U.S. DEPARTMENT OF ENERGY

Strategic Petroleum Reserve Annual Report for Calendar Year 2019

Report to Congress
May 2021

United States Department of Energy
Washington, DC 20585

Message from the Secretary

The Secretary of Energy is required[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 2019*.

This report also includes details concerning the physical capacity, type, and quantity of petroleum in the Strategic Petroleum Reserve in 2019, as well as plans for upgrades and major maintenance. The Energy Policy and Conservation Act 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 Kamala Harris**
  President of the Senate

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

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

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

- **The Honorable Bernard Sanders**
  Chairman, Senate Committee on Budget

- **The Honorable Lindsey Graham**
  Ranking Member, Senate Committee on Budget

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

[1] Section 165 of the Energy Policy and Conservation Act, as amended (Pub. L. No. 94-163, title I (Dec. 22, 1975) (42 U.S.C. § 6245)).

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

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

- **The Honorable John Barrasso**
  Ranking Member, Senate Committee on Energy and Natural Resources

- **The Honorable Rosa DeLauro**
  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 Jason Smith**
  Ranking Member, House Committee on the Budget

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

- **The Honorable Cathy McMorris Rodgers**
  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. Mike Nartker, Principal Deputy Assistant Secretary, or Ms. Elizabeth Noll, Deputy Assistant Secretary for House Affairs, Office of Congressional and Intergovernmental Affairs, at (202) 586-5450 or Ms. Katherine Donley, Deputy Director for External Coordination, Office of the Chief Financial Officer, at (202) 586-0176.

Sincerely,

Jennifer Granholm

Executive Summary

Program Highlights and Status

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

The SPR entered calendar year (CY) 2019 with 649.1 million barrels (MMbbl) of crude oil, and at the end of CY 2019 (as of December 31, 2019), the SPR held 634.9 MMbbl—an amount equivalent to 948 days of supply of total U.S. petroleum net imports, based on 2019 net petroleum import levels[2]. The net decrease resulted from Congressionally-mandated SPR crude oil sales.

In 2019, the SPR successfully carried out two Congressionally-mandated crude oil sales. In April 2019 the SPR began crude oil sales in accordance with Section 404 of the Bipartisan Budget Act of 2015 (Public Law 114-74) and the Energy and Water, Legislative Branch, and Military Construction and Veterans Affairs Appropriations Act, 2019 (Public Law 115-244, 132 Stat. 2908 (Sept. 21, 2018)), which authorized the Secretary of Energy to draw down and sell up to $300 million worth of SPR crude oil in fiscal year (FY) 2019 to generate revenue for the SPR modernization program. Under Section 404, over the course of four years, commencing in FY 2017 and continuing through FY 2020, the Secretary is authorized to generate up to $2 billion in revenue needed for the SPR modernization program, based on annual appropriations. The FY 2019 SPR modernization program crude oil sale concluded in May 2019 with 4,307,485 barrels (bbl) delivered in over 14 shipments. The SPR deposited $299,999,960.89 into the Energy Security and Infrastructure Modernization (ESIM) Fund, which supports the SPR modernization program.

In October 2019, the SPR began a crude oil sale in accordance with Section 5010(a)(1)(C) of the 21st Century Cures Act (Public Law 114-255) and Section 403(a)(2) of the Bipartisan Budget Act of 2015 (Public Law 114-74). The combined CY 2019 sale concluded in November 2019 with 9.85 MMbbl delivered in over 61 shipments. The SPR deposited $566,610,383 into the General Fund of the Treasury.

[2] *United States Energy Information Administration (EIA)*. "U.S. Net Imports of Crude Oil & Petroleum Products," Monthly data. https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=MTTNTUS2&f=M, Accessed 06/08/2020.

Through the Energy and Water, Legislative Branch, and Military Construction and Veterans Affairs Appropriations Act, 2019 (Public Law 115-244), the budget authority for the SPR Account was $235 million, with Congress providing $206 million for operating and maintaining the SPR and $29 million for the continued operation of the Northeast Gasoline Supply Reserve (NGSR). For the SPR Petroleum Account, Congress appropriated $10 million for the cost of SPR crude oil sales. Over the history of the SPR through FY 2019, Congress appropriated a total amount of $24.9 billion, net of sales and transfers. Obligations for the SPR in FY 2019 totaled approximately $197.2 million. From this amount, the SPR obligated $21.4 million for Federal program management, and $175.8 million for contractual goods and services to operate and maintain the SPR. Additional obligations for the NGSR's storage costs and administrative oversight totaled $18.2 million. SPR Petroleum Account obligations related to the logistics cost of moving oil totaled $10 million.

Changes to Performance Capabilities

Vapor Pressure Mitigation Program

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, SPR oil 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 degasification processing unit completed final operation in October 2018 and is due for replacement by a modern unit as part of the SPR Modernization Program's Life Extension Phase 2 Project.

Environment, Safety, and Health

The SPR had another safe year. In CY 2019, the SPR had a Total Recordable Case Rate of 0.61 and a Days Away/Restricted/Transferred Rate of 0.20. These low accident rates resulted in all four SPR storage sites to continue participation in OSHA's Voluntary Protection Program (VPP). The VPP program is OSHA's official recognition that the employers and employees at a site have implemented an exemplary occupational safety and health system and maintain injury and illness rates below the averages for respective industry. The Big Hill and Bayou Choctaw storage sites each received an additional VPP award, the 'Star of Excellence,' for achieving incident rates at least 90 percent below the national average.

In addition, a third-party auditor found the SPR's Environmental Management System to be in compliance with the International Organization for Standardization's (ISO) 14001 standards.

STRATEGIC PETROLEUM RESERVE ANNUAL REPORT FOR CALENDAR YEAR 2019

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I. Legislative Language

The Energy Policy and Conservation Act (EPCA), (42 U.S.C. 6201 *et seq*.), enacted on December 22, 1975 (Public Law 94-163), formally established the SPR. Since then, the SPR has operated to reduce the impact of oil supply disruptions and to carry out obligations under the International Energy Program.

Section 165 of EPCA, 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 2019* includes:

- Status of the physical capacity of the SPR and the type and quantity of petroleum products stored in the SPR;
- 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;
- Description of current withdrawal and distribution rates and capabilities, and an identification of any operational or other limitations on those rates and capabilities;
- Listing of petroleum product acquisitions made in the preceding year and planned in the following year, including quantity, price, and type of petroleum;
- Summary of the actions taken to develop, operate, and maintain the SPR;
- Summary of the financial status and financial transactions of the SPR Account and the SPR Petroleum Account for the year;
- Summary of expenses for the year, and the number of federal and contractor employees;
- Status of contracts for development, operation, maintenance, distribution, and other activities of the SPR;
- Summary of foreign oil storage agreements and implementation status;
- 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 a SPR capable of reducing the impact of severe energy supply interruptions.

As of December 31, 2019, the SPR contained 634.9 MMbbl of crude oil. That inventory provides the equivalent of approximately 1,069 days of supply petroleum net imports, based on 2019 average U.S. crude and product net imports of 594 thousand barrels per day (Mbbl/d). The United States relies on the SPR to fulfill their obligations under the International Energy Program.

Legislative Activity

Laws enacted through the date of this report that directly affect the SPR program at present and over the next decade and beyond:

- Section 403 of the Bipartisan Budget Act of 2015 (Public Law 114-74), enacted on November 2, 2015, 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 FY 2018 and continuing through FY 2025.

- Section 404 of the Bipartisan Budget Act of 2015 (Public Law 114-74), authorizes the Secretary to sell crude in an amount up to $2 billion for the period encompassing FY 2017–2020. The sales were for the purpose 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 (Public Law 114-254) required 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) (Public Law 114-94), enacted on December 4, 2015, requires the Secretary to draw down and sell a total of 66 MMbbl of crude oil from the SPR, or a volume which generates up to $6.2 billion, over three consecutive years, commencing in FY 2023 and continuing through FY 2025.

- Section 5010 of the 21st Century Cures Act of 2015 (Public Law 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 FY 2019. The SPR executed the first portion of these sales in the spring of 2017.

- Section 3009 of America's Water Infrastructure Act of 2018 (Public Law 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 SPR will deposit these funds into the treasury as defined in the law.

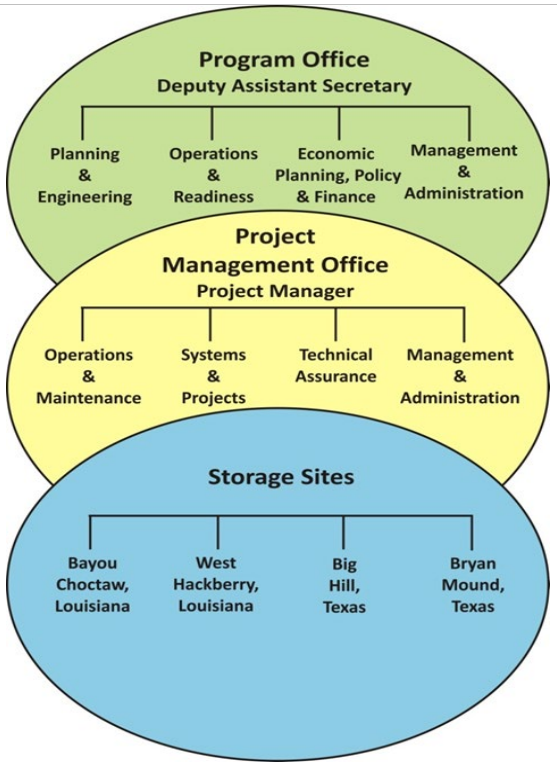
III. Program Management

Organization

The Assistant Secretary for Fossil Energy (ASFE) at DOE headquarters in Washington, DC, has overall program responsibility for carrying out the SPR's mission and maintaining operational readiness. ASFE further delegates this responsibility to the Deputy Assistant Secretary (DAS) for Petroleum Reserves, who leads the Program Office (PO), also in Washington, DC. The DAS for Petroleum Reserves executes through the SPR Project Management Office (PMO) in New Orleans, Louisiana, which supervises day-to-day operations of the SPR. As of December 31, 2019, the PO staffing was 23 Federal employees and 10 contractor employees, while SPR PMO staffing was 86 Federal employees and 628 contractor employees. Figure 1 depicts the SPR's organizational structure.

