U.S. DEPARTMENT OF ENERGY

Strategic Petroleum Reserve Annual Report for Calendar Year 2021

Report to Congress
November 2023

United States Department of Energy
Washington, DC 20585

Message from the Secretary

The Secretary of Energy[1] is required 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 2021.

This report also includes details concerning the physical capacity, type, and quantity of petroleum in the Strategic Petroleum Reserve in 2021, 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 Patty Murray**
  Chair, Senate Committee on Appropriations

- **The Honorable Susan Collins**
  Vice Chair, Senate Committee on Appropriations

- **The Honorable Sheldon Whitehouse**
  Chairman, Senate Committee on Budget

- **The Honorable Chuck Grassley**
  Ranking Member, Senate Committee on Budget

- **The Honorable Patty Murray**
  Interim Chair, Subcommittee on Energy and Water Development
  Senate Committee on Appropriations

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

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

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

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

- **The Honorable Kay Granger**
  Chairwoman, House Committee on Appropriations

- **The Honorable Rosa DeLauro**
  Ranking Member, House Committee on Appropriations

- **The Honorable Chuck Fleishmann**
  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 Jodey Arrington**
  Chairman, House Committee on the Budget

- **The Honorable Brendan Boyle**
  Ranking Member, House Committee on the Budget

- **The Honorable Cathy McMorris Rodgers**
  Chair, House Committee on Energy and Commerce

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

- **The Honorable Jeff Duncan**
  Chairman, Subcommittee on Energy, Climate and Grid Security
  House Committee on Energy and Commerce

- **The Honorable Diana DeGette**
  Ranking Member, Subcommittee on Energy, Climate and Grid Security
  House Committee on Energy and Commerce

If you have any questions or need additional information, please contact Ms. Rebecca Ward, Deputy Assistant Secretary for Senate Affairs or Janie Thompson, Deputy Assistant Secretary for House Affairs, Office of Congressional and Intergovernmental Affairs, at (202) 586-5450; or Meg Roessing, Deputy Director for External Coordination, Office of Budget, Office of the Chief Financial Officer, at (202) 586-3128.

Sincerely,

Jennifer Granholm

Executive Summary

Program Highlights and Status

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

The SPR entered calendar year (CY) 2021 with 638.1 million barrels (MMbbl) of crude oil, and at the end of CY 2021 (as of December 31, 2021), the SPR held 593.7 MMbbl. The net decrease of crude oil is a result of the SPR conducting three congressionally mandated crude oil sales, the Hurricane Ida Emergency Exchange, and the fiscal year (FY) 2022 Winter Exchange in CY 2021.

In February 2021, the SPR returned the remaining 0.312 MMbbl of Exchