mound to Jones Creek pipeline. In addition, this modification granted a 10-year extension to the current lease term through May 31, 2030.

XIII. Conclusion

The SPR continues to protect the U.S. economy from severe petroleum supply disruptions through continued safe and environmentally responsible operation and management of this emergency stockpile of crude oil. The SPR maintained crude oil stocks at four site facilities: Bryan Mound and Big Hill in Texas, and Bayou Choctaw and West Hackberry in Louisiana. The SPR entered CY 2018 with 662.8 MMbbl of crude oil and ended CY 2018 with 649.1 MMbbl. The SPR continued efforts for maintaining the SPR in accordance with EPCA (42 U.S.C. § 6201, *et seq.*).

Appendix: Strategic Petroleum Reserve Site Information

Bryan Mound

Location
Brazoria County, Texas (3 miles southwest of Freeport, Texas).

Site Description
Authorized 247 MMbbl storage facility with 19 active caverns.

24-inch diameter, 6-mile brine disposal pipeline extending 4 miles offshore in the Gulf of Mexico.

Oil, brine, and raw water piping distribution system connecting caverns with central plant and water intake structure located on Brazos River. Twenty-one (21) pumps totaling approximately 45,000 horsepower.

System Parameters

Drawdown Rate:	(Sour)	1,500,000 bbl/d*
	(Sweet)	1,000,000 bbl/d
Raw Water Pumping Rate:		1,626,000 bbl/d
Oil Fill Rate:		225,000 bbl/d
Brine Disposal Rate:		260,000 bbl/d

Bryan Mound has three storage tanks that are required for site drawdown and refill operations. Two tanks are currently unusable due to a damaged internal floating pan, and the other is under construction for conversion to an external floating roof. Unavailability of the storage tanks has reduced the site's actual drawdown capability from 1,500,000 bbl/d to 1,350,000 bbl/d. Bryan Mound's Tank 2 is currently under construction and is projected to be completed in FY 2020. Bryan Mound Tank 4—a component of the SPR LE2 Project—is projected to be completed in FY 2024.

Distribution Facilities
DOE-owned 3.9-mile, 30-inch pipeline to Seaway Freeport Marine Terminal; DOE-owned 4.0-mile, 30-inch pipeline to Seaway Jones Creek Tank Farm; and Pipeline and DOE-owned 46.3-mile, 40-inch pipeline to Seaway Texas City Terminal and Docks.

Acquisition
Acquired 499.47 acres fee simple, through eminent domain, in April 1977, from Freeport Mineral Company and other owners. Dow Chemical Company was the previous operator.

West Hackberry

Location
Cameron Parish, Louisiana (25 miles southwest of Lake Charles, Louisiana).

Site Description
Authorized 220 MMbbl storage facility with 21 active caverns.

Oil, brine, and raw water piping distribution system connecting caverns with central plant, water intake structure located on Intra-coastal waterway and nine brine disposal wells. Thirty-three (33) pumps totaling over 41,680 horsepower.

System Parameters

Drawdown Rate:	(Sour)	1,300,000 bbl/d
	(Sweet)	1,300,000 bbl/d
Raw Water Pumping Rate:		1,400,000 bbl/d
Oil Fill Rate:		225,000 bbl/d
Brine Disposal Rate:		225,000 bbl/d

Distribution Facilities
DOE-owned 42.8-mile, 42-inch pipeline to Sunoco Nederland Terminal; DOE-owned 13.6-mile, 36-inch pipeline to Zydeco Pipeline common carrier pipeline system (Lake Charles Meter Station) at Carlyss.

Acquisition
Acquired 405.36 acres fee simple through eminent domain in April 1977 from numerous private landowners. Olin Corporation was the previous site operator. Acquired 160.0 additional acres fee simple by condemnation in two actions, first in July 1979 and then in March 1980.

Big Hill

Location
Jefferson County, Texas (26 miles southwest of Beaumont, Texas).

Site Description
Authorized 170 MMbbl storage facility with 14 active caverns.

Oil, brine, and raw water systems connecting caverns with central plant, water intake structure located on the Intracoastal Waterway, and a 48-inch diameter, 14-mile brine disposal pipeline extending four miles offshore in the Gulf of Mexico. Forty-eight (48) pumps totaling 46,000 horsepower.