Figure 1

Strategic Petroleum Reserve Organizational Structure



Contractual Support

The PMO is responsible for operations, maintenance, design, and development of the SPR. The PMO primarily fulfills this responsibility through Fluor Federal Petroleum Operations (FFPO), which serves as the management and operating (M&O) contractor providing leadership and expertise to operate and maintain SPR facilities and systems. The period of performance for the current contract is five years and began on April 1, 2014, with one five-year option. On August 15, 2018, the SPR exercised the five-year option period, which extends the contract's period of performance through 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 original five-year period of performance, which commenced August 12, 2020, has been extended to August 11, 2025.

Several support services contracts exist for management, technical, and computer support. The largest support service contractor is Infinity Technology, a certified 8(a) Service-Disabled Veteran-Owned Small Business that provides management and technical support services. This contract began on November 1, 2016, with a two-year base period of performance and three one-year options. The contract expires on October 31, 2021.

Other support contractors providing support to the PO in Washington, DC, in 2019 included Core Laboratories, L.P.; AOC Petroleum Support Services, LLC; and Cyborg, Inc.

The SPR purchased power for the four storage sites from Gexa Energy, CenterPoint Energy, and Entergy Louisiana, LLC.

In CY 2019, the SPR held contracts with three commercial facilities that provided terminal services for fill, drawdown, and storage of crude oil. The SPR has a contract with Sunoco Partners Marketing & Terminals, L.P. with a five-year term that runs through September 2023. The contract has five one-year option periods that can be exercised after the initial five-year term. The SPR's connection agreement with Phillips 66 is a five-year agreement that will run through November 2023. The SPR's M&O contractor has a five-year agreement with Seaway Crude Pipeline Company for terminal services. This agreement with Seaway will conclude on November 30, 2021.

In addition to the contract relationships, DOE's Sandia National Laboratory provides valuable geotechnical support to the SPR that includes analysis of the salt domes, cavern integrity, vapor pressure, crude oil quality, and new cavern development.

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 created in salt dome formations. Salt dome storage technology provides maximum security and safety for the Nation's stockpile of crude oil and is also the lowest-cost technology for large-scale petroleum storage. The average operational cost for the SPR in FY 2019 was $0.271 per barrel, which includes the cost for operational management, staffing, security operations, and maintenance. The average operational coast for the SPR does not include infrastructure-related costs that are funded by the Life Extension Phase 2 (LE2) project.

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 713.52 MMbbl and a maximum sustained drawdown capability of 4.415 MMbbl/d.[3] Shown in Table 1 is the authorized storage capacity and sustained drawdown capability of each SPR site as of December 31, 2019.

Table 1. Authorized Storage Capacity and Sustained Drawdown Capability (As of December 31, 2019)

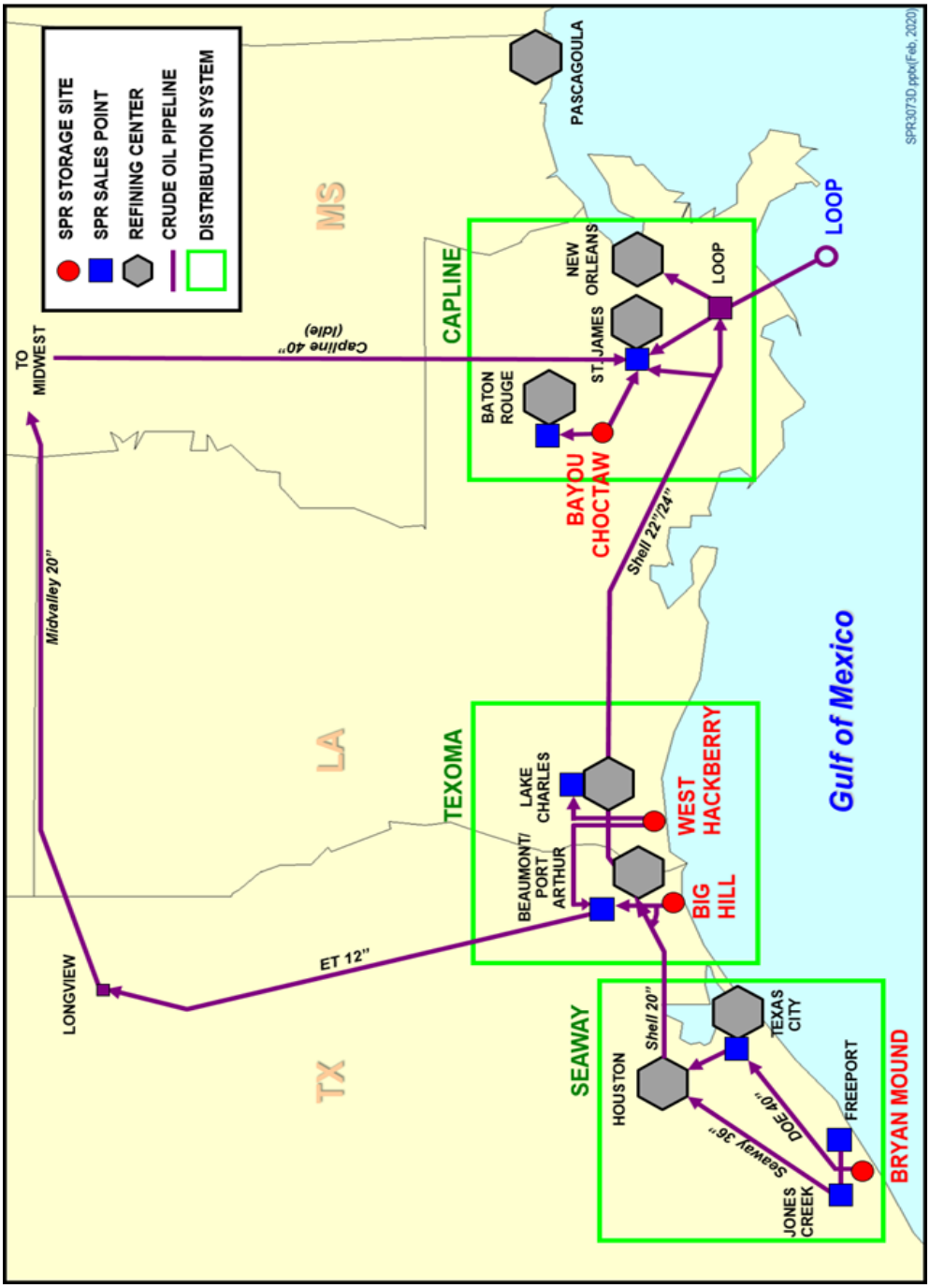
CURRENT SITE CAPABILITY			
Storage Facility	**Authorized Storage Capacity (MMbbl)**	**Crude Mix Sweet/Sour (MMbbl)**	**Sustained Drawdown Capability (MMbbl/d)**
Bryan Mound	**247.14**	**67/164**	**1.5***
West Hackberry	**220.38**	**102/87**	**1.3**
Big Hill	**170.00**	**63/81**	**1.1**
Bayou Choctaw	**76.00**	**19/52**	**0.515**
Total Program	**713.52**	**251/384 (40%/60%)**	**4. 415[3]**

Sweet = Sulfur content < 0.5 percent; Sour = Sulfur content > 0.5 percent
MMbbl = Million Barrels
Bryan Mound maximum sustained drawdown capability reduced to 1.350 Mbbl/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. During part of CY 2019, Capline flowed northbound, and was then shut in for reversing to flow southbound. The locations of the SPR storage sites and respective distribution systems are shown in Figure 2.

[3] Current SPR maximum drawdown capability is reduced to 4.22 MMbbl/d due to a damaged floating pan in Tank 2 at Bryan Mound.

Figure 2. Storage Sites and Distribution System



Cavern Maintenance

During 2019, the SPR PMO oversaw a total of 11 well workovers[4] at the four SPR sites. These workovers included ten diagnostic workovers, and one remediation workover to install a cemented protective steel liner inside the existing wellbore. The SPR typically uses two workover rigs to perform this work; one leased rig and one DOE-owned rig. A dedicated safety professional monitors rig activities at each workover.

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, 2019, the site had 19 operational storage caverns with a total authorized storage capacity of 247.14 MMbbl, and a cavern inventory of 230.3 MMbbl. During 2019, the site drawdown rate was reduced by 150,000 bbl per day, as previously reported in 2018, due to pending conversion of two crude oil storage tanks used for drawdown. One storage tank will be converted from an internal floating roof to an external floating roof tank, and the second storage tank requires conversion to an external floating roof tank.

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, 2019, the site had 14 operational storage caverns, with a combined authorized storage capacity of 170.0 MMbbl, and a cavern inventory of 143.8 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, 2019, the site had 21 operational storage caverns with a combined authorized storage capacity of 220.38 MMbbl, and a cavern inventory of 189.8 MMbbl.

[4] A well workover is the process for replacing existing pipes and equipment that have been damaged, broken, or are not working properly. A remediation workover is a retest of the cavern wall integrity and newly installed pipes and hardware after a cavern has failed a state inspection.

