U.S. DEPARTMENT OF ENERGY

Strategic Petroleum Reserve Annual Report for Calendar Year 2015

Report to Congress
July 2018

United States Department of Energy
Washington, D.C. 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 2015*.

This report also includes details concerning the physical capacity, type, and quantity of petroleum in the Strategic Petroleum Reserve in 2015, 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 Michael R. Pence**
  President of the Senate

- **The Honorable Paul Ryan**
  Speaker of the House of Representatives

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

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

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

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

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

[1] Section 165 of the Energy Policy and Conservation Act (42 U.S.C. 6245), as amended.

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

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

- **The Honorable Maria Cantwell**
  Ranking Member, Senate Committee on Energy and Natural Resources

- **The Honorable Rodney P. Frelinghuysen**
  Chairman, House Committee on Appropriations

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

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

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

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

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

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

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

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

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

If you have any questions or need additional information, please contact Mr. Jake McCurdy, Office of Congressional and Intergovernmental Affairs, or Mr. Dwight Bolton, Deputy Assistant Secretary for House Affairs, Office of Congressional and Intergovernmental Affairs, at (202) 586-5450.

Sincerely,

Rick Perry

Executive Summary

Program Highlights and Status

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

The SPR entered 2015 with 691 million barrels of crude oil, and as of December 31, 2015, the SPR held 695 million barrels, equivalent to approximately 148 days of net U.S. petroleum imports, which is an increase of 4,159,551 barrels from 2014. The net increase resulted primarily from the acquisition of crude oil barrels delivered to the SPR following a 2014 test sale.

The SPR also maintained 1 million barrels of refined petroleum product stocks in multiple contracted storage facilities in the New York Harbor, greater Boston, Massachusetts, and greater Portland, Maine areas; these stocks comprise the Northeast Gasoline Supply Reserve, a component of the SPR.

Section 161(g)(6) of the Energy Policy and Conservation Act (EPCA) requires the Secretary of Energy to acquire petroleum products for the SPR within the 12-month period beginning after the completion of a test sale, to the extent that funds are available in the SPR Petroleum Account. In 2015, crude oil was purchased to replenish the volumes sold during a 2014 test sale, consistent with section 161(g)(6) of EPCA. During June and July of 2015, 4.2 million barrels of sweet crude oil were delivered to the Bryan Mound facility through the Seaway Jones Creek terminal.

The Consolidated and Further Continuing Appropriations Act, 2015 (Public Law 113-235) appropriated $200 million for the SPR. A total amount of $24.2 billion, net of sales and transfers, has been appropriated for the SPR from FY 1976 through FY 2015. Obligations for the SPR in FY 2015 totaled approximately $201.3 million. From this amount, $22 million was obligated for Federal program management. The remaining $179.3 million was obligated for contractual goods and services to operate and maintain the SPR and to conduct emergency drawdowns and sales, if required.

Section 402 of the Bipartisan Budget Act of 2015 (Public Law 114-74) required the Secretary to complete a long-term strategic review (LTSR) of the SPR and submit a report of the review to Congress. The LTSR assessed the ability of the SPR to carry out its energy security mission in the context of changing North American and global oil markets. DOE submitted the LTSR to Congress in August 2016.

In 2015, the SPR began the process of obtaining approval and funding to replace or upgrade site equipment and facilities that are approaching or have exceeded their 25-year life span. This project, known as the Life Extension II (LE2) Project, is part of the SPR Modernization Program. The LE2 Project is being conducted in accordance with DOE Order 413.3B, Program and Project Management for the Acquisition of Capital Assets, and received approval for Critical Decision 0, Approve Mission Need in October 2015. The LE2 Project's approved cost range is $700 million to $1.4 billion.

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, which tends to increase the crude oil vapor pressure. During a drawdown, oil that is delivered to storage tanks at terminals may release toxic and flammable gases at levels that can present environmental and health risks to terminal personnel and the public. The SPR mitigates the risks posed by toxic and flammable gases using a customized, portable degasification unit that reduces the crude oil vapor pressure in the caverns so that the crude oil can be delivered safely. The unit is moved among the SPR sites every 2-4 years, as necessary, to degas caverns that show high levels of vapor pressure.

The degas unit began a five-year program at the West Hackberry, Louisiana site in August 2014. Degasification of crude oil has continued since then with a process total of 45.60 million barrels in FY 2015. Processing of oil through the degas unit should be completed in the beginning of fiscal year 2019.

Environment, Safety, and Health

During calendar year (CY) 2015, the SPR had the safest year on record. The SPR's Total Recordable Case Rate was 0.58 cases per 200,000 worker hours, which significantly improved upon the SPR's goal of less than 1.40 cases per 200,000 worker hours. The Days Away/Restricted/Transferred Case rate was 0.23 cases per 200,000 worker hours, which was well below the SPR's goal of less than 0.90 cases per 200,000 worker hours. The SPR storage sites have received several awards for management quality, environmental stewardship, and safety management systems. In 2015, the SPR received two awards from the Occupational Safety and Health Administration's (OSHA) Voluntary Protection Program (VPP) Region VI: the Bayou Choctaw, Bryan Mound, and West Hackberry sites each received a Star of Excellence award, and the Big Hill site was recognized as a "Star Among Stars." A Star of Excellence award requires the site to have an incident rate of at least 90 percent below the national average, and the "Star Among Stars" distinction recognizes Region VI sites that have exceeded the performance needed to qualify for a Star of Excellence award.

STRATEGIC PETROLEUM RESERVE ANNUAL REPORT FOR CALENDAR YEAR 2015

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I. Legislative Language

The SPR was authorized by the Energy Policy and Conservation Act (EPCA) (42 U.S.C. 6201 *et seq*.), which was enacted on December 22, 1975 (Pub L. 94-163). The SPR has operated since that time in recognition of the long-term dependence of the United States on imported crude oil and petroleum products.

Section 165 of EPCA, as amended, requires the Secretary of Energy to submit an annual report to the President and the Congress on the activities of the Strategic Petroleum Reserve. Consistent with this statutory provision, this *Strategic Petroleum Reserve Annual Report for Calendar Year 2015* includes information on:

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

II. Program Mission

Introduction

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

As of December 31, 2015, the SPR contained 695 million barrels of crude oil. That inventory provides the equivalent of approximately 148 days of net petroleum imports based on 2015 average net U.S. imports of 4.711 million barrels per day (MMbbl/d). The United States relies on the SPR to fulfill its obligations under the international energy program.

Legislative Activity

Section 402 of the Bipartisan Budget Act of 2015 (Public Law 114-74) required the Secretary of Energy to complete a long-term strategic review (LTSR) of the SPR within 180 days after November 2, 2015, and to develop and submit to Congress a proposed action plan, including a proposed implementation schedule.

Additionally, three statutory provisions enacted in November and December 2015 will directly impact the SPR over the next decade and beyond:

Section 403 of the Bipartisan Budget Act of 2015, enacted on November 2, 2015, requires the Secretary of Energy (hereinafter "the Secretary") to drawdown and sell a total of 58 million barrels (MMbbl) of crude oil from the SPR over eight consecutive years, commencing in Fiscal Year (FY) 2018 and continuing through FY 2025.

Section 404 of the Bipartisan Budget Act of 2015 authorizes the Secretary to sell up to $2 billion worth of crude oil between FY 2017 and FY 2020 to fund a modernization program for the SPR. The volume of crude oil sold pursuant to section 404 in any given fiscal year is dependent on annual appropriation amounts as well as the price of crude oil at the time of delivery.

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 drawdown and sell a total of 66 MMbbl of crude oil from the SPR over three consecutive years, commencing in FY 2023 and continuing through FY 2025.

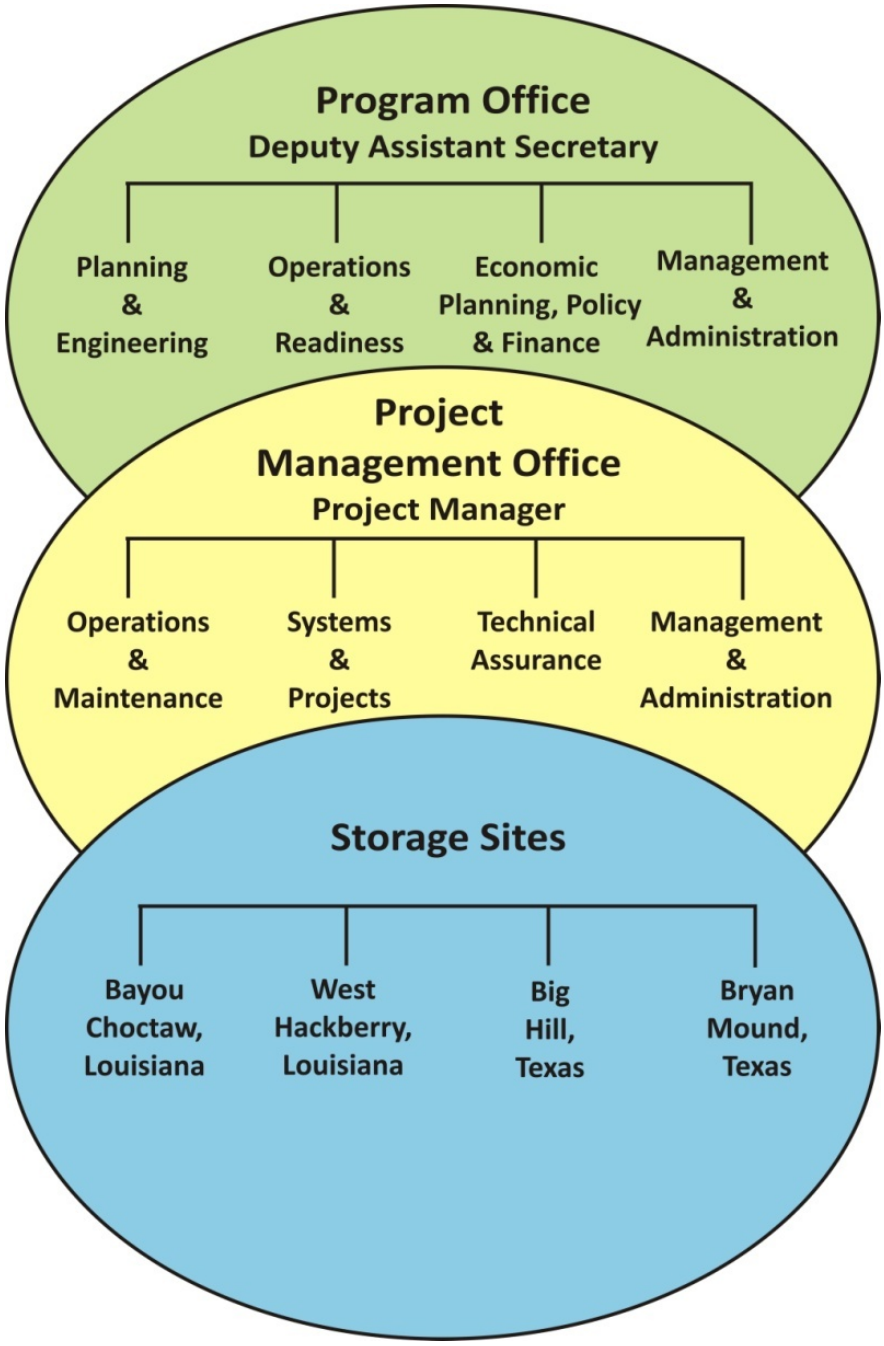
III. Program Management

Organization

The Assistant Secretary for Fossil Energy at DOE in Washington, DC has overall program responsibility for carrying out the SPR's mission and for monitoring the SPR's operational readiness capability. This responsibility is delegated to the Deputy Assistant Secretary for Petroleum Reserves and is exercised through the Program Office in Washington, DC and the SPR Project Management Office (PMO) in New Orleans, Louisiana. As of December 31, 2015, Program Office staffing was at 24 Federal employees and 16 contractor employees, while SPR PMO staffing was at 90 Federal employees and 526 contractor employees. Figure 1 depicts the SPR's organizational structure.