System Parameters

Drawdown Rate:	(Sour)	1,100,000 bbl/d
	(Sweet)	1,000,000 bbl/d
Raw Water Pumping Rate:		1,192,000 bbl/d
Oil Fill Rate:		225,000 bbl/d
Brine Disposal Rate:		241,000 bbl/d

Distribution Facilities
DOE-owned 24.5-mile, 36-inch pipeline to Sunoco Nederland Terminal; Phillips 66 2-mile, 24-inch pipeline to Phillips 66 Docks; Zydeco 20-inch pipeline system to Houma, Louisiana.

Acquisition
Acquired 271 acres fee simple through eminent domain in November 1982 and July 1983 from three landowners (*i.e.*, 238.48 acres from Amoco, 27.06 acres from the Pipkin estate, and 5.46 acres from the Patrick Henry Phelan estate).

Bayou Choctaw

Location
Iberville Parish, Louisiana (12 miles southwest of Baton Rouge, Louisiana).

Site Description
Authorized 76 MMbbl storage facility with six active caverns.

Oil, brine, and raw water piping distribution system connecting caverns with central plant, a water intake structure, and 12 brine disposal wells). Eighteen (17) pumps totaling over 18,000 horsepower.

System Parameters

Drawdown Rate:	(Sour)	515,000 bbl/d
	(Sweet)	300,000 bbl/d
Raw Water Pumping Rate:		558,000 bbl/d
Oil Fill Rate:		110,000 bbl/d
Brine Disposal Rate:		110,000 bbl/d

Distribution Facilities
DOE-owned 37.2-mile, 36-inch pipeline to Shell's Sugarland Terminal and Capline Pipeline.
Shell-owned 16-mile, 24-inch pipeline to Baton Rouge.

Acquisition
Acquired 355.95 acres fee simple through eminent domain in April 1977 from numerous private owners. Union Texas Petroleum (a subsidiary of Allied Corporation) was the previous operator.

In 1985, DOE acquired an additional existing cavern through a cavern exchange agreement with Union Texas Petroleum. The transaction involved a 3.5-acre exchange with no net change in government-owned acreage.

In November 2011, DOE acquired an existing cavern through eminent domain from A. Wilbert's L.L.C. to replace Cavern 20, which has experienced preferential leaching and is within 60 feet of the edge of the dome, posing an environmental risk with continued use.

List of Acronyms

A&E	architectural and engineering
ASFE	Assistant Secretary for Fossil Energy
bbl	barrels
bbl/d	barrels per day
BP	British Petroleum
CAS	Contractor Assurance System
CASB	Cloud Access Security Broker
C&D	construction and demolition
COOP	Continuity of Operations Plan
CY	calendar year
DLP	data loss prevention
DOE	U.S. Department of Energy
DOI	U. S. Department of Interior
E&P	exploration and production
EAC	Environmental Advisory Committee
EIA	U.S. Energy Information Administration
EPEAT	Electronic Product Environmental Assessment Tool
EPCA	Energy Policy and Conservation Act
ES&H	Environment, Safety, and Health
ESIM	Energy Security and Infrastructure Modernization
FAST Act	Fixing America's Surface Transportation Act
FFPO	Fluor Federal Petroleum Operations
FY	fiscal year
H_2S	hydrogen sulfide
IA	Interagency Agreement
IEA	International Energy Agency
IEP	international energy program
IH	Industrial Hygiene
ISO	International Organization for Standardization
JHA	Job Hazard Analysis
LE2	Life Extension Phase 2
LED	light-emitting diode
Mbbl	thousand barrels
Mbbl/d	thousand barrels per day
MIT	mechanical integrity test
MMbbl	million barrels
MMbbl/d	million barrels per day
M&O	maintenance and operations
NGSR	Northeast Gasoline Supply Reserve
OSHA	Occupational Safety and Health Administration
PMO	Project Management Office

QPAD	Quality and Performance Assurance Division
RIK	Royalty-in-Kind
RECAP	Readiness and Capability
SPR	Strategic Petroleum Reserve
SPREX-RECAP	SPR Exchange Readiness and Capability
STE	systems test exercise
VOC	volatile organic compound
VPP	Voluntary Protection Program

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