Bayou Choctaw Site Status

The Bayou Choctaw storage site is located in Iberville Parish, Louisiana, approximately 12 miles southwest of Baton Rouge, Louisiana. As of December 31, 2019, 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 built in the late 1970s and began operations in early 1980 primarily to support fill and drawdown of the Weeks Island (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 commercial lease agreement for the St. James marine terminal with Shell Oil Products U.S., expired on December 31, 2019. ExxonMobil Pipeline Company (EMPCO) won a competitive bid to become the new lessee, and it successfully assumed operations of the St. James Terminal Facility at midnight, December 31, 2019. Therefore, January 1, 2020 is the new contract effective date. The new lease agreement includes a 10-year base period with two five-year option periods. The new lessee will provide normal operations and maintenance of the terminal, including supporting the SPR as a sales and distribution point in the event of an SPR drawdown.

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

V. West Hackberry Cavern 6 Crude Oil Transfer Project

In 2012, the SPR PMO identified West Hackberry Cavern 6 as having a cavern well stability problem that could potentially result in future oil accessibility issues. Consequently, the SPR developed and instituted a plan to remove the oil from Cavern 6 and transfer it into other available caverns on the site. As of December 31, 2019, the SPR PMO had removed all readily accessible oil from Cavern 6. Due to these well stability problems, Cavern 6 will not return to service. The SPR will continue operations to transfer low volumes of residual crude migrating to the wellhead. Even without Cavern 6, the physical drawdown capability at West Hackberry remains at 1.3 MMbbl/d.

VI. Bryan Mound Cavern 2 Crude Oil Transfer Project

In 2014, the SPR PMO made the decision to permanently empty Cavern 2 of sweet crude oil inventory due to failed Mechanical Integrity Tests on both of wells, a historical problem that has increased in frequency. Crude oil removal out of Cavern 2 began March 1, 2015, as a single closed-loop, cavern-to-cavern movement to other available sweet crude oil caverns on the site. Once empty, the SPR performed geotechnical analysis and well stabilization activities.

As of December 31, 2019, the SPR PMO had removed all readily accessible inventory from the cavern. The SPR will continue to transfer low volumes of any residual crude migrating to the wellhead. Once this phase is complete, longer-term decommissioning activities will commence. Even without Cavern 2, the physical drawdown capability at Bryan Mound[5] remains at 1.5 MMbbl/d.

VII. SPR Modernization Program – Life Extension Phase 2 (LE2) Project

In 2015, the SPR commenced a program, involving all four sites that will replace or upgrade equipment and facilities approaching or already exceeding the projected 25-year life span. This commencement occurred with the signing of Critical Decision-0 (CD-0), *Approve Mission Need*, in accordance with DOE Order 413.3B, Program and Project Management for the Acquisition of Capital Assets. CD-1, *Approve Alternative Selection and Cost Range*, was approved in December 2016, with a cost range of $750 million to $1.4 billion. In 2018, design efforts continued and procurement of Long Lead Government Furnished equipment began. In 2019, LE2 efforts continued with the assumption of the architect-engineer (A-E) scope by the M&O.

In 2019, the SPR's major accomplishments for LE2 included completion of a revised plan and schedule to implement an Earned Value Management System (EVMS)[6]; completion of revised project management, planning, and control documentation; and completed environmental assessments required under the National Environmental Policy Act. In FY 2020, designs progressed to support establishment of the project technical, cost, and schedule baseline and approval to begin construction in FY 2021 to support DOE Order 413.3B Program and Project Management for the Acquisition of Capital Assets requirements. In addition, the FY 2019 SPR Modernization crude oil sale was completed, with $299,999,961 in sales revenue deposited in the ESIM Fund. An overall total of $971,024,412 was deposited in the ESIM Fund based on

[5] Bryan Mound maximum sustained drawdown capability reduced to 1.350 Mbbl/d due to repairs needed to an above ground storage tank. Current SPR maximum drawdown capability is reduced to 4.22 MMbbl/d due to a damaged floating pan in Tank 2 at Bryan Mound.

[6] EVMS is a project management technique that helps integrate three components of project performance: scope, schedule, and cost. It is used to objectively measure project performance against the project's baseline.

combined sales conducted in FY 2017, FY 2018, and FY 2019. As of the end of FY 2019, a final SPR Modernization Sale was scheduled for FY 2020. In March of 2020, the final sale was postponed until as late as FY 2022.

The SPR team's success with procuring long-lead equipment for the project helps to mitigate risks and deliver equipment in time for installation, which is critical to ensuring the overall schedule and cost control for the LE2 project. As part of the LE 2 project, the SPR drawing system is being updated to a data-driven 3D CAD system. SmartPlant[7], the selected 3D design tool integrates typical 2D drawing information with equipment specification data and geolocated objects. It will help to mitigate cost risk while providing required design data, reducing the need to issue change notices before awarding construction contracts, and thus optimizes overall project execution within available funding. First, the tool set allows integration of engineering discipline specific requirements; automatically calculates quantity take-off information that is hand calculated in a 2D environment; automatically produces related drawings, like instrument loop drawings, from design details contained in the 3D model (reducing engineering time required in a 2D environment); and integrates sparing and logistics data with the existing SAP logistics modules (reducing the staff hours required to make the newly installed equipment/system operational). Second, the use of a geolocated equipment design process reduces construction interferences that occur into a 2D design for effective reviews for safety, operability, and maintainability perspectives. Thus, the ensuing 3D product maximizes productive use of engineering resources, minimizes design errors, and allows easier information integration into existing data systems resulting in a more resource conscious operational mode.

The SPR revised the plan and schedule for the LE2 project EVMS system. DOE Order 413.3B requires EVMS certification prior to approval of CD-2, *Approve Performance Baseline*, and CD-3, *Approve Start of Construction*. The M&O contractor is preparing for the EVMS certification by conducting self-reporting and training of Cost Account Managers (CAMs). Through this process, the PMO is working with the DOE Headquarters' Office of Project Management, which provides independent oversight of the project. The SPR PMO expects to achieve EVMS certification by mid-2021. Achieving EVMS certification is a major milestone for the LE2 project.

[7] SmartPlant is an advanced design software used for streamlining the engineering design process. It is widely used for plant and piping design. The software gives designers to create 3D models quickly and easily for piping, electrical, and instrumentation designs.

VIII. Petroleum Acquisition

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 performance of a comprehensive market assessment prior to initiation or continuation of any oil fill activities that SPR acquisition activities will not unduly affect current market conditions.

Crude Oil Inventory Status

As of December 31, 2019, the SPR's crude oil inventory was 634.9 MMbbl, a decrease of 14.2 MMbbl from the previous year. The net decrease resulted from Congressionally-mandated sales.

Fill of Reserve

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

- **Table 2 Year-End Inventories and Oil Fill History,** lists year-end inventories and average daily fill rates for the years 1977–2017 (by FY and CY);
- **Table 3 Crude Oil Receipts (As of December 31, 2019),** lists crude oil receipts by country of origin since 1977; and
- **Table 4 Crude Oil Inventory (As of December 31, 2019),** 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)
2019	644.8	(41.6)[16]	634.9	(38.9)[17]

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
16. FY19 Mandatory Sale, FY19 Modernization Sale
17. FY19 Modernization Sale, FY20 Mandatory Sale

Table 3. Crude Oil Receipts (As of December 31, 2019)

Source Country	Cumulative (MMbbl)	Percent of Total (%)
Mexico	266.3	30.8
United Kingdom	193.9	22.5
United States*	116	13.4
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	1.8
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**	863.6***	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, 2019)

Storage Site	Inventory (MMbbl)		
	Sweet*	Sour**	Total***
Bryan Mound, Brazoria County, Texas	66.6	163.6	230.2
Big Hill, Jefferson County, Texas	62.5	81.2	143.7
West Hackberry, Cameron Parish, Louisiana	102.2	87.1	189.3
Bayou Choctaw, Iberville Parish, Louisiana	18.9	51.8	70.7
Subtotal Underground Inventory	250.2	383.7	633.9
Tanks and Pipelines	0.1	0.9	1.0
Total Inventory	250. 3	384.6	634.9
Total Accounts Receivable	0.0	0.0	0.0
Total SPR Book Inventory	250.3	384.6	634.9

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

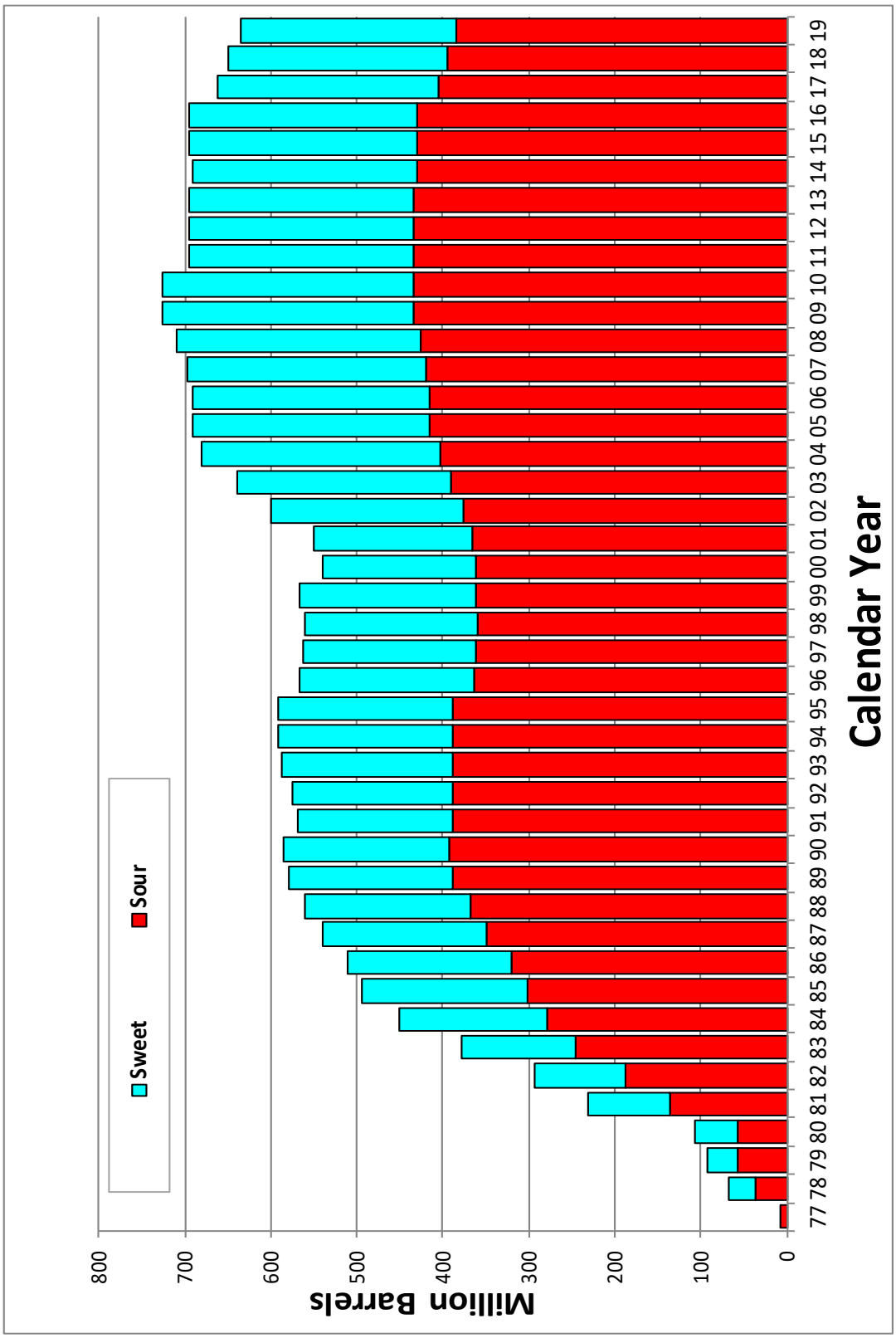


Figure 3. Cumulative Oil Fill

IX. Emergency Response Capabilities

Sale of Oil

Section 161 of EPCA gives authority to the President under specified conditions to direct the Secretary of Energy to conduct a public sale of oil from the SPR. The SPR PMO awards contracts based on the best value to the government.

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 use in SPR sales contracts. The first step in the process is to issue a Notice of Sale identifying the volume, characteristics, and location of the petroleum for sale. The Notice of Sale also provides delivery dates and the requirements to successfully submit offers, as well as measures required for assuring performance and financial responsibilities.

During a drawdown, the SPR PMO may issue multiple Notices of Sale using a web-based automated oil sales and evaluation 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 possible 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 offer evaluation process provides for offerors who bid the highest prices to determine the transportation methods, up to the limits of the distribution system. Negotiations on specific delivery arrangements to the SPR happen later in the process.

Within five business days of notification, all "apparently successful offerors" must 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 the 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 SPR PMO invoices the purchaser 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[8]

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 the design drawdown rate, the SPR can draw down crude oil at an initial rate of 4.415 MMbbl/d[9] for a period of 90 days. After this period, the drawdown rate gradually decreases as site inventories reduce and the declining number of caverns containing crude oil becomes a constraint. The actual drawdown rate may be substantially lower than design drawdown rate due to downstream considerations, such as possible limitations on the market's ability to accept oil, at a given moment in time, or capacity limitations on non-DOE owned infrastructure limitations.

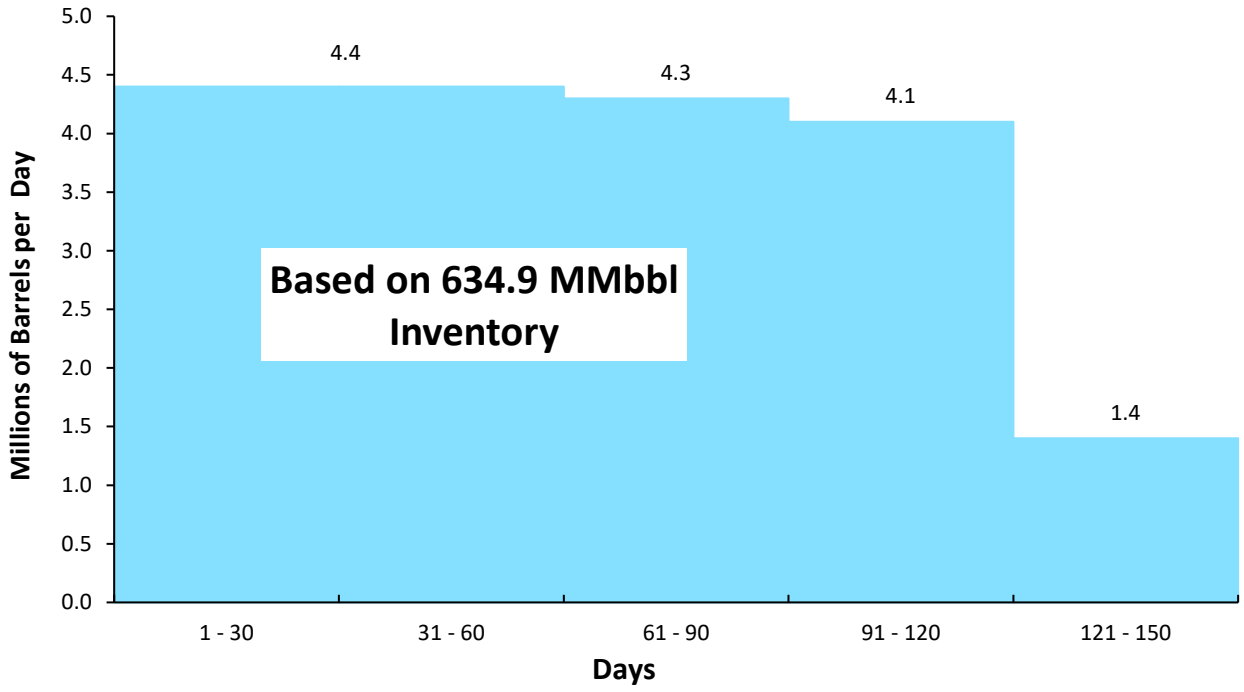
Table 5. Crude Oil Streams (As of December 31, 2019)

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	

[8] This 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.
[9] Current sustained drawdown capability is reduced to 4.22 MMbbl/d due to unavailability of Bryan Mound Tank 2 pending repairs.

Figure 4 illustrates the SPR's design drawdown capabilities during 2019, with an inventory of 634.9 MMbbl.[10]

Figure 4. Design Drawdown Capability
(As of December 31, 2019)



[10] Design drawdown capability is temporarily reduced to 4.22 MMbbl/d due to unavailability of a storage tank at Bryan Mound that is used during drawdown.

Drawdown Readiness Activities

The SPR drawdown readiness assurance activities performed during CY 2019:

- The Drawdown Readiness Review Program requires and monitors quarterly drawdown readiness. The SPR PMO conducted four reviews in 2019, confirming preparation of all sites and systems for an SPR crude oil drawdown or exchange.

- On a quarterly basis as a part of the Drawdown Readiness Review Program, the SPR PMO publishes Readiness and Capability (RECAP) and SPR Exchange Readiness and Capability (SPREX-RECAP) Reports, 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 collects data to support readiness status. The STE program involves a tabletop exercise at each site every year and a dynamic site test performed when directed. In 2019, the SPR conducted tabletop exercises at the Big Hill, Bryan Mound, and Bayou Choctaw sites. DOE approved a dynamic oil sale movement exercise in lieu of a tabletop exercise at West Hackberry. Further explanation of these exercises follows:

    - The Bryan Mound site conducted a tabletop Recovery Program Exercise (RPX) on February 20, 2019. 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 February 4, 2019, and continued for 30 days and successfully demonstrated that a rate of 1,275 Mbbl/d could be maintained as per the tabletop plan with our RPX recovery equipment.

    - At West Hackberry, rather than conducting a planned tabletop STE, DOE approved accepting documentation of an actual Mandatory oil sale movement This provided a realistic exercise which tested the SPR's capability to meet a 13-day notice for emergency drawdown. The oil sale movement successfully delivered 200,024 barrels of crude oil to the Lake Charles Meter Station and accomplished the goals of the planned exercise.

    - The Bayou Choctaw site conducted an administrative tabletop exercise on April 23, 2019. This exercise simulated a drawdown within two delivery groups: 1.5 MMB of sour crude oil delivered to Placid Refinery in five 300 Mbbl batches at a rate of 192 Mbbl/d for 15 days, April 23–May 7; and 3.0 MMB of sour crude oil delivered to St. James marine terminal in six separate 500 Mbbl batches at a rate of 480 Mbbl/d for 15 days, May 7–May 21. All tabletop planned goals were successfully met.

- The Big Hill site conducted a tabletop exercise on August 21, 2019. This exercise simulated a drawdown within two delivery groups: 4.9 MMbbl of sweet crude oil delivered to Boston Marathon, NYC Marathon in seven separate 700 MB batches at a rate of 41,667 Mbbl/d delivered to Nederland Terminal, August 1-7; and 4.0 MMB of sweet crude oil delivered to Phillips 66 in eight separate 500 MB batches at a rate of 20,833 BPH delivered to Beaumont Terminal during 15 days, August 1-15. All tabletop planned goals were successfully met.

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. Though several other regions of the country have emerged as significant supply centers, the Gulf Coast remains a major refining and trans-shipment destination for crude oil. As a result, the use of oil distribution infrastructure has changed significantly. 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 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 with reversal of the Seaway Pipeline's flow direction. The Seaway Pipeline now flows from Cushing, Oklahoma, to Freeport, Texas. In December 2013, Shell reversed a section of one of the 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. The flow of oil eastward now connects the SPR to refineries previously unable to receive pipeline deliveries from the SPR. Refineries along the Mississippi River, such as Valero Meraux, Shell Norco, and P66 Alliance can now receive pipeline deliveries from the SPR.