Figure 1

Strategic Petroleum Reserve Organizational Structure



Contractual Support

The PMO is responsible for the design, development, operation and maintenance of the SPR. Fluor Federal Petroleum Operations serves as the management and operating prime contractor, providing management and personnel to operate and maintain the SPR facilities and related systems. The period of performance for this contract is five years, which began on April 1, 2014, with five one-year options.

Vali Cooper International, a Service-Disabled Veteran-Owned Small Business, is an architectural and engineering firm under contract to provide design services for the four SPR storage facilities. The period of performance is three years, which commenced August 15, 2014.

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

Several support services contracts exist for management, technical, and information technology support. In 2015, the largest support services contractor was Performance Excellence Partners, a certified Small Disadvantaged Business that participates in the Small Business Administration's 8(a) Business Development Program, provided management and technical support. Performance Excellence Partners' contract concluded October 31, 2016.

Other support services contractors that provided support to the Program Office in Washington, DC in 2015 included PB Energy Storage Services, Inc., AOC Petroleum Support Services, LLC, and Cyborg, Inc.

Electrical power is provided to the four SPR sites by local utilities GEXA Energy LP, Reliant Energy Retail Services, LLC, and Entergy Louisiana, LLC.

The SPR holds contracts with three commercial facilities that provided terminal services for fill, drawdown, and storage of crude oil in 2015. SPR's contract with Sunoco Partners Marketing & Terminals, L.P. runs through 2018. SPR's five-year contract with Phillips 66 runs through September 2017. SPR's five-year contract with Seaway Crude Pipeline Company concluded December 1, 2016.

IV. Crude Oil Storage Program

Strategic Petroleum Reserve Storage Facilities

The SPR currently operates and maintains four major oil storage facilities in the Gulf Coast region of the United States. All oil stored in the SPR's facilities is in large underground caverns that have been created in salt dome formations. Salt dome storage technology provides maximum security and safety for the Nation's stockpile of crude oil, and it is also the lowest-cost technology for large-scale petroleum storage projects. The average operations cost for FY 2015 was $0.233 per barrel for management, staffing, operations and maintenance, and security of the SPR. This cost is substantially less than industry storage costs and most foreign petroleum oil reserves.

The SPR has two sites in Texas (Bryan Mound and Big Hill) and two sites in Louisiana (West Hackberry and Bayou Choctaw). These four SPR sites have a combined storage capacity of 714 million barrels and a maximum design drawdown capability of 4.415 MMbbl/D[2]. Table 1 shows the design storage capacity and design drawdown capability of each SPR site as of December 31, 2015.

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 pipeline systems has access to one or more major refining centers, interstate crude oil pipelines, and marine terminals for crude oil distribution. The locations of the SPR storage sites and their respective distribution systems are shown in Figure 2.

Table 1
Authorized Storage Capacity and Design Drawdown Capability
(As of December 31, 2015)

CURRENT SITE CAPABILITY			
Storage Facility	**Design Storage Capacity* (MMbbl)**	**Crude Mix Sweet/Sour (MMbbl)**	**Design Drawdown Capability (MMbbl/D)**
Bryan Mound	**247.0**	**71/176**	**1.5****
West Hackberry	**221.0**	**108/113**	**1.3**
Big Hill	**170.0**	**72/98**	**1.1**
Bayou Choctaw	**76.0**	**24/52**	**.515**
Total Program	**714.0**	**275/439 (39%/61%)**	**4.415[2]**

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

* Storage Capacities reflect Temporary Deviation (VA-D9-054) to minimize oil storage risks in Bayou Choctaw Cavern 20. (i.e. West Hackberry +1.5 MMbbl, Big Hill +1.0 MMbbl, Bayou Choctaw -2.5MMbbl).

** Current Bryan Mound maximum drawdown capability is reduced to 1.350 MMbbl/D due to needed repair to aboveground storage tank.

[2] Current SPR maximum drawdown capability is reduced to 4.415 MMbbl/D due to a damaged floating pan in Tank 2 at Bryan Mound.

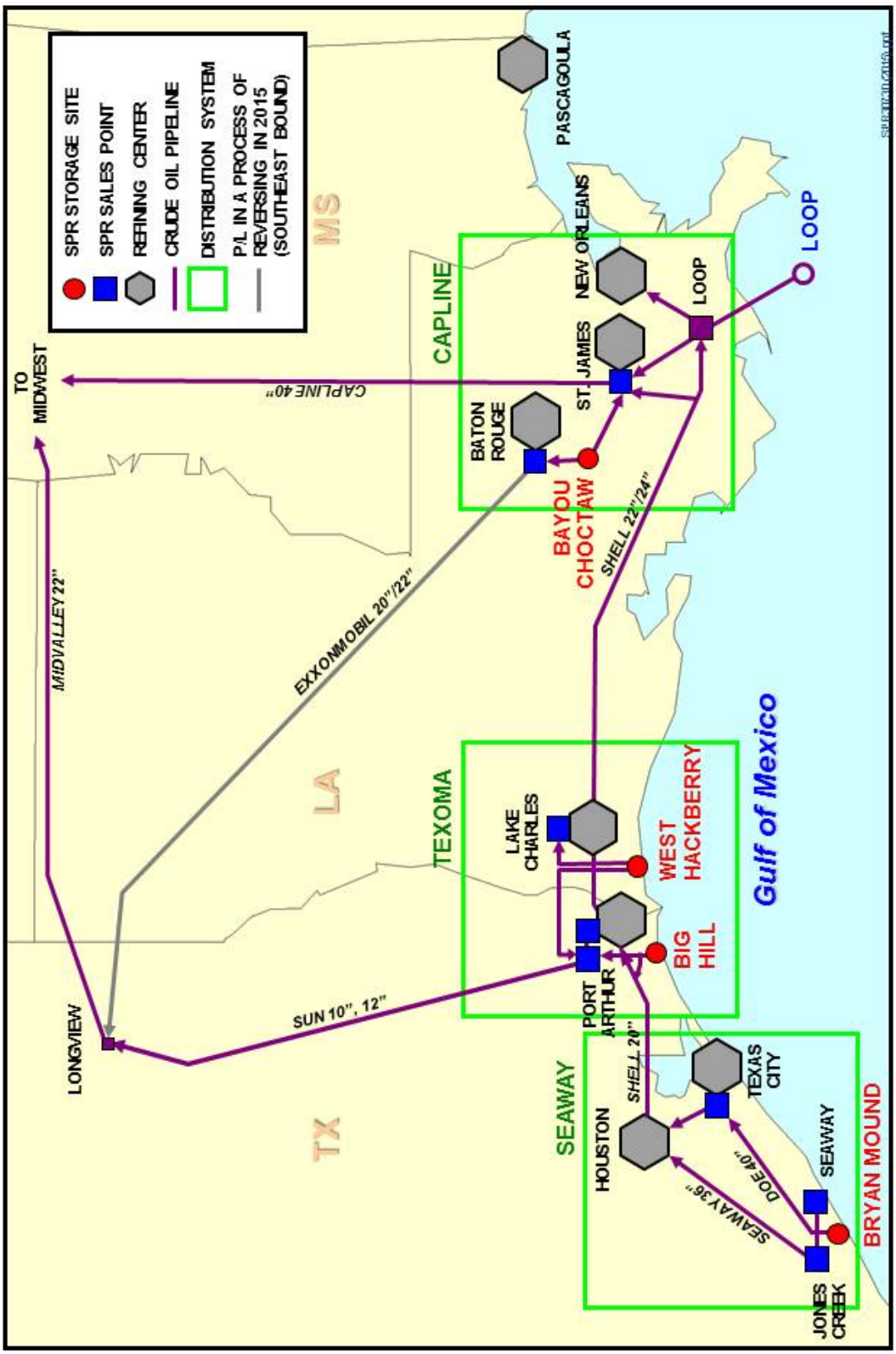


Figure 2
Storage Sites and Distribution System

Cavern Maintenance

During 2015, a total of 13 well workovers were performed at the four SPR sites. These workovers included five diagnostic workovers, six remediation workovers to install cemented protective steel liners inside existing well-bores, one brine string repair workover, and one brine disposal well repair. Two workover rigs were used to perform this work, including one leased rig and one DOE-owned rig. A dedicated safety professional was assigned to each rig.

Bryan Mound Site Status

The Bryan Mound storage site is located in Brazoria County, Texas, approximately three miles southwest of Freeport, Texas. As of December 31, 2015, the site had 19 operational storage caverns with a total authorized storage capacity of 254.0 million barrels, and a cavern inventory of 245.0 million barrels. During 2015, the site drawdown rate was reduced by 150,000 barrels per day pending replacement of a damaged internal floating pan on a storage tank that is used during drawdown.

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, 2015, the site had 14 operational storage caverns, with a combined authorized storage capacity of 170.0 million barrels and a cavern inventory of 162.4 million barrels.

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, 2015, the site had 21 operational storage caverns with a combined authorized storage capacity of 221.0 million barrels and a cavern inventory of 213.2 million barrels.

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, 2015, the site has six operational storage caverns, with an authorized storage capacity of 76.0 million barrels, and a cavern inventory of 73.6 million barrels.

The SPR annually performs a number of major maintenance projects to maintain each of the four site's operational capabilities.

St. James Marine Terminal Status

The SPR constructed a marine terminal on the Mississippi River at St. James, Louisiana in the 1970s to support fill and drawdown of the SPR sites. The St. James marine terminal has six aboveground storage tanks with a total storage capacity of two million barrels. As of December 31, 2015, the St. James marine terminal was leased to Shell Oil Products US (Shell) under a long-term lease agreement that expired in December 2017. Under the lease agreement, Shell provided for all normal operations and maintenance of the St. James marine terminal and is required to support the SPR as a sales and distribution point in the event of an SPR drawdown.

A connection between the St. James marine terminal and the adjacent LOCAP terminal enhances the SPR's emergency distribution capabilities by enabling unencumbered crude oil distribution to other pipeline systems, including Capline, the ExxonMobil Pipeline Northline, the Red Stick Pipeline, the Shell Sugarland terminal, the NuStar St. James terminal, and the Plains St. James terminal.

V. Capacity Maintenance Program

The Capacity Maintenance Program was not used during CY 2015.

VI. West Hackberry Cavern 6 Transfer Project

In 2013, access to the sour crude oil inventory in West Hackberry Cavern 6 was considered at risk. Cavern 6 is a three-well cavern with the following history:

- Well 6B borehole failed, and a liner was installed in 2002.
- Well 6 borehole failed, and the well was plugged and abandoned in 2011.
- Well 6C borehole failed a mechanical integrity test, a liner was cemented in, the borehole failed, and the well was plugged in 2012.

Because of this well history and the associated risk, the SPR decided to empty Cavern 6 while there was still ready access, and to then place Cavern 6 in a "maintain and monitor" status and ensure that it continued to meet all regulatory requirements.

The removal of crude oil from Cavern 6 began February 1, 2013, as a single closed loop cavern-to-cavern movement. Oil was transferred from Cavern 6 to a receiving cavern. The brine from the receiving cavern was then transferred to Cavern 6. During the year, simultaneous operations of transferring crude oil out of Cavern 6 and leaching another sour cavern occurred, thereby achieving two SPR program objectives.

As of December 31, 2015, the readily accessible oil in Cavern 6, approximately 6.3 MMbbl of the 6.4 MMbbl inventory, has been transferred. Oil will continue to be removed from Cavern 6 as it gradually seeps into the well 6C borehole. Once this phase is complete, longer-term decommissioning activities will begin.

VII. Bryan Mound Cavern 2 Transfer Project

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

Because of this well history and the associated risk, the decision was made to empty Cavern 2, while there was still ready access, and to then conduct geotechnical analysis and well stabilization. The removal of crude oil from Cavern 2 began March 1, 2015, as a single closed-loop cavern-to-cavern movement. Oil was transferred from Cavern 2 to a receiving cavern. The brine from the receiving cavern was transferred to Cavern 2. This process is expected to take approximately 2 years. Cavern 2 will continue to meet regulatory requirements during this period.

As of December 31, 2015, 4.36 MMbbl of crude oil from Cavern 2 was transferred to the receiving cavern, with transfer of the remaining 2.35 MMbbl underway and expected to continue until Cavern is emptied. Once this phase is complete, longer-term decommissioning activities will commence.

VIII. SPR Modernization Program - Life Extension 2 Project

In 2015, the SPR initiated the process of obtaining approval and funding to replace or upgrade site equipment and facilities that are approaching or have exceeded their 25-year design life. This project, known as the Life Extension Phase II (LE2) Project, is part of the SPR Modernization Program. The LE2 Project is being conducted in accordance with DOE Order 413.3C, Acquisition of Capital Assets. During the second and third quarters of the year, the SPR presented the need for this LE2 Project in accordance with the DOE Order 413.3 via briefings to DOE's Project Review Management Committee and DOE's Energy Systems Acquisition Advisory Board. The SPR received approval for Critical Decision 0, Approve Mission Need in October 2015. The approved cost range for this process is $700 million to $1.4 billion.

Following the approval of Critical Decision 0, the LE2 Project officially became a DOE project. Project requirements for the LE2 Project include: providing updates at various working levels of the LE2 Project through the DOE Project Assessment and Reporting System; establishing an overall Federal Project Director for the LE2 Project; and implementing other project management tools. Additionally, in 2015, working closely with the Office of Project Management, the SPR began the approval process for Critical Decision 1, Analysis of Alternatives, immediately following the approval of Critical Decision 0.

IX. Petroleum Acquisition and Exchange

Oil Acquisition Market Assessments

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

Crude Oil Acquisition

Section 161(g)(6) of EPCA requires the Secretary of Energy to acquire petroleum products for the SPR within the 12-month period beginning after the completion of a test sale, to the extent funds are available in the SPR Petroleum Account. During 2015, the SPR purchased crude oil to replenish the volumes sold during a 2014 test sale, and in June and July of 2015, 4.2 million barrels of sweet crude oil was delivered to the Bryan Mound facility through the Seaway Jones Creek terminal.

Crude Oil Inventory Status

As of December 31, 2015, SPR's crude oil inventory was 695,118,985 barrels, an increase of 4,159,551 barrels from the previous year. The net increase resulted from the acquisition of crude oil delivered to the SPR.

Fill of Reserve

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

- Table 2 lists year-end inventories and average daily fill rates for the years 1977 through 2015 (by FY and CY).
- Table 3 lists crude oil receipts by country of origin since 1977.
- Table 4 identifies the location of the inventory by storage site, and Figure 3 illustrates the cumulative oil fill by year.

Table 2
Year-End Inventories and Oil Fill History

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

Mbbl = Thousand Barrels Mbbl/D = Thousands of 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

Table 3
Crude Oil Receipts
(As of December 31, 2015)

Source Country	Cumulative (MMbbl)	Percent of Total (%)
Mexico	266.3	31.1
United Kingdom	193.9	22.7
United States*	110.7	12.9
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	1.8
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**	858.3***	100.0

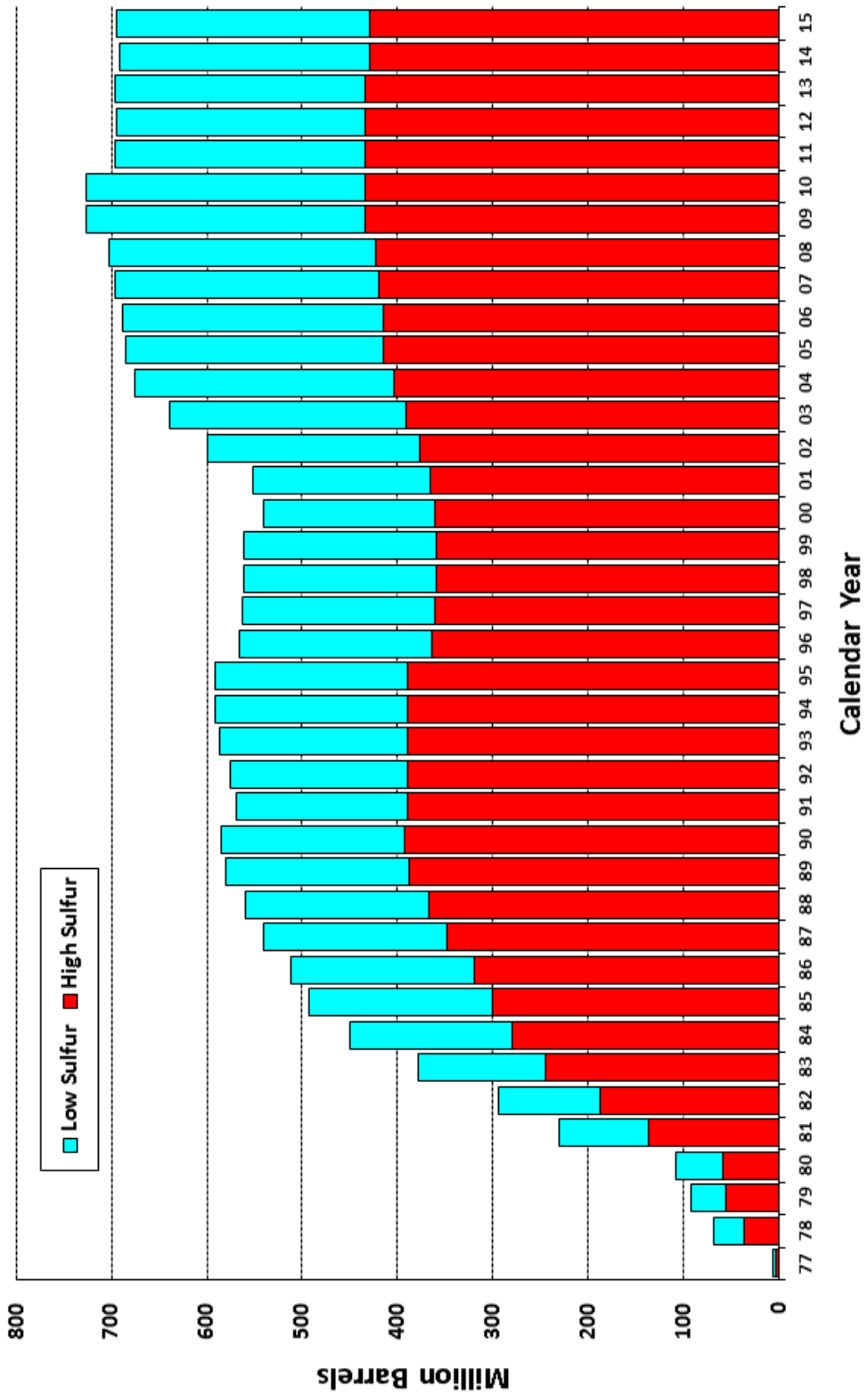
MMbbl = Million Barrels
* Included receipts from offshore Gulf of Mexico
** Totals do not add due to rounding
*** Cumulative total receipts unadjusted for sales and operational gains and losses
**** Prior to 1995

Table 4
Crude Oil Inventory
(As of December 31, 2015)

Storage Site	Inventory (MMbbl)		
	Sweet*	Sour**	Total***
Bryan Mound, Brazoria County, Texas	68.6	176.4	245.0
Big Hill, Jefferson County, Texas	67.7	94.6	162.3
West Hackberry, Cameron Parish, Louisiana	107.7	105.6	213.3
Bayou Choctaw, Iberville Parish, Louisiana	21.8	51.8	73.6
Subtotal Underground Inventory	265.7	428.4	694.1
Tanks and Pipelines	0.4	0.7	1.1
Total Inventory	266.1	429.0	695.1
Total Accounts Receivable	0.0	0.0	0.0
Total SPR Book Inventory	266.1	429.0	695.1

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

Figure 3
Cumulative Oil Fill



X. 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. Contracts are awarded to the highest qualified offerors.

Competitive Sales Procedures

DOE regulations in 10 CFR Part 625 govern the process for price competitive sales from the SPR, including the establishment of Standard Sales Provisions that contain provisions to be utilized in contracts for the sale of SPR crude oil. The first step in the process is the issuance of 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. Measures required for assuring performance and financial responsibilities are also described in the Notice of Sale.

During a drawdown, multiple Notices of Sale may be issued using a web-based automated oil sales and evaluation system, which provides a triple redundant backup system. Each Notice of Sale covers a sales period of one to two months. Offerors may have five days or less from the date a Notice of Sale is issued until offers are due. Delivery of oil could commence as soon as 13 days after the President calls for a drawdown of the SPR. Subsequent sales periods, if necessary, will be coordinated 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 five percent of the maximum potential contract amount, or $10 million, whichever is less. The offer evaluation process is structured so that the offerors bidding the highest prices will determine the transportation methods, up to the limits of the distribution system. Specific delivery arrangements are negotiated later in the process.