At the beginning of CY 2019, commercial pipeline systems connected the SPR to about 56 percent of the refining capacity in the United States. That connection covered 43 refineries, which processed approximately 57 percent of crude oil imports to the United States during CY 2018 (final CY 2019 data will not be available until the late summer of 2020). Remarkably, while connections to individual refineries have changed, the total number of 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.

Due to changing market conditions, the Capline pipeline was shut-in during the middle of CY 2019, to begin the process of reversing the flow direction from northbound to southbound. As a result of this decision by the pipeline owners, the SPR will lose pipeline connectivity to nine Midwestern refineries out of the total 43 refineries mentioned above. Southbound Capline

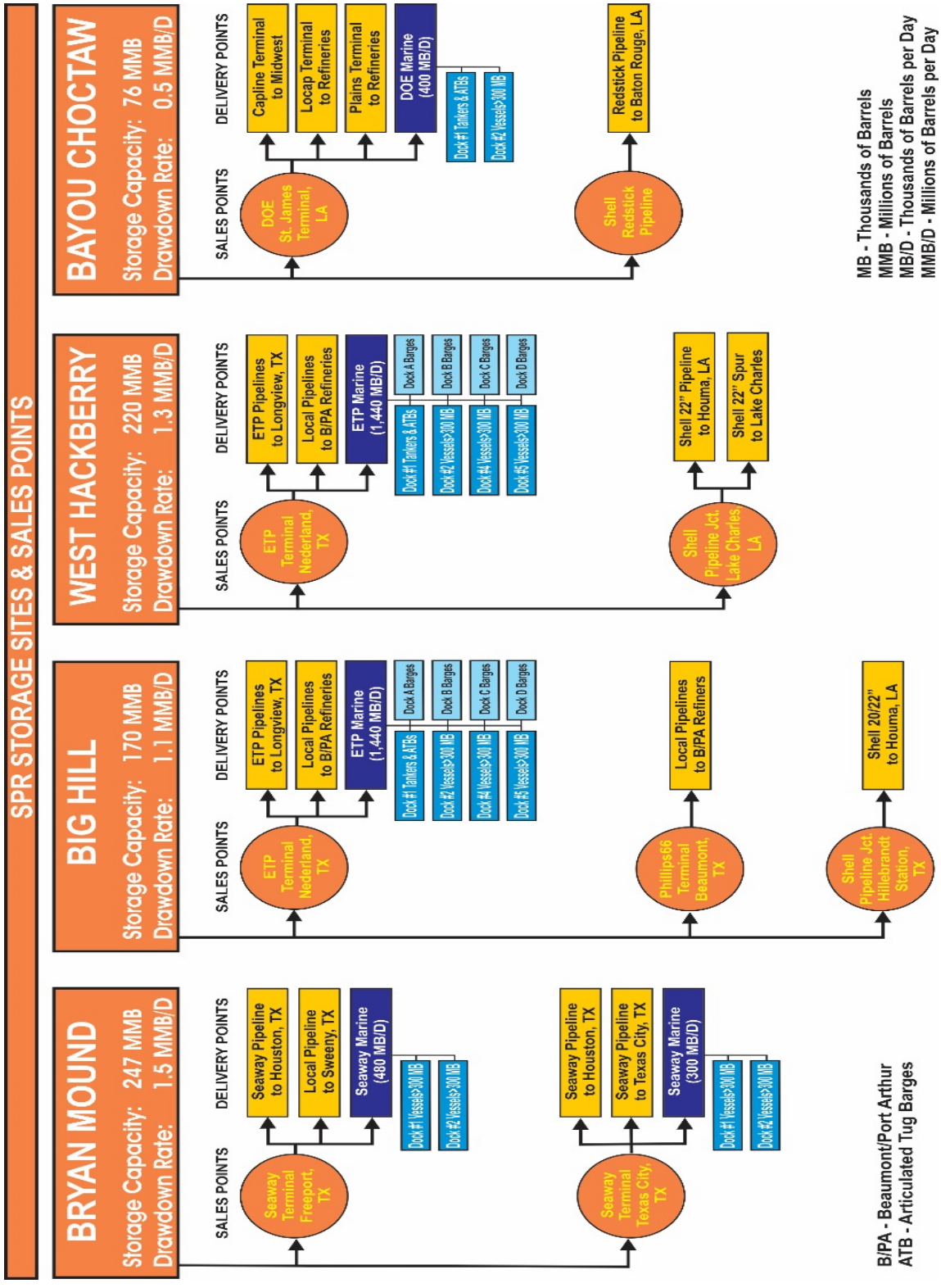
operations, originating in Patoka, Illinois and ending at the Capline terminal in St. James, Louisiana, will commence in 2021.

The SPR also connects to three marine terminals that have a combined contracted marine distribution capacity of 2.220 MMbbl/d, and it owns one marine terminal (leased to Shell in 2019, with EMPCO taking over the lease at the beginning of 2020) with a distribution capacity of 400 Mbbl/d. These marine terminals are: Seaway Terminal (Enterprise Products), Freeport, Texas; Seaway Terminal (Enterprise Products), Texas City, Texas; Energy Transfer Terminal, Nederland, Texas; and the DOE-owned, St. James Terminal, St. James, Louisiana.

Figure 5 illustrates the SPR's pipeline and marine distribution capabilities.

The crude oil pipeline from Bryan Mound to Seaway Terminal (Jones Creek) is temporarily out-of-service due to water undermining the soil beneath the pipeline. The undermining occurred at the pipeline's Brazos River crossing during Hurricane Harvey in August and September 2017. Repair method selection and design are ongoing. This DOE-owned pipeline is currently leased to EMPCO who is responsible for the repair. Expected completion is FY 2021.

Figure 5: Pipeline and Marine Design Distribution Capabilities



Distribution Assessment

The SPR performs an annual distribution assessment based on established technical and performance criteria. The assessment evaluates the SPR's crude oil distribution system capabilities to: a) for adequate connections to the commercial distribution systems, and b) identify the need for any remedial plans. The *2019 Distribution Assessment Report, November 2019*, evaluated the SPR's distribution capability at a sustained drawdown rate, in order to replace oil imported in the base year (2018) and, for future years (2020, 2025, 2030, 2035, and 2040). Calendar Year 2018 is the base year due to the timing of the annual distribution report completion, which relies on the most recently finalized refinery oil import demand data (CY 2018) as well as CY 2018 petroleum data from EIA's most recently published 2019 Annual Energy Outlook.

Established Level I Technical and Performance Criteria[11] for the SPR's distribution capabilities requires that the physical distribution system infrastructure—both DOE-owned and commercial—are capable of distribution rates exceeding 120 percent[12] of the combined site drawdown rates to provide sufficient allowances for terminal operational delays and commercial demand variances. The SPR measures performance in this area via the Distribution Capability performance measure.[13] 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 using 100 percent of contractual terminal services to move oil from the DOE pipelines to contracted marine terminals, the St. James marine terminal or to third-party pipelines via the contracted terminal's existing connections. As stated previously, such an assumption is unlikely to reflect actual distribution capability during an emergency oil disruption event.

[11] Establishes the SPR top-level technical and performance criteria for design, construction, performance, and testing.

[12] "The Strategic Petroleum Reserve, A Report on the Capability to Distribute SPR Oil," National Petroleum Council (December 1984), states: "A level of [distribution] redundancy of approximately 20 percent was assumed as an allowance for refinery demand variances, terminal operation delays, and other factors."

[13] The Distribution Capability performance measure is calculated using 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.

Base-Year Assessment

The base-year assessment indicates that none of the three SPR crude oil distribution systems were compliant with Level I Performance Criteria. The distribution system has enough capacity to meet disruption levels as have been experienced in the past. The Level I Performance criteria for the aggregated total SPR has remained below 120 percent for five years in a row, as a result of petroleum infrastructure additions by the private sector, commercial pipeline reversals, and the resulting marine terminal and pipeline congestions. Table 6 provides the performance measures for the base and previous year.

Table 6: Base-Year Distribution Assessment

System	Sustained Drawdown Rate (Mbbl/d)	Physical Distribution Capability (Mbbl/d)	Performance Measure As of 12/31/2018	Performance Measure As of 12/31/2017
Seaway	1,500*	1,444	96%	106%
Texoma	2,400	2,337	97%	99%
Capline	515	602	117%	141%
Total	4,415	4,383	99%	106%

Mbbl/d = Thousand Barrels per day

* Current Bryan Mound maximum sustained drawdown capability is reduced to 1,350 Mbbl/d due to needed repair to above ground storage tank.

Future Year Assessments

For future years 2020, 2025, 2030, 2035, and 2040, the SPR performed an assessment from the 2018 perspective using the U.S. petroleum refining supply and demand projections from the Energy Information Administration's *Annual Energy Outlook 2019*. One of the key issues facing the SPR is the Congressionally-mandated sale of approximately 300 MMbbl of crude oil between FY 2017 and FY 2028 and the impact of these sales on drawdown rates and final configuration of the SPR storage sites. At that point in time (2028), due to reduced inventory within the caverns at each operational storage site, the maximum drawdown rate will be below 4.415 MMbbl/d. At this time to determine a rate is problematic based on the crude oil types (sour or sweet) and the amounts sold of each type. Using the *Annual Energy Outlook 2019* projections for U.S. petroleum imports as a starting point, the Distribution Assessment, concluded that the distribution capability of the SPR falls below Level I Performance Criteria in the out years, for the Seaway and Texoma systems. Only Capline's performance measures are

likely to increase above 120 percent in the latter part of the forecast.[14] The SPR's Level I performance measure for distribution is an important indicator of whether physical barriers exist to the distribution of SPR crude oil. Table 7 provides the performance measures by distribution system for each forecast period.

Table 7. Forecasted Performance Measures

System	2020	2025	2030	2035	2040
Seaway	77%	105%	79%	86%	90%
Texoma	89%	70%	82%	89%	112%
Capline	79%	91%	106%	126%	132%
Total	84%	83%	85%	94%	108%

International Energy Program Requirements

The United States, as a member of the International Energy Agency (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. The United States has been in compliance with since inception by maintaining stocks of crude oil in reserves that are equivalent to 90 days of net oil imports.

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 the share of total IEA oil consumption. For the United States, this share was 41.6 percent as of March 2020.

X. Commercial Activities

Commercial Leases

By design and purpose, the SPR's infrastructure is for emergency use. In between periods of emergency use, SPR's infrastructure in under-utilized. The SPR has commercialized under-utilized crude oil distribution facilities to be more cost-effective, at present leased three crude

[14] Due to increased refinery oil import demands relative to the Capline System's drawdown rate, which is much smaller than the drawdown rates of the Seaway and Texoma Systems.

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 go to the U.S. Treasury.

Bayou Choctaw Pipeline: In 2019, lease revenue totaled approximately $164,544. In the early 1990s, the SPR determined that leasing the Bayou Choctaw pipeline would be advantageous to the U.S. 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 2019 totaled $5.5 million, with a maintenance cost avoidance of $500,000 per year. The initial term of the lease was through April 13, 1998, with automatic annual lease renewals thereafter until December 2019. In May 2017, the SPR PMO negotiated a two-year lease extension for modernizing the St. James Marine Terminal in anticipation the Bayou Choctaw Pipeline and St. James Marine Terminal would revert to government maintenance and operations. This did not happen, and in September 2018, the SPR PMO released new lease solicitations for the Bayou Choctaw Pipeline and the St. James Marine Terminal. An award notice to the successful lessee, EMPCO, of both the pipeline and marine terminal, was made in June 2019. The lease agreements with EMPCO, effective January 1, 2020, are for ten years with two five-year options. Shell Pipeline supported the lease transition up to December 31, 2019, when the lease expired.

St. James Marine Terminal: In 2019, St. James Marine Terminal lease revenue was $2 million. Shell Pipeline Corporation won the right to lease the terminal on January 31, 1997, on a revenue-sharing basis. In June 2019, EMPCO won a new lease contract effective January 1, 2020, for ten years with two five-year options. Shell Pipeline supported the lease transition up to December 31, 2019, when its lease expired.

Bryan Mound Pipelines: In 2019, lease revenues totaled $3,229,584. EMPCO leased two of the three Bryan Mound pipelines on January 14, 1999, and 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 extends for a term of ten years and that will expire on May 31, 2030. The extension supports the lessee time for repair and replacement of the Bryan Mound to Jones Creek pipeline, removal of the damaged pipeline segment and mitigate any potential loss of revenue.

Commercial Revenues

During CY 2019, receipts to the General Fund of the U.S. Treasury from the commercial leases of the SPR's distribution facilities and pipelines totaled $5,394,128. Table 8 summarizes commercial revenues from 1996–2019.

Table 8. Summary of Commercial Revenues (December 31, 2019)

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	2,523,452	0	182,535	2,000,000	4,705,987
2019	3,229,584	0	164,544	2,000,000	5,394,128

XI. Budget and Finance

With enactment of the Energy and Water, Legislative Branch, and Military Construction and Veterans Affairs Appropriations Act, 2019 (Public Law 115-244) Congress appropriated $235 million for the SPR, which included $29 million for the Northeast Gasoline Storage Reserve (NGSR). Congress appropriated an additional $10 million to the SPR Petroleum Account for the cost associated with conducting crude oil sales.

Appropriations through Fiscal Year 2019

Over the history of the SPR, Congress has appropriated a total amount of $24.9 billion, net of sales and transfers, for the SPR through FY 2019. Table 9 describes the distribution of this annual appropriation.

Table 9. Appropriations for Storage Facilities Operations and Management and Petroleum Account* (As of December 31, 2019)

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		(2,000,000)	
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			156,637	
2002	0	154,009			170,880	

2003	**1,955**	**157,823**			**173,687**	
2004	**0**	**155,044**			**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**	**0**	**269,116**	
2019	**10,000**	**209,026**	**25,974**	**0**	**245,000**	

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 $194,914 for operations, $29,000,000 for NGSR, and $8,716 for disaster recovery.

Strategic Petroleum Reserve Account and SPR Petroleum Account

The Strategic Petroleum Reserve 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 2019 totaled approximately $197.2 million. From this amount, $21.4 million funded federal program management, and $175.8 million funded contractual goods and services to operate and maintain the SPR. Additional obligations for the NGSR's storage costs and administrative oversight totaled $18.2 million. Obligations for SPR Petroleum Account oil sale charges totaled $10 million.

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 incremental costs of withdrawing oil from the storage caverns and transporting it to the point where purchasers take title. Receipts from the sale of oil go to the U.S. Treasury (except for receipts from crude oil sales conducted in

accordance with Section 404 of the Bipartisan Budget Act of 2015, which go to the ESIM Fund as mandated by law), and an equal amount of mandatory budget authority is created in the SPR Petroleum Account for emergency sales conducted under Section 161 of the EPCA.

On April 15, 2014, the Secretary of Energy authorized establishment of the Northeastern Regional Refined Petroleum Product Reserve, now identified as the Northeast Gasoline Supply Reserve (NGSR), as a component of the SPR. The purpose of the NGSR is to mitigate market disruptions in the Mid-Atlantic and New England coastal areas resulting from natural disasters. After establishment of a Congressional Control Level, the Office of Management and Budget apportioned $235.6 million in late June 2014 (receipts from an SPR test sale) to establish the NGSR.

For FY 2019, the capitalized cost of the crude oil in the SPR was $19.3 billion, with an average cost per barrel of approximately $29.95 (excluding storage costs) in accordance with Federal Accounting Standards. Inflated to 2019 dollars, the average cost per barrel is $63.19.

Through use of a Royalty-in-Kind (RIK) program, established by the Department of the Interior 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 the Department of Interior (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

* In coordination with Minerals Management Service, DOE completed a total DOE-RIK program reconciliation (1999–2009) in CY 2009,

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 2019, the SPR tracked five critical performance measures as part of the SPR Annual Operating Plan, in accordance with statutory requirements in the Government Performance and Results Act (GPRA) of 1993 and the GPRA Modernization Act of 2010. Table 11 reflects a complete accounting of the Office of Petroleum Reserves' performance measures**.**

Table 11. SPR Critical Performance Measures

Performance Measure	FY 2018 Actual Performance	FY 2019 Target Output	FY 2019 Actual Performance
Average Annual 90-Day Drawdown Rate	4.11 MMB/Day	4.13 MMB/Day	4.15 MMB/Day
Calculated maintenance performance appraisal report rating	98.23	≥95 out of a possible 100 points	98.29
Operating cost per barrel of storage capacity	$0.247	≤$0.30 operating cost per barrel	$0.271
Multi-Year Oil Sales	N/A	Annual drawdown costs < 1.5 % of revenue earned	0.58%
SPR Modernization Project	N/A	≥ 0.85 on both Cost and Schedule Performance Index	Was not tracked and reported on in FY 2019, since the metric derives from the Earned Value Management System (EVMS) that has not yet been certified by the Office of Project Management.

XII. Other Program Activities

Congressionally-Mandated SPR Crude Oil Sales

The SPR successfully carried out two sales in CY 2019 with the second sale in the final quarter of CY 2019 meeting requirements for FY 2020.

Earlier in CY 2019, the SPR conducted a crude oil sale in accordance with Section 404 of the Bipartisan Budget Act of 2015 (Public Law 114-74). Section 404 authorizes the Secretary of Energy to draw down and sell crude oil in an amount up to $2 billion during FYs 2017–2020 and deposit it into the Energy Security and Infrastructure Modernization (ESIM) Fund in order to carry out an SPR modernization program.

A Notice of Sale was issued for the FY 2019 ESIM Sale on February 28, 2019, and resulted in 72 bids from ten companies. Twelve bids were accepted from three companies for a total volume of 4.43 MMbbl. Deliveries commenced on April 20, 2019, and completed on May 15, 2019. The SPR provided a total of 4.31 MMbbl [15] over 14 deliveries. Collections for the sale totaled $306,540,229. The SPR deposited $299,999,961 of revenue into ESIM Fund and $6,540,268 of revenue to the U.S. Treasury for the Cures Act. The SPR allocated a total of 92.7 Mbbl of the 4.31 MMbbl delivered to the 21st Century Cures Act sale.

Northeast Gasoline Supply Reserve

The NGSR, a 1 MMbbl stock of gasoline, consists of contracted storage at multiple facilities in the New York Harbor area; the greater Boston, Massachusetts area; and the greater Portland, Maine area. Contracted storage became necessary because the SPR does not own storage facilities suitable for the storage of refined petroleum products. The previous Administration determined in 2014 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 are comparable to the benefits from a similar action undertaken under Title I, Part B of the statute. That Administration also determined the availability of funds in the SPR Petroleum Account would facilitate 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 provides higher product quality, because unlike crude oil, refined products require periodic turnover for strict quality specifications.

The Northeast region of the United States heavily depends on product supplies from the Gulf Coast, as well as local refining and imports. Yet even though SPR crude oil stored along the Gulf Coast helps to mitigate the impacts of crude oil supply interruption(s), vulnerabilities elsewhere in the supply chain could still result in significant regional disruptions. Thus, the establishment

[15] There were 92,678 additional barrels received Funds from those barrels were applied to the FY19 Congressionally-mandated sale. A slight difference between sold and delivered always exist.

of a regional product reserve closer to the point of consumption helps to mitigate the impact of short-term disruptions as stakeholders resolve issues with the larger supply chain (from crude oil refining through product distribution to consumers).