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

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

Drawdown Capabilities[3]

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

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

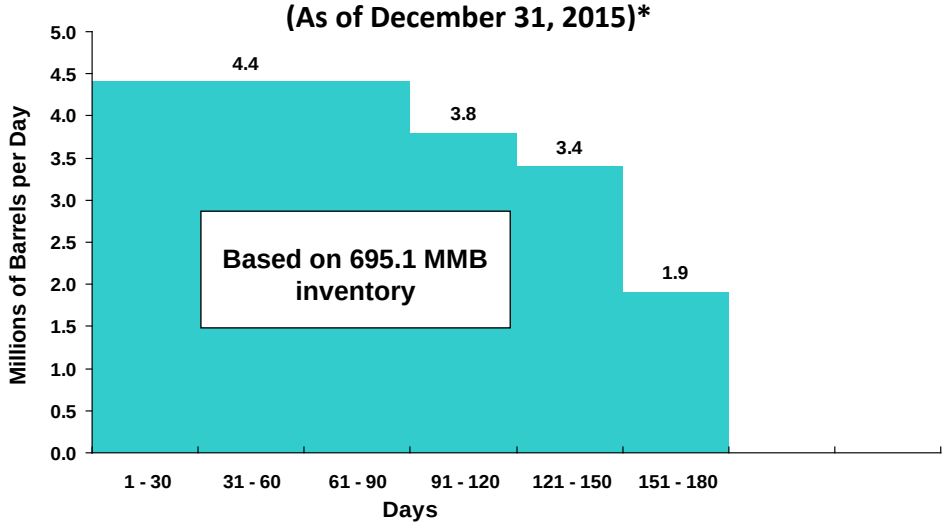
Table 5
Crude Oil Streams
(As of December 31, 2015)

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 in Freeport and Texas City, Texas
Bryan Mound (Sour)	33.3	1.41	
Texoma System			
West Hackberry (Sweet)	36.9	0.33	Pipeline, tankship, or barge at Sun Partners Marketing & Terminals LP, Nederland, Texas; Pipeline at Shell-22"/DOE connection, Lake Charles, Louisiana
West Hackberry (Sour)	33.5	1.38	
Big Hill (Sweet)	35.4	0.40	Pipeline, tankship, or barge at Sun Partners Marketing & Terminals LP, Nederland, Texas; Pipeline or tankship at Phillips 66 Terminal Nederland, Texas; Pipeline at Shell-20"/DOE connection, Winnie, Texas
Big Hill (Sour)	30.8	1.44	
Capline System			
Bayou Choctaw (Sweet)	35.4	0.43	Pipeline at Capline, Plains Marketing or LOCAP Terminals, St. James, Louisiana; Tankship at Sugarland St. James Terminal, St. James, Louisiana; 24-inch site connection to Red Stick Pipeline, Iberville Parish, Louisiana
Bayou Choctaw (Sour)	31.9	1.46	

[3] 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.
[4] Current design drawdown capability is reduced to 4.25 due to unavailability of Bryan Mound Tank 2 pending repairs.

Figure 4 illustrates the SPR's design drawdown capabilities during 2015, with an inventory of 695.1 million barrels.

Figure 4
Design Drawdown Capability
(As of December 31, 2015)*



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

Drawdown Readiness Activities

The SPR performed the following drawdown readiness assurance activities during 2015:

- The Drawdown Readiness Review program requires and monitors quarterly drawdown readiness. Four reviews were conducted in 2015, confirming that all sites and systems were prepared for an SPR crude oil drawdown or exchange.

- The Systems Test Exercise (STE) program determines the drawdown readiness of an SPR site's equipment, procedures, systems, and personnel, and collects data to further ensure a readiness status. The STE program involves a tabletop exercise at each site every year and a dynamic site test performed when directed. In 2015, tabletop exercises were conducted at all four sites.

- An administrative tabletop exercise was successfully conducted at Big Hill on February 18, 2015. This exercise simulated a drawdown using recovery equipment with the following deliveries: February 18, 2015 – March 19, 2015, rate of 850 Mbbl/D sweet (30 day duration) delivered in a single batch at 85% of max drawdown rate.

- An administrative tabletop exercise was successfully conducted at Bryan Mound on August 18, 2015. This exercise simulated a drawdown with the following deliveries:

Texas City for a total of 5 MMbbl sour delivered in 500 Mbbl batches at 720 Mbbl/D, and Freeport Dock for a total of 3 MMbbl sour delivered in 500 Mbbl batches at 480 Mbbl/D.

- An administrative tabletop exercise was successfully conducted at Bayou Choctaw on June 16, 2015. This exercise simulated a drawdown with the following deliveries: 1.5 MMbbl sour delivered in 300 Mbbl batches at 192 Mbbl/D, and 3 MMbbl sour delivered in 500 Mbbl batches at 480 Mbbl/D.

- An administrative tabletop exercise was successfully conducted at West Hackberry on July 15, 2015. This exercise simulated a drawdown with the following deliveries: Nederland Terminal (30 days) for a total of 10 MMbbl sweet delivered in 500 Mbbl batches at 600 Mbbl/D.

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 has turned into a major refining and trans-shipment destination for crude oil. As a result, there have been significant changes in the use of oil distribution infrastructure. Through 2011, most major pipelines originated in the Gulf Coast region and provided crude oil to local refineries and Midwest refiners. Since then, several major pipelines have reversed direction and are now flowing crude to the U.S Gulf Coast refining centers and thereby reducing imports.

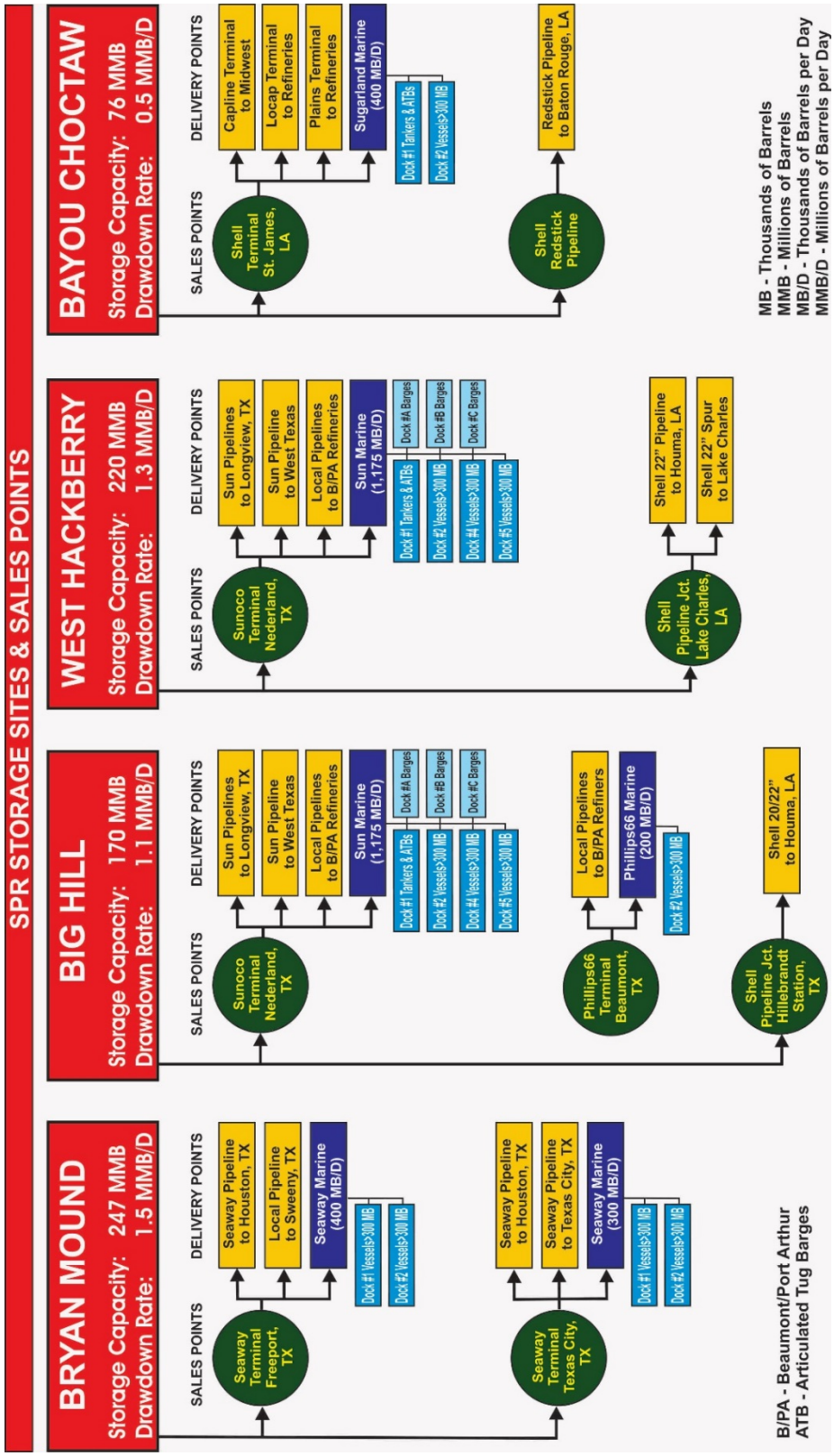
Consequently, in 2012, the SPR lost connectivity to 10 refineries in the Central U.S. when the Seaway Pipeline's flow direction was reversed. The Seaway Pipeline now flows from Cushing, Oklahoma, to Freeport, Texas. In December 2013, Shell reversed section of one of its pipeline systems, now referred to as the Houston-to-Houma system (formerly Houma-to-Houston), to flow eastbound from Houston 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.

In 2015, the SPR was connected by commercial pipeline systems to about 57 percent of the refining capacity in the United States. That connection covers 45 refineries, which processed approximately 59 percent of crude oil imports to the United States during 2015.

The SPR is also connected to four marine terminals that have a combined contracted marine distribution capacity of 2.075 MMbbl/D and own one marine terminal with a distribution capacity of 0.400 MMbbl/D that is leased to Shell. These are: Seaway Terminal (Enterprise Products), Freeport, Texas; Seaway Terminal (Enterprise Products), Texas City, Texas; Sunoco Terminal, Nederland, Texas; Phillips 66 Beaumont Terminal, Nederland, Texas; and Shell Sugarland, St. James Terminal, St. James, Louisiana. Figure 5 illustrates the SPR's pipeline and

marine distribution capabilities.