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 for 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. The contractors must also make available specific facilities in the event a release becomes necessary, including the ability to meet the government's release requirements in the aftermath of an event without commercial electric power. In addition, the contractors must 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 never been used for its intended purpose, namely, to supplement gasoline supplies to consumers affected by supply disruptions in the Northeast. The SPR PMO renewed the NGSR contract in FY 2019, with three 1-year options, which will carry the NGSR through CY 2022 assuming exercise of all option years.

The new NGSR contract distribution is as follows:

Buckeye Terminals LLC: Raritan Bay, NJ	700,000 bbl
Buckeye Terminals LLC: South Portland, ME	100,000 bbl
Global Partners LP: Revere, MA	200,000 bbl

The NGSR has been proposed to be sold by the Administration because it is expensive and does not adequately meet its designed purpose. With only 1 million barrels, the volume is less than 1 day of average gasoline consumption in the Northeast. Yet it still costs approximately $20 million annually to maintain. Since it was created in 2014, the NGSR has never been used.

Quality and Performance Assurance

The SPR conducted oversight activities per DOE procedural requirements. These activities included on-site management appraisals, technical assessments, security surveys, 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 Environment, Safety, and Health; Safeguards and Security; Cyber Security; and Emergency Management. Additionally, an expansion of CAS now covers Finance, Human Resources, Property and Facilities, Procurement, Cavern Integrity, Data Systems, M&O, Engineering, Internal Audit, and LE2.

Additionally, the Quality and Performance Assurance Division (QPAD) conducted a technical assessment on the M&O contractor's self-assessment program. This organizational assessment evaluated the M&O's effectiveness in executing a self-assessment program capable of fulfilling the requirements of ISO 9001: 2015, as well as DOE and FFPO programmatic control documents.

QPAD personnel performed seven inspections, or site surveillances, in 2019 and documented them in Technical Assurance Surveillance Reports. These included inspections at the SPR sites and supplier/vendor facilities. These inspections contributed to all M&O activities and procedures meeting contractual requirements.

QPAD personnel also 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 2019. Each organization performed oversight activities in accordance with these plans and reported quarterly status to QPAD. Meanwhile, QPAD personnel conducted analysis and provided a roll-up status report to the Project Manager each quarter.

The oversight of the critical few performance measures included 16 objective processes and 14 LE2 measures. A subject matter expert (SME) assessed each measure to verify the M&O contractor's performance based on agreed to objectives. QPAD then performed an independent assessment to validate the subject matter expert's due diligence. The Performance Fee Board then received both positive and negative results via a summary report from the board secretary. With this information the Project Manager and the Performance Fee Board chairperson were able to determine appropriate fee distribution to the M&O contractor.

Additionally, the SPR's Quality Council monitored the activities of three process improvement teams. The first team worked to implement methods to collect and document the unique knowledge and experiences of SPR personnel. The second team investigated the necessity to update and modernize SPR Oil Sale Procedures and Processes. The third team worked to improve the SPR's ability to collect and trend root cause data, and to effectively apply a risk assessment methodology to all SPR identified non-conformances.

Vapor Pressure Mitigation

The SPR completed reassembly and commissioning of the portable degasification plant (stored at the Bryan Mound facility since 2011) at the West Hackberry site in 2014. Operation of the West Hackberry degas plant started August 27, 2014, and continued through October 2018 with the degassing of 15 of 22 West Hackberry crude oil storage caverns.

The SPR PMO recognized a need in 1992 for a continuous vapor pressure-mitigation program based on 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 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, gasses encapsulated in the salt release and absorb 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 the release of gas into the atmosphere in amounts that may pose environmental, safety, and health risks.

The degas plant removes excess gasses from the crude oil for sale and distribution to customers with a greatly reduced potential for emission of volatile organic compound (VOC) ozone precursors, benzene, and hydrogen sulfide (H_2S). The degas plant reduces the VOCs in the vapors of treated oil by 97 percent. Specifically, given life-cycle VOC emissions from the plant averaging about 2 tons per year, emissions from a single full-scale drawdown of degassed oil would lead to a reduction of 77,000 tons of VOCs, or 1,900 times the pollutants generated from operation of the plant over the entire 25-year life cycle.

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 (EMS) certification. Since November 2018, the SPR successfully maintained ISO 14001:2015(e) Standard certification by means of a third-party recertification audit, certification was valid through 2021. In November 2019, the SPR account maintained EMD audit compliance with the same third-party auditor.

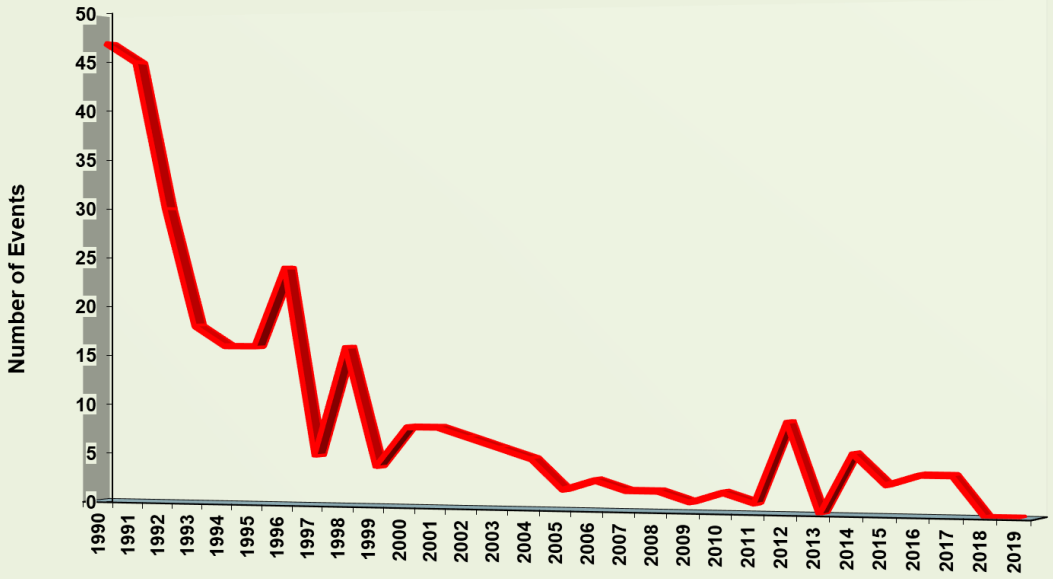
Environment, Safety, and Health

In CY 2019, the SPR had a Total Recordable Case Rate of 0.61 and a Days Away/Restricted/ Transferred Rate of 0.20.[16] These low accident rates positioned all four SPR storage sites to continue participation in OSHA's Voluntary Protection Program (VPP). The VPP program is OSHA's official recognition that the employers and employees at a site have built an exemplary occupational safety and health system and maintain injury and illness rates below the averages for the respective industry. The Big Hill and Bayou Choctaw storage sites each received an additional VPP award, the "Star of Excellence", for achieving incident rates at least 90 percent below the national average.

Figure 6 shows the SPR's performance for reportable environmental incidents from 1993–2019. During CY 2019, there were zero reportable project events or reportable releases to the environment at the SPR.

[16] The TRC Rate is a metric used by OSHA to quantify the number of recordable occupational injuries and illnesses per 100 full-time employees. The DART Rate is a metric used by OSHA to quantify the number of days away from work, days of restricted work activity, and days of job transfers caused by occupational injuries and illnesses per 100 full-time employees.

Figure 6: Environmental Reportable Events 1990–2019



Pollution Prevention

The SPR sets fiscal year goals for hazardous solid waste, non-hazardous solid waste, and Construction and Demolition (C&D) waste generated at sites. Waste diversion is the prevention and reduction of generated waste. The SPR achieves waste diversion in several ways, including source reduction, recycling, and/or reuse.

Hazardous Waste

SPR met the FY 2019 goal to divert at least 50 percent of hazardous solid waste generated with a diversion rate of 100 percent.

Non-Hazardous Waste

The SPR team continued efforts to reduce municipal solid waste by diverting 82 percent of non-hazardous solid waste during FY 2019. The goal was to divert at least 50 percent of non-hazardous solid waste. In FY 2019, the SPR team also continued the strategy to reduce municipal solid waste sent to landfills, which in turn helps achieve DOE greenhouse gas reduction targets.

Construction and Demolition (C&D) Debris

The FY 2019 goal was to divert at least 50 percent of C&D waste generated. The SPR diverted 21 percent. The SPR project did not achieve the C&D goal because a significant number of wooden mats used during a construction project at the Bryan Mound site were destroyed and not recycled.

Exploration and Production (E&P)

Although there are no specific goals established for exploration and production (E&P) waste generation or diversion, the SPR continued with the effort to recycle this waste stream whenever possible. During FY 2019, the SPR diverted 20 percent of E&P waste. 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. The SPR generated 16.5 million pounds more E&P waste in FY 2019 than in FY 2018. The increase in E&P waste came mostly from the closure of Pond 9 at the Big Hill site. The SPR excavated impacted solids from Pond 9 and hauled them off site for disposal.

Environmental Improvement Measures

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

The SPR sites perform periodic avian inventories and upload this data 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 Summit. The SPR recognized the 49th Anniversary of Earth Day in 2019 as an opportunity for employees to come together and make commitments to environmental sustainability and a global green economy. SPR employees created an Earth Day crossword puzzle and conducted a raffle to win a bird feeder and bird seed. Also, each site received tree saplings (dogwood, sourwood, and service berry) to give away to SPR employees. FFPO Environmental planted a tree at the New Orleans office on the Clearview side of the 850 building.

In 2019, the SPR participated in a Beta Test of the Federal Energy Management Program's (FEMP) Technical Resilience Navigator (TRN). For these efforts in 2019, the SPR program received the FEMP Director's Award through the Federal Energy and Water Management Awards Program.

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. The SPR conducted EAC meetings at the Bryan Mound site January 28–29, 2019, and at the New Orleans Project Management Office on July 29–30, 2019.

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. Protective Force personnel assist Emergency response team members 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 2019, the SPR completed and executed a Strategic Plan to secure drawdown capability, and to protect people, resources, and classified information.

During 2019, 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 team continues to strengthen a protection strategy by building relationships with local, state and federal law enforcement agencies, emergency response agencies and personnel. The SPR program also conducts both security and emergency management 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

The SPR continued to enhance safety and health systems throughout the complex during 2019. The Ergonomic Program achieved improvement by sending Industrial Hygiene Specialists and Safety Specialists for training as Certified Behavioral-Based Ergonomic Specialists. The new certification applies to both office and industrial ergonomic evaluations. Additionally, the ergonomic program saw enhancement by the development of a digital ergonomic assessment workflow. The workflow supported SPR employees in requesting online training of personnel to better track and schedule the assessments, and document and track recommendations. Since establishment of the workflow, FFPO has performed over 100 ergonomic assessments across the entire SPR. The Management in Action program focused initially on contacts between managers and employees. Leadership expanded it in 2016 to include first-line supervisors in the process. As a result of the enhancement, FY 2019 saw 1,143 Management in Action observations performed.

The SPR team also continued to strengthen involvement in the subcontracting selection process. The involvement in the subcontractor selection process is a proactive approach for reviewing performance of adequate risk assessments, and implementation of appropriate

hazard controls. This will be particularly important and a key factor during the SPR's LE2 project. This level of oversight will continue through contract closeout with documented lessons learned.

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 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 for similar tasks.

During CY 2019, a performance improvement team for lockout and tagout initiated rolling out a new software program to improve ease of use, strengthen energy control, and maintain consistency between the sites for all lockout and tagout procedures.

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 provide a self-evaluation to OSHA and DOE each year demonstrating continued improvement of the safety and health management system. The self-evaluation also includes 20 or more answers to specific questions about the in place Process Safety Management System. Recommendations for improvements made during each of the OSHA on-site assessments must be replicated at all sites. In 2019, all four sites maintained VPP certification, and the West Hackberry site successfully hosted an on-site OSHA assessment for continued acceptance in the VPP program. The Bayou Choctaw site plans to have an on-site assessment in 2020.

Accident Rates for the SPR

The SPR continued to improve the safety and health systems throughout the complex during CY 2019. The SPR had another safe year in CY 2019. The SPR maintained a low accident rate with a Total Recordable Case Rate of 0.61 and a Days Away/Restricted/Transferred Rate of 0.20 for CY 2019. The SPR storage sites are recipients of several awards for management quality, environmental stewardship, and safety management systems.

Integrated Safety Management

The SPR completed an annual Integrated Safety Management (ISM) System validation and documentation of performance in the *ISM System Annual Review and Update Report of 2019*. 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 2019, the SPR made improvements to the ISM System Description and Annual Report such as the addition of performance metrics and the inclusion of

program information. The organization analyzed each ISM Core Function to identify possible areas for enhancement. The SPR team briefed the Annual Report to a joint audience of DOE and M&O contractor personnel.

Annual Safety Summit and Tripartite Safety Council

The SPR team held the recurring annual Environment, Safety, and Health (ES&H) Summit in CY 2019. The ES&H Summit included briefings by the safety, health, and environmental departments of the M&O contractor, as well as the security contractor.

The SPR also conducted two Tripartite Safety Council meetings in CY 2019. The purpose of these council meetings was to give all SPR contractors' representatives an opportunity to address safety issues directly with the SPR Project Manager that had not yet achieved resolution through normal channels. Each SPR site, the security contractor, and the A&E contractor had representatives at the meeting. Action items from these council meetings get tracked through closure.

In 2019, the M&O contractor continued the Health, Safety, and Environment Week that began in 2015, conducting events at each of the SPR sites during the first week of May. After a kick-off by senior management televised from New Orleans, each of the sites conducted daily activities highlighting some environmental or safety topic with excellent employee participation. In New Orleans, there were lunch time 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, InfoPath Forms, and K2 workflow engine. The SPR team has developed and deployed more than 50 automated business processes that support timely and consistent task completion. In 2016, system changes included consolidation of several systems into one large data management SharePoint farm.

Data Security, Accessibility, and Resiliency

In 2019, the SPR program expanded the Alternate Data Center 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 support remotely accessible infrastructure, a significant number of portable computers and Smartphones, and robust backup communications to provide reliable performance in an emergency, essential for working remotely. Comprehensive mobile device management for laptops, smartphones, and tablets is in place to improve user access to SPR data. A secure extranet is in place to significantly improve collaboration with partners and external customers. Efforts also continue in the deployment of a wireless network infrastructure at the SPR storage

sites for site user participation in SPR automated business processes and have untethered access to SPR data. The SPR team implemented an enhanced cyber security program, using innovative approaches, tailored controls, and monitoring of the SPR operational environment. Per recommendation from the DOE Office of Enterprise Assessments' review, the SPR implemented a Privileged Account Management solution in September 2016. This solution improves the security of privileged accounts on the SPR network by requiring usage of multifactor authentication via a Personal Identity Verification card. The SPR conducted a cloud computing study first in 2014, and then reassessed it in 2016, to determine the best, and most cost-effective use of 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.

Awards and Certifications

During 2019, SPR received the OSHA Region VI Star Among Stars awards for performance at the Bayou Choctaw and Big Hill sites.

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 the 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 2019, FFPO maintained ISO 9001 and 14001 certifications and updated the 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 2019 American Fuel and Petrochemical Manufacturers annual meeting in San Antonio, Texas, during the second week of March 2019. The team also conducted additional meetings at the SPR offices in Washington, DC, and at some of the customers' corporate offices. Meetings with customers always have two primary functions: to gather customer information to improve the SPR's response capabilities and to update those customers on SPR activities. The customers provided valuable feedback and reported that the overall experience was excellent.

In order to maintain an accurate and current list of customer contacts, the SPR validated customer contact information and discussed updates on refinery activities, such as expansion plans and any planned or actual changes to crude oil inputs. Customers also discussed operational or administrative issues encountered when dealing with the SPR.

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

Real Estate Actions

During 2019:

- In 2019, Fluor Property Section and the Office of Asset Management conducted Facilities Information Management System validations for buildings, trailers, and other structures & facilities; DOE-owned land; DOE-archived assets; and DOE leases. FLUOR scored GREEN on all four validation scorecards.

- SPR secured an eight-year lease (five firm, three 1-year options) at 990 N. Corporate Drive Suite 100, New Orleans, Louisiana to support the LE2 Project employee workspace expansion.

XIII. Conclusion

The Office of Petroleum Reserves along with the SPR PMO continues to operate and maintain the SPR's emergency stockpile of crude oil in accordance with EPCA (42 U.S.C. § 6201, *et seq.*) in order to meet the primary mission of protecting the U.S. economy from severe petroleum supply disruptions. The SPR entered CY 2019 with 649.1 MMbbl of crude oil and ended with 634.9 MMbbl.

With a dedicated federal civilian workforce and an equally dedicated M&O contractor workforce, the SPR program is well positioned to continue the unique status as a protector of the U.S. economy, and in partnership with the International Energy Agency to act as a deterrent to rogue actors across the globe who seek to destabilize world oil markets.

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

Design 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 needed for site drawdown and refill operations. Two tanks are currently unusable due to a damaged internal floating pan. The unavailability of the tanks has reduced the site's actual design drawdown capability from 1.5 MMbbl/d to 1.35 MMbbl/d.

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

Design Drawdown Rate:	(Sour)	1,300,000 bbl/d
	(Sweet)	1,180,000 bbl/d*
Raw Water Pumping Rate:		1,400,000 bbl/d
Oil Fill Rate:		125,000 bbl/d**
Brine Disposal Rate:		225,000 bbl/d

* WH Sweet DD Rate currently reduced to 1,180,000 bbl/d due to Cav WH-105 conversion to Sour service (Deviation WH-D3-136 applies).

** WH Oil Fill Rate currently reduced to 125,000 bbl/d due to brine disposal well issues.

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

Design 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:		232,000 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 (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 (18) pumps totaling over 18,000 horsepower.

System Parameters

Design 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
bbl	barrel
bbl/d	barrels per day
CAS	Contractor Assurance System
C&D	construction and demolition
CY	calendar year
DOE	U.S. Department of Energy
DOI	U.S. Department of Interior
E&P	exploration and production
EAC	Environmental Advisory Committee
EPEAT	Electronic Product Environmental Assessment Tool
EPCA	Energy Policy and Conservation Act
EMPCO	ExxonMobil Pipeline Company
ES&H	Environment, Safety, and Health
ESIM	Energy Security and Infrastructure Modernization
FFPO	Fluor Federal Petroleum Operations
FY	fiscal year
H_2S	hydrogen sulfide
IEA	International Energy Agency
IEP	International Energy Program
ISO	International Organization for Standardization
JHA	Job Hazard Analysis
LED	light-emitting diode
LE2	Life Extension Phase 2
Mbbl	thousand barrels
Mbbl/d	thousand barrels per day
MMbbl	million barrels
MMbbl/d	million barrels per day
M&O	management and operations
NGSR	Northeast Gasoline Supply Reserve
OSHA	Occupational Safety and Health Administration
QPAD	Quality and Performance Assurance Division
RIK	Royalty-in-Kind
SPR	Strategic Petroleum Reserve
RECAP	Readiness and Capability
SPREX-RECAP	SPR Exchange Readiness and Capability
SPR PMO	Strategic Petroleum Reserve Project Management Office
STE	systems test exercise
VOC	volatile organic compound
VPP	Voluntary Protection Program

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