Figure 5
Pipeline and Marine Design Distribution Capabilities



Distribution Assessment

The SPR performs an annual evaluation of the SPR's crude oil distribution system capabilities based on established technical and performance criteria. The SPR conducts this annual evaluation to (a) ensure that there are adequate connections to the commercial distribution systems and (b) identify the need for any remedial plans. The 2014 Distribution Assessment evaluated the SPR's theoretical capability, at its maximum drawdown rate, to replace oil imported in the base year (2014), and for future years 2020, 2025, and 2030. The 2014 Distribution Assessment does not intend to model distribution capability during an actual emergency oil disruption event.

Established Level I Technical and Performance Criteria for the SPR's distribution capabilities require that the physical distribution system infrastructure, both DOE-owned and commercial, can meet distribution rates exceeding 120 percent of the combined site drawdown rates in order to sufficiently allow for terminal operational delays and commercial demand variances.

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

Base-Year Assessment

The base-year assessment indicates that two of the three SPR crude oil distribution systems were compliant with Level I Performance Criteria (offsite pipeline and marine distribution capabilities exceed 120 percent of the combined maximum drawdown rates). The Level 1 Performance criteria for the Texoma System remained below 120 percent for two years in a row as a result of petroleum infrastructure additions, pipeline reversals, and resulting marine terminal and pipeline congestions.

Table 6 provides the performance measures for the base and previous year.

Table 6
Base-Year Distribution Assessment

Mbbl/D = Thousands of Barrels per Day

System	Design Max. Drawdown Rate (Mbbl/D)	Physical Distribution Capability (Mbbl/D)	Performance Measure As of 12/31/2014	Performance Measure As of 12/31/2013
Seaway	1,500	1,764	118%	135%
Texoma	2,400	2,379	99%	112%
Capline	515	856	166%	183%
Total	4,415	4,999	113%	128%

Future Year Assessments

From the 2015 perspective, for future years 2020, 2025, and 2030, the SPR performed an assessment using U.S. petroleum refining supply and demand projections from the Energy Information Administration's *Annual Energy Outlook 2015 (AEO 2015)*. The future year assessment assumed the design drawdown rate does not change from base-year levels and assumes no infrastructure changes to the SPR. Based on the *AEO 2015* projections for U.S. petroleum imports, the Distribution Assessment concluded that the distribution capability of the SPR falls below Level 1 Performance Criteria during the outer years with the current infrastructure in place, for the Seaway and Texoma systems, and for a portion of the outer years with the current infrastructure in place, for the Capline system. In light of these results, remedial planning has commenced to address the insufficient connectivity to commercial distribution systems. Table 7 provides the performance measures by system for the base year and each forecast period.

Table 7
Base and Future Years
Performance Measures

System	2014	2020	2025	2030
Seaway	118%	83%	90%	103%
Texoma	99%	79%	83%	90%
Capline	166%	111%	143%	140%

Physical vs. Effective Distribution Capability

The assessment discussed above focuses exclusively on the SPR's physical distribution capability, which is distinct from the SPR's *effective* distribution capability. Physical distribution capability focuses on the actual connections that the SPR maintains to physical assets. Effective distribution capability is the rate that SPR crude oil can be incrementally added to the market. It depends on oil market activity, the utilization of commercial pipelines and commercial terminals at the time of drawdown, and the magnitude and geographical location of the oil supply disruption.

In reality, the ability of the SPR to distribute incremental oil without disrupting domestic and Canadian crude flows has diminished due to congestion of commercial facilities in the SPR's Gulf Coast distribution region. In recent years, the changing geography of U.S. oil production has led to major changes in the domestic oil refining and distribution systems. New patterns of oil supply and demand among U.S. oil producers and refineries, along with associated changes in the U.S. midstream, have significantly reduced the ability of the SPR to distribute *incremental* volumes of oil during possible future oil supply interruptions. Moving SPR oil to Midwest refineries—a historical pattern—would be of no value during a petroleum supply disruption as non-Canadian imports and Gulf Coast supplies into this refining complex have essentially disappeared. The U.S. pipeline distribution system, along with other modes of oil transport, is instead moving large volumes of oil to the Gulf Coast, especially from U.S. tight oil plays and Canada. This new geography of U.S. oil production and energy exports has also increased commercial traffic at U.S. Gulf Coast marine loading facilities.

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

In 2015, the Office of Petroleum Reserves continued assessing the SPR's effective distribution capability, which included assessment of the crude volume that could be delivered to the market under various supply disruption scenarios. This project will quantify the SPR's

distribution capabilities in terms of incremental barrels that can be added to the market without disrupting commercial flows.

The Department's 2015 Quadrennial Energy Review (QER) found that the SPR's ability to offset future energy supply shortages has been adversely impacted by domestic and global oil market developments coupled with the need for upgrades. One of the QER's recommendations was to invest to optimize the SPR's energy response capability, including the need to increase the SPR's incremental distribution capability by adding dedicated marine terminal capacity to the SPR distribution system.

International Energy Program Requirements

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

In the event of a severe petroleum supply interruption, the IEA Governing Board may choose to collectively release oil stocks to respond to the crisis. In a coordinated IEA response, each member country is responsible for a share of the total release that is proportionate to their share of total IEA oil consumption. For the United States, this share was 43.9 percent in 2015.

XI. Commercial Activities

Commercial Leases

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

Bayou Choctaw Pipeline: In 2015, lease revenues totaled $236,583. This pipeline was leased to Shell Pipeline Company LP on May 1, 1997, on a revenue-sharing basis. In 1998, the lease was converted from an annual lease to a 10-year lease with automatic renewals in five (5) year increments thereafter. The current lease period expired on December 31, 2017.

Bryan Mound Pipelines: In 2015, lease revenues totaled $11,243,574. Two of the three Bryan Mound pipelines were leased to ExxonMobil Pipeline Company on January 14, 1999. ExxonMobil began using the pipelines in June 2000 as part of its onshore distribution system for the Diana-Hoover production in the Gulf of Mexico. The first five-year option of the lease agreement was executed and began in June 2010. The second and final five-year option of the

lease agreement was executed on February 12, 2014, for the period of June 1, 2015–May 31, 2020.

St. James Marine Terminal: In 2015, St. James marine terminal lease revenues were $2,000,000. The terminal was leased to Shell Pipeline Corporation (now Equilon Enterprises LLC, "doing business as" Shell Oil Products US) on January 31, 1997, on a revenue-sharing basis. On April 2, 2003, the contract was renegotiated for a period of 10 years in the amount of $1.7 million per year, with a five-year option in the amount of $2 million per year. Payments were retroactive to January 1, 2003.

Commercial Revenues

During calendar year 2015, receipts to the General Fund of the United States Treasury from the commercial leases of the SPR's distribution facilities and pipelines totaled $13,480,157. Table 8 summarizes commercial revenues from 1996 to 2015.

Table 8
Summary of Commercial Revenues
(December 31, 2015)

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

XII. Budget and Finance

With enactment of the Consolidated and Further Continuing Appropriations Act, 2015 (Pub Law 113-235), Congress appropriated $200 million for the SPR.

Appropriations through Fiscal Year 2015

A total amount of $24.2 billion, net of sales and transfers, has been appropriated for the SPR from FY 1976 through FY 2015. The distribution of this annual appropriation is described in Table 9.

Strategic Petroleum Reserve Account

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

Obligations for the SPR in FY 2015 totaled approximately $201.3 million. From this amount, $22 million was obligated for Federal program management. The remaining $179.3 million was obligated for contractual goods and services to operate and maintain the SPR and to conduct an emergency drawdown and sale, if required.

Table 9
Appropriations for Storage Facilities Operations and Management and Petroleum Account*
(As of December 31, 2015)

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	15,965		156,637	
2002	0	154,009	16,871		170,880	
2003	1,955	157,823	13,909		173,687	
2004	0	155,044	15,904		170,948	
2005*	43,000	109,946	16,764		169,710	
2006*	(43,000)	190,510**	16,830		207,340	
2007	0	146,950	17,491		164,441	
2008		143,980	18,004	24,773	186,757	
2009	(21,586)	176,255***	18,824	31,507	226,586	
2010	0	199,732	19,091	25,000	243,823	
2011	0	186,873	22,568	0	209,441	
2012*	0	172,914	19,790	0	192,704	
2013*	0	162,975	19,650	0	182,625	
2014*	0	167,514	21,846		189,360	
2015		174,999	25,001		200,000	

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.

Strategic Petroleum Reserve Petroleum Account

The SPR Petroleum Account funds the acquisition of oil for the SPR, the associated costs of 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, 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 are deposited to the Department of the Treasury, and an equal amount of mandatory budget authority is created in the SPR Petroleum Account to be used for sale expenses and to repurchase oil for the SPR. In 2015, $239.6 million was obligated towards repurchasing crude oil and associated throughput and miscellaneous charges. At the end of FY 2015, $11.2 million remained available in the SPR Petroleum Account.

On April 15, 2014, the Secretary of Energy authorized establishment of 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 caused by natural disasters. The Congressional Control level was established and $235.6 million was apportioned by the Office of Management and Budget (OMB), in late June 2014, from receipts from an SPR test sale, to establish the NGSR. Oversight and administration of the product acquisition and commercial storage activities will occur for 4.5 years.

For FY 2015, the capitalized cost of the crude oil in the SPR was $20.8 billion, for an average cost per barrel of approximately $29.89 (excluding storage costs).

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

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

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

* In coordination with Minerals Management Service, DOE completed a total DOE-RIK program reconciliation (1999 – 2009) in CY 2009, requiring net figure adjustments to prior years.
** Net figures that include Department of Interior preliminary volumes and adjustments to prior years.
*** Department of Interior data not available.

Performance Measurement

In FY 2015, the SPR tracked 22 measures that are indicative of how the strategic goals and objectives for the SPR were pursued. They are consistent with the SPR Strategic Plan, which provides a framework for implementing the program's mission by setting a course for the program and guiding decisions about the effective use of resources. 20 of the tracked measures met or exceeded the performance measure, while two measures ("Distribution Capability as a Percentage of Drawdown Rate" and "Northeast Home Heating Oil Reserve [NEHHOR] Operating Cost – Negotiate best possible commercial storage rates per Federal Acquisition Regulations [FAR]") did not meet the target during this period. Due to a reduction in locally connected refinery imports and interstate pipeline imports, the Distribution Capability performance measure did not meet the performance target. Distinct from the SPR, the contract support costs for the NEHHOR were higher than anticipated, resulting in a slightly higher per barrel operating cost than the target.

The financial measure of "Operating Cost per Barrel of Storage Capacity" was $0.233 versus a target of $0.25. This is a measure of operational cost-effectiveness and indicates the responsible use of financial resources.

In FY 2015, the critical few performance measures were again incorporated into the SPR Annual Operating Plan, in accordance with the Under Secretary for Science's direction. This ensures

integration of these critical few performance measures into the planning process and enables tracking of their performance. A complete accounting of the Office of Petroleum Reserves' performance measures is reflected in Table 11.

Table 11
Performance Measures

Performance Measures	FY 2014 Actual Performance	FY 2015 Target Output	FY 2015 Actual Performance
Oil Inventory, Drawdown Readiness, and Distribution			
90-Day Sustainable Drawdown Rate	4.25 MMbbl/Day	4.25 MMbbl/Day	4.25 MMbbl/Day
Number of Days to Commence Crude Oil Drawdown	13 Days	13 Days	13 Days
Number of Days to Complete Heating Oil Drawdown	12 Days	13 Days per Drawdown	13 Days
Distribution Capability as a Percentage of Drawdown Rate	128%	≥120% of Drawdown Rate	113%
Calculated Site Availability	97.25%	≥95%	97.3%
Calculated Maintenance Performance Appraisal Report (MPAR) Rating	96.8%	≥95 out of a possible 100 points	97.6
Percent of Site Security Survey Ratings that are Satisfactory	100%	100%	100%
Number of Barrels of Crude Oil Processed	4.6 MMbbl	37 MMbbl	45.6 MMbbl
Well Integrity Compliance with State Regulations	N/A	100%	100%
Customer Knowledge and Focus			
Percentage of Key Customers Visited	42%	33%	51%
Operational Effectiveness, Efficiency and Knowledge Management / Fiscal Responsibility and Budgetary Control			
Information System Availability	99.9%	≥98%	99.9%
Operating Cost per Barrel of Storage Capacity	$0.239	≤$0.25 per barrel	$0.233
NEHHOR Operating Cost – Negotiate best possible commercial storage rates per FAR regulations	N/A	$7.12 operating cost per barrel	$7.15 operating cost per barrel
NSGR Operating Cost – Negotiate best possible commercial storage rates per FAR regulations	N/A	$22.17 operating cost per barrel	$21.38 operating cost per barrel
Dynamic Teamwork: Continuous Improvement			
ISO 9001-2008 Certification	April 16, 2014	September 15, 2015	November 6, 2014
Partnerships			
Number of Partnerships Arrangements with Federal, State, and Local Agencies	14	N/A	N/A
Memorandum of Understanding / Agreements (MOA) with Federal, State, and Local Agencies to minimize life safety and environmental risks to the sites and community	N/A	12	13
Local Community Support / Environment, Safety, and Health			
Maintain or apply for OSHA VPP Star Status through completion of an annual self-evaluation or application for each SPR storage fixed site	May 21, 2014	February 15, 2015	February 15, 2015

Number of Cited Environmental Violations Received	0	0	0
Number of Reportable Releases to the Environment Annually	1	≤4	0
ISO 14001 Certification	April 16, 2014	Proof of ISO 14001 re-certification of the SPR EMS by May 3, 2015	April 30, 2015
Site Sustainability Plan Submittal	November 14, 2013	November 28, 2014	November 24, 2014
Employee Development and Quality of Life			
Employee Individual Development Plans (IDPs)	100%	95%	100%

XIII. Other Program Activities

Long-Term Strategic Review of the SPR

Section 402 of the Bipartisan Budget Act of 2015 (Public Law 114-74) required the Secretary to complete a LTSR of the SPR and submit a report of the review to Congress. In May 2015, the Office of Petroleum Reserves began work on the project, which assesses the ability of the SPR to carry out its energy security mission in the context of changing North American and global oil markets.

The LTSR addressed multiple challenges and critical decisions that impact the future of the SPR, including changes in the U.S. midstream sector, which could constrain the SPR's normal distribution pathways; surface and sub-surface infrastructure challenges; questions regarding the appropriate inventory level for the SPR; and the need to review the SPR's legal authorities within EPCA.

Northeast Gasoline Supply Reserve

The Northeast Gasoline Supply Reserve (NGSR) consists of contracted storage at multiple facilities in the New York Harbor, greater Boston, Massachusetts, and greater Portland, Maine areas. The SPR does not own storage facilities suitable for the storage of refined petroleum products. It was determined that the benefits of contracting for the storage of up to one million barrels 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. It was also determined that the availability of funds in the SPR Petroleum Account would enable the creation of a refined petroleum product reserve in time for the 2014 hurricane season. Placing the refined product reserve within the normal supply chain also ensures product quality, because unlike crude oil, refined products require periodic turnover to ensure that the products remain within strict quality specifications.

Four storage service contracts were executed to support the establishment of a regional product reserve in the Northeast. The Northeast region of the United States heavily depends

on product supplies from the Gulf Coast, as well as local refining and imports. The crude oil stored in the SPR sites along the Gulf Coast are well suited to mitigating impacts of crude oil supply to refineries. However, vulnerabilities elsewhere in the supply chain could still result in significant regional disruptions. The establishment of a regional product reserve closer to the point of consumption can mitigate the impact of short-term disruptions, while issues with the larger supply chain (from crude oil refining through product distribution to consumers) are resolved.

DOE provides operational oversight of the NGSR, including managing contracts, providing independent product quality and quantity assurance certifications, performing annual audits, establishing a sales procedure and platform, and coordinating with each of the storage contractors to ensure availability and accessibility of 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 the Environmental Protection Agency's Clean Air Act requirements. Additionally, the contractors must ensure that their specific facility is available in the event that the SPR requires a release and that they can 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 the Department if conditions exist for a potential release.

Quality and Performance Assurance

The SPR conducted oversight activities per DOE procedural requirements. These activities included onsite management appraisals, technical assessments, security surveys, and quarterly reviews of the Management and Operating (M&O) Contractor's Contractor Assurance System (CAS).

The CAS covers six oversight areas mandated by DOE Order 226.1B, Implementation of DOE Oversight Policy. These categories are Environmental, Safety and Health, Quality Assurance, Security, Emergency Management/Fire Protection, and Cyber Security. Additionally, CAS has expanded to cover Finance, Human Resources, Property and Facilities, Procurement, Cavern Integrity, Data Systems, Operations and Maintenance, Engineering, and Internal Audit.
The Quality and Performance Assurance Division (QPAD) conducted technical assessments on several key areas within the M&O contractor's organization. The assessment of the Mail Handling Operations program evaluated their ability to effectively operate a mail distribution center. The assessment of the Reliability, Availability, and Maintainability (RAM) program evaluated the M&O contractor's ability to adequately implement a RAM program per the requirements of internal and external plans, policies, and procedures. The assessment of the Conduct of Operations (COPs) program evaluated the M&O contractor's effectiveness in executing COPs procedures at all of the SPR facilities. Finally, the assessment of the Implementation of the West Hackberry Tank 14 Judgment of Needs Report evaluated the M&O contractor's implementation of corrective actions to mitigate identified deficiencies associated

with the use of a scissor lift at the SPR West Hackberry site. The assessments evaluated contractor compliance with the oversight requirements in DOE Order 414.1D, Quality Assurance and DOE Order 226.1B, Implementation of DOE Oversight Policy.

Nine inspections or site surveillances were performed by QPAD personnel in 2015 and were documented in Technical Assurance Surveillance Reports. These included inspections at the SPR sites and supplier/vendor facilities. These inspections were done to ensure all activities and procedures were conducted according to contractual requirements.

The oversight of the critical few performance measures included eight objective processes. The assessment of each measure was conducted by a subject matter expert to ensure that the contractor's performance was measured against their objectives, appropriately monitored, documented, and verified. QPAD then performed an independent assessment to validate the SME's due diligence. Both positive and negative results were submitted to the Performance Fee Board via the board secretary. Once the assessment results were completed and documented, a summary report was submitted to the Project manager and the Performance Fee Board chairperson to determine the appropriate fee distribution.

Additionally, the SPR's Quality Council monitored the activities of three process improvement teams. Those teams, which carried over from FY 2014, worked to identify methods to capture the unique knowledge and experiences of SPR personnel and redesign the availability of resources used by all SPR personnel when evaluating contractor performance. The other team was established in FY 2015 and was tasked to explore ways to enhance and improve DOE's on-site management appraisal process.

Executive Order 13693

The Office of the President issued Executive Order 13693, Planning for Federal Sustainability in the Next Decade, on March 19, 2015. The goal of Executive Order 13693 is to maintain Federal Leadership in sustainability and greenhouse gas emission reductions. The Executive Order incorporates and builds upon past Executive Orders and Memoranda and has extended many current requirements to FY 2025. Executive Order 13693 revokes the following:

- Executive Order 13423 (January 24, 2007), Strengthening Federal Environmental, Energy, and Transportation Management.
- Executive Order 13514 (October 5, 2009), Federal Leadership in Environmental, Energy, and Economic Performance.
- Presidential Memorandum of December 2, 2011 (Implementation of Energy Savings Projects and Performance-Based Contracting for Energy Savings), and
- Presidential Memorandum of May 24, 2011 (Federal Fleet Performance)

The goal of the Executive Order is for Executive departments and agencies to be among the Nation's leaders "to build a clean energy economy that will sustain our prosperity and the

health of our people and our environment for generations to come." Under this Executive Order, Federal agencies must continue to increase efficiency and improve their environmental performance to help protect the planet for future generations, to avoid energy costs, and to make Federal facilities more resilient. The Federal environmental performance goals have been expanded and updated with clear objectives to reduce greenhouse emissions across Federal operations.

The SPR's efforts to comply with Executive Order 13693 include implementing activities, policies, procedures, and programs that support sustainability goals. The annual Site Sustainability Plan documents the status of these actions, as well as the SPR's successes and challenges with attaining these goals. The Site Sustainability Plan addresses the status of specific goals listed in the Executive Order that include:

- Reduce scope 1, 2, and 3 greenhouse gas emissions;
- Sustainable buildings—reduce energy intensity in goal subject buildings;
- Renewable electric energy;
- Reduce potable and industrial, landscaping, and agricultural water (ILA) consumption;
- Reduce fleet vehicle greenhouse gas emissions and fuel consumption;
- Promote sustainable acquisition and procurement of bio-based products, energy and water efficient products, environmentally preferred products, non-ozone depleting chemicals, products with increased recycled content, and non-toxic and or less toxic chemicals, and fuel-efficient products;
- Practice pollution prevention and waste reduction by supporting on-going waste recycling and reduction programs;
- Initiate energy performance contracts;
- Promote electronics stewardship through purchasing Electronic Product Environmental Assessment Tool (EPEAT) registered, Energy Star and Federal Energy Management Program (FEMP) designated equipment, enabling power management, duplex printing, and other energy efficient and environmentally preferable features, and using environmentally sound disposal practices; and,
- Incorporate climate change resilience by implementing policies, planning, procedures, and commitment to address the impacts of climate change.

Sustainability activities initiated and continued at the Strategic Petroleum Reserves in 2015 include:

- Tracking fugitive emissions;
- Annually "right sizing" the vehicle fleet capacity by evaluating current fleet composition (e.g., vehicle size, number, and types);
- Employment of alternative fuel (hybrid) vehicles, optimizing the number of vehicles in the agency fleet, supporting carpooling, and promoting telephone and video conferencing to reduce air and ground travel;
- Encouraging teleconferencing to reduce travel by ground and air where practicable;
- A total of 29 standard electrical utility meters have been installed which allows the SPR to monitor energy usage of select buildings and 83 large (4160V) pumps. Meter data is captured on 15 or 30-minute demand periods and stored by a data historian for analyses;
- Conduct internal energy and water surveys at one of the four storage sites annually (e.g., Big Hill was surveyed in 2015);
- When applicable, using raw water instead of potable water for firefighting activities, to wash down pump pads, and provide pump seal flush and bearing cooling; reporting all water leaks and repair them as promptly as possible; and minimize fire water flow during testing**;**
- Installation of more energy efficient Light Emitting Diode (LED) bulbs, replacing florescent and high-pressure sodium bulbs, inside buildings;
- Annually update a building upgrade budget and schedule that addresses energy optimization, equipment life extension, GHG reduction, aging Heating, Ventilation, & Air Conditioning (HVAC) equipment, and environmental control and air quality replacements;
- Two new Liebert HVAC systems were installed in FY 2015. The new systems are expected to have high efficiency to improve (decrease) the power utilization effectiveness (PUE) of the data center;
- Renewable energy certificates (RECs) were purchased as 100% new renewable wind credits;
- Utilizing updated standard specifications, which incorporate sustainable materials and practices;

- "Less-Paper" work style promotional campaign was successfully implemented in FY 2013 to reduce printing/copying and continues to be implemented;

- Programs for reducing waste generation have been in place and are always improving; In FY 2015, 99% of the hazardous waste was diverted;

- Efforts continue to minimize all wastes through source reduction and reuse. Non-hazardous solid waste and construction and demolition (C&D) waste generation were both reduced in FY 2015. 78% of municipal solid waste was recycled and 99% of C&D waste was recycled;

- Using the "Buy It Green" (BIG) program for selecting environmentally preferable chemicals, products, and materials;

- The process of reviewing and approving acceptable chemicals and bio-based products for use on the SPR is ongoing. The list that is maintained is called the Qualified Product List (QPL). This chemical review identifies offending chemicals and allows for acceptable alternatives, such as bio-based products, to be purchased;

- Minimizing energy consumption by electronics through employing virtual desk top function, thin clients, and power saving and sleep modes;

- Purchasing EPEAT and ENERGY STAR®-rated electronic equipment where appropriate in eligible product categories; 98% of eligible electronics purchased in FY 2015 were EPEAT registered products;

- Dispositioning of excessed electronics through reuse or recycling; and,

- Continue the implementation of the Natural Phenomena Hazards Assessment Program conducted in compliance with DOE O 420.1C, Facility Safety, Chapter IV (Natural Phenomena Hazards Mitigation) to address climate change.

The SPR Energy Efficiency supports implementation of the Site Sustainability Plan, and the SPR's Energy Efficiency and Pollution Prevention Committee (E2P2) is comprised of Federal and contractor personnel who review and propose projects that focus on energy efficiency and sustainability measures.

Vapor Pressure Mitigation

Reassembly and construction of the portable degasification plant (that had been stored at the Bryan Mound facility since 2011) concluded at the West Hackberry site in 2014. Operation of the West Hackberry degas plant started in August 2014 and continued through December 2015. The degas plant is scheduled to remain at West Hackberry until January 2019 and will degas 15

of the 21 West Hackberry caverns during that time. A process total of 46.4 MMbbl of crude oil was degassed in FY 2015.

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

The degas plant degasifies the crude oil so that it can be sold and distributed to customers with a greatly reduced potential for emission of volatile organic compound (VOC) ozone precursors, benzene, and H_2S. The degas plant reduces the amount of VOCs in the vapors from the treated oil by 97 percent. Specifically, given life cycle VOC emissions from the degas plant averaging about two tons per year, emissions from a single full-scale end-of-lifecycle drawdown are reduced by 77,000 tons, or 1,900 times the pollutants generated from operation of the plant over its entire 25 year lifecycle.

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 Systems certification. During 2015, the SPR successfully maintained ISO 14001 certification by means of a third-party recertification audit. This certification is valid through April 2018 and is granted to all four SPR storage sites as well as the New Orleans SPR PMO Headquarters, including the warehouse building and the warehouse facility at the Stennis Space Center.

Environment, Safety, and Health

DOE is involved in the Environmental Management System (EMS) through the SPR Integrated Safety Management System (ISM), of which the EMS serves as the environmental leg.

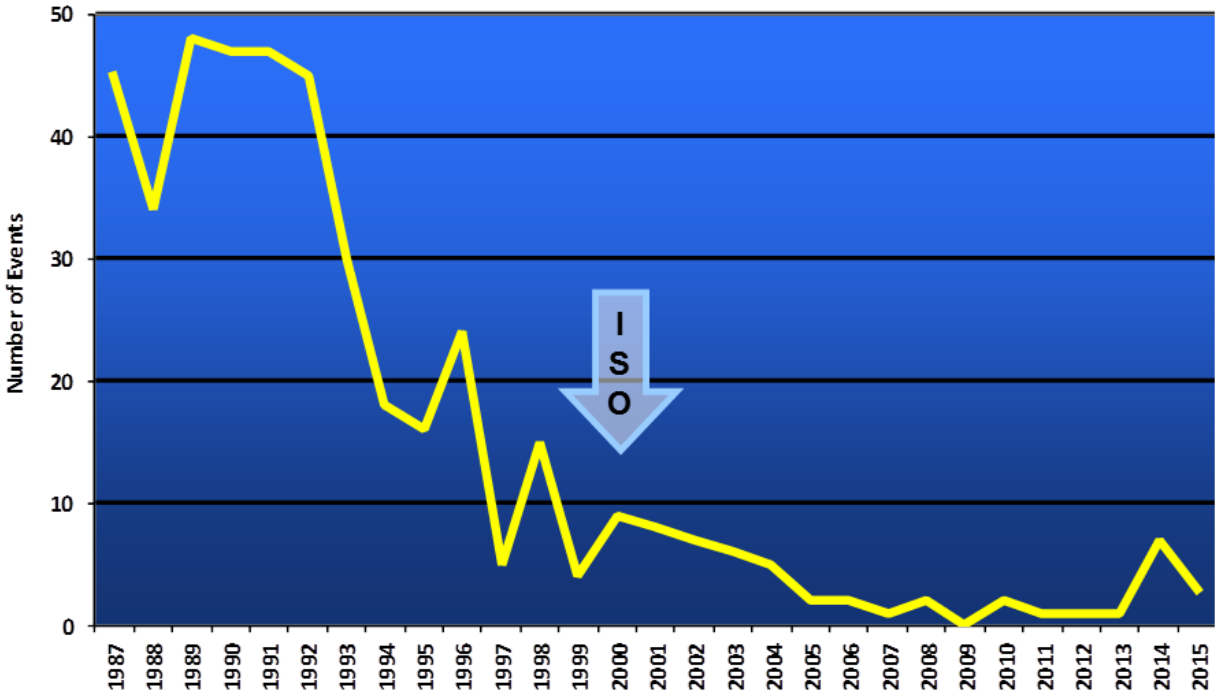
The SPR is accountable to the public for the safe delivery of crude oil during a national energy emergency and is a good steward of the environment. The safety management process is also a leg of SPR ISM. During 2015, all SPR storage sites continued their participation in occupational safety and health programs, including OSHA's Voluntary Protection Program (VPP) as well as DOE's VPP. All four sites were recognized for their accident rate performance by OSHA Region VI. Bayou Choctaw, Bryan Mound, and West Hackberry each received a Star of Excellence Award, while Big Hill received a "Star Among Stars" Award. A Star of Excellence

award requires the site to have an incident rate of at least 90 percent below the national average, and the “Star Among Stars” distinction recognizes Region VI sites that have exceeded the performance needed to qualify for a Star of Excellence award.

The enterprise risk assessment conducted last year was revised to evaluate the current risk to the total SPR operation, taking into consideration the existing hazard controls and incorporating quarterly reviews.

Figure 6 shows the SPR’s performance for recordable environmental incidents from 1993 through 2015. During CY 2015, there were three recordable environmental incidents. These incidents, three permit exceedances, were within the established targets of the FY 2015 work authorization directives.

Figure 6
Annual Summary of Project Events



Pollution Prevention

The SPR sets fiscal year goals for hazardous solid waste, non-hazardous solid waste, and construction and demolition debris waste generated at its sites. Waste diversion is the prevention and reduction of generated waste. This can be achieved in several ways, including source reduction, recycling, or reuse. These three waste streams were included based on guidance in Executive Order 13693, "Planning for Federal Sustainability in the Next Decade".

Also in FY 2015, the SPR continued its strategy to reduce municipal solid waste sent to landfills, which in turn assists in achieving DOE greenhouse gas reduction targets.

Hazardous Waste

The SPR met the FY 2015 goal to divert at least 50 percent of hazardous solid waste generated with a diversion rate of 99 percent.

Non-Hazardous Waste

The SPR continued its successful efforts to reduce municipal solid waste by diverting 78.5 percent of non-hazardous solid waste during FY 2015. The goal was to divert at least

50 percent of non-hazardous solid waste.

Construction and Demolition Debris

The FY 2015 goal was to divert at least 50 percent of construction and demolition debris waste generated. The SPR successfully met that goal by diverting 99.6 percent of construction and demolition debris waste generated.

Exploration and Production

Although there are no specific goals established for Exploration and Production (E&P) waste generation or diversion, the SPR continued with its effort to recycle this waste stream whenever possible. During FY 2015, 44 percent of E&P waste was diverted. The generated E&P waste included crude oil contaminated plastic and absorbents, crude oil contaminated solids, workover wastes, off-specification crude oil mixtures, and drill cutting wastes.

Environmental Improvement Measures

The SPR personnel participated for the 16th year in the annual Lake Pontchartrain Basin Foundation Beach Sweep. The local New Orleans activity is part of a worldwide event promoted by the Ocean Conservancy. Thirty-four employees, their families, and concerned citizens contributed time and effort cleaning debris at an assigned location on the southern shore of Lake Pontchartrain covering an estimated two lineal miles of shoreline and city street/storm drains. The SPR volunteer team collected an estimated 391 pounds of trash, documenting 109 man-hours of volunteered time, with 15 of those certified as community service hours for area schools.

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

Throughout the year, educational papers and informative posters that highlight specific wildlife topics are developed and sent to the sites to be posted on their wildlife bulletin board. The sites perform periodic avian inventories, which are uploaded into the Cornell Laboratory of Ornithology database.

The SPR recognized the 45th anniversary of Earth Day in 2015 as an opportunity for employees to join together and make commitments to environmental sustainability and a global green economy. For Earth Day, the SPR sponsored materials to construct bird houses during Kids Day, participated in photo contests, sent Earth Day messages to employees, gave an Earth Day presentation to an elementary school, and served an Earth Day-themed decorated cake to employees.

Security and Emergency Operations

The SPR maintains its capability to effectively respond to any emergency during day-to-day operations and severe weather conditions. The Continuity of Operations Plan, Emergency Command Vehicles, communication vehicles, and the Emergency Communications Network are the cornerstones for continuing essential work functions under catastrophic conditions. Protection force personnel assist emergency response team members as "support responders" for emergency conditions.

The SPR finished building the infrastructure for applying and maintaining a robust HSPD-12 credentialing program that includes training and maintenance. In 2015, the SPR completed its Vulnerability Assessment and Site Security Plan.

During 2015, the SPR completed four announced and four unannounced oil spill response drills in support of the Oil Pollution Act of 1990 (33 U.S.C. 2701 *et seq.*). Each storage site completed two oil boom containment deployments and exercised command and control, response and recovery activities.

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

Safety and Health Improvement Areas

Safety and Health Maintains Best Practice Performance

The SPR continued to improve the safety and health systems throughout the complex during 2015. The accident investigation process included reach-back to the M&O's corporate parent.

The M&O initiated the Management in Action (MIA) program, which required senior management to walk the site and engage in one-on-one dialogs with workers about safety and health. MIA reports were entered in a database of trend analysis. As a result of the reach-back capability, the M&O was also able to implement programs such as "Stop and Think" and "Speak Up! Listen Up!" developed by the corporate parent.

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

The SPR participates in the Occupational Safety & Health Administration (OSHA) VPP and Process Safety Management (PSM) programs, as well as DOE's VPP. Each SPR site must submit a candid self-evaluation to OSHA and DOE each year, including 20 or more very specific questions about their Process Safety Management System. They are also required to maintain ongoing improvements to their safety management system. Recommendations for improvements made during each of the OSHA onsite assessments must be replicated at all of the sites. In 2015, all four sites maintained their VPP certification, as did the security contractor at West Hackberry. The sites will have onsite OSHA assessments beginning in October of 2016.

Accident Rates Lowest in the History of the SPR

During CY 2015, the SPR's Total Recordable Case Rate was 0.58 cases per 200,000 worker hours, which significantly improved upon the SPR's goal of less than 1.40 cases per 200,000 worker hours. The Days Away/Restricted/Transferred Case rate was 0.23 cases per 200,000 worker hours, which was well below the SPR's goal of less than 0.90 cases per 200,000 worker hours. As a result, the SPR had its safest accident rates on record.

Integrated Safety Management

The SPR completed its annual Integrated Safety Management (ISM) validation and documented its performance in the ISM Annual Review and Update Report of 2015, which summarized the results of all audits and assessments conducted during the fiscal year. This report provides senior management with qualitative and quantitative data verifying that ISM is performing effectively and is used to judge annual ISM performance. During 2014, independent ISM assessment was conducted by a Fluor corporate team, who focused on the five core functions as implemented by the MOC. The assessment found the MOC to be compliant with ISM requirements, and provided several opportunities for improvement that are currently underway.

Annual Safety Summit and Tripartite Safety Council

For the past 11 years, the SPR has held an annual Management Safety Summit, which in 2011 was expanded to incorporate environmental issues as well. The 2015 ES&H Summit included briefings by the safety, health, and environmental departments of the M&O contractor as well as the security contractor. Current issues were briefed and discussed in the open forum.

The SPR also conducted two Tripartite Safety Councils. The purpose of these Councils is to give all SPR contractors' representatives an opportunity to address safety issues directly with the SPR Project Manager that have not been resolved through normal channels. Each SPR site, the

security contractor, and the architectural and engineering contractor have representatives at the meeting. Actions from these Councils are tracked to closure.

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 currently has developed and deployed over 50 automated business processes that assure that tasks are completed timely and in a consistent manner. System changes include consolidation of several systems into one large data management SharePoint farm.

Data Security, Accessibility, and Resiliency

The SPR has expanded the functionality of its Alternate Data Center, the program's emergency backup information technology system. The enhanced recovery capabilities allow for remotely accessible infrastructure with secure two-factor identification, a significant number of portable computers and Smartphones, and robust backup communications to provide reliable performance in an emergency so that essential work can be performed remotely. Elderly Blackberry communications devices were retired and replaced with a comprehensive mobile device (smartphones, tablets, laptops) management and data extensibility enhancement to improve user access to SPR data and usability; and to establish a secure extranet to significantly improve partner and external customer access.

Additionally, SPR is currently in the process of deploying wireless network infrastructure at the SPR storage sites to allow site users to participate in SPR automated business processes and have untethered access to SPR data. The SPR has implemented a strong cybersecurity program using innovative approaches, and tailored controls and monitoring to the SPR operational environment, as independently verified by the DOE Office of Enterprise Assessments in April 2015. A cloud computing study was completed to determine how to best and most cost effectively use cloud services to improve accessibility and resiliency. A pilot project is underway to migrate users to Microsoft Office 365 to leverage cloud services for email and Microsoft Office capabilities. The main objective is to increase availability of email for SPR mobile users.

Awards and Certifications

The SPR received the following awards and certifications in 2015 for performance during 2014:

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

A Star of Excellence award requires the site to have an incident rate of at least 90 percent below the national average, and the "Star Among Stars" distinction recognizes sites that have exceeded the performance needed to qualify for a Star of Excellence award.

International Organization for Standardization 9001 Quality Management System

During 2015, Fluor Federal Petroleum Operations maintained their ISO 9001 and 14001 certifications.

Customer Service

The SPR's Customer Service Team met with several refiners, traders, pipeline companies, and other customers during the 2015 American Fuel and Petrochemical Manufacturers' annual meeting in San Antonio, Texas during the third week of March. Additional meetings were held 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, each customer was asked to review their contact information and to provide updates on refinery activities such as expansion plans and any planned or actual changes to their crude oil inputs. Customers were also encouraged to discuss any operational or administrative issues they have encountered when dealing with the SPR so that those issues may be addressed.

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

Real Estate Actions

During 2015:

- Modification 090 to Interagency Agreement No. DE-AI96-78PO02816 was executed on September 22, 2015, to extend the agreement's period of performance for one year, through September 30, 2015.

- Modification 008 to Interagency Agreement No. DE-AI96-08PO92982 was executed on September 11, 2015, to extend the agreement's period of performance for through June 17, 2018.

- Modification M034 to the Bayou Choctaw Pipeline Lease with Shell was fully executed on June 30, 2015, documenting the responsibilities of each party.

- Modification M023 to the St. James Sugarland Terminal Lease with Shell was fully executed on June 30, 2015, documenting the responsibilities of each party.

- Modification M034 to Bryan Mound Pipeline Lease with ExxonMobil was fully executed on May 19, 2015 to provide funding for the tariff charged by ExxonMobil to transport approximately 4,201,500 barrels to the Brayan Mound Site as a result of the oil purchase under DE-SOL-0008003.

- FIMS Validations for Buildings, Trailers, and Other Structures & facilities; DOE Owned Land; and DOE Leases were conducted with Fluor Property Section on June 23 - 25, 2015. Fluor scored GREEN on all three validations.

XIV. Conclusion

The SPR continues to protect the United States economy from severe petroleum supply disruptions through continued operation and management of this emergency stockpile of crude oil. The SPR maintained crude oil stocks at four site facilities: Bryan Mound and Big Hill in Texas, and Bayou Choctaw and West Hackberry in Louisiana. The SPR entered 2015 with 691 million barrels of crude oil, and as of December 31, 2015, the SPR held 695 million barrels, equivalent to approximately 148 days of net U.S. petroleum imports, which is an increase of 4,159,551 barrels from 2014. The SPR also maintained 1 million barrels of refined petroleum product stocks in multiple contracted storage facilities in the New York Harbor, greater Boston, Massachusetts, and greater Portland, Maine areas; these stocks comprise the Northeast Gasoline Supply Reserve, a component of the SPR. The SPR continued efforts for maintaining the SPR in accordance with EPCA (42 U.S.C. § 6201 *et seq.*).

Appendix: Strategic Petroleum Reserve Site Information

Bryan Mound

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

Site Description
254 million barrel storage facility consisting of 19 caverns.

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

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

System Parameters

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

*Bryan Mound has three storage tanks that are required for site drawdown and refill operations. Two tanks are currently unusable due to a damaged internal floating pan. The unavailability of the storage tank has reduced the site's actual 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
221 million barrel storage facility consisting of 21 caverns.

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

System Parameters

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

*The drawdown rate is affected due to increased vapor pressure in several of the site's caverns.

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
170 million barrel storage facility consisting of 14 caverns.

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

System Parameters

Drawdown Rate:	(Sour)	1,100,000 BBL/D
	(Sweet)	1,000,000 BBL/D
Raw Water Pumping Rate:		1,192,000BBL/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, LA.

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

Bayou Choctaw

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

Site Description
76 million barrel storage facility consisting of six caverns.

Oil, brine, and raw water piping distribution system connecting caverns with central plant, a water intake structure, 12 brine disposal wells, and a pipeline for disposing of brine to Boardwalk Louisiana Midstream, LLC (formerly PetroLogistics Olefins, LLC). Eighteen (18) pumps totaling over 18,000 horsepower.

System Parameters

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

Distribution Facilities
DOE-owned 37.2 mile, 36-inch pipeline to Shell's Sugarland Terminal and Capline Pipeline; Shell 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 Petrologistics Olefins, LLC 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
AEO	Annual Energy Outlook
AFPM	American Fuel and Petrochemical Manufacturers
API	American Petroleum Institute
BBL	Barrels
BIG	Buy It Green
CAS	Contractor Assurance System
C&D	Construction and Demolition
CY	Calendar Year
DOE	Department of Energy
DOI	Department of Interior
E&P	Exploration and Production
EMS	Environmental Management System
EPEAT	Electronic Product Environmental Assessment Tool
EPCA	Energy Policy and Conservation Act
FEMP	Federal Energy Management Program
FY	Fiscal Year
GHG	Greenhouse Gases
HVAC	Heating, Ventilation, & Air Conditioning
IDP	Individual Development Plan
ILA	Industrial, Landscaping & Agricultural
ISM	Integrated Safety Management
ISO	International Organization for Standardization
LED	Light Emitting Diode
LPBF	Lake Pontchartrain Basin Foundation
Mbbl	Thousand Barrels
Mbbl/D	Thousand Barrels per Day
MIT	Mechanical Integrity Test
MMbbl	Million Barrels
MMbbl/D	Million Barrels per Day
M&O	Management and Operating
NGSR	Northeast Gasoline Supply Reserve
OMB	Office of Management and Budget
OSHA	Occupational Safety and Health Administration
PLM	Plant Lifecycle Module
PSM	Process Safety Management
Pub. L.	Public Law
QPAD	Quality and Performance Assurance Division
RIK	Royalty-in-Kind
SPR	Strategic Petroleum Reserve
SPR PMO	Strategic Petroleum Reserve Project Management Office

SSP	Site Sustainability Plan
STE	Systems Test Exercise
TBL	Technical Baseline
VOC	Volatile Organic Compound
VPP	Voluntary Protection Program
WAD	Work Authorization Directive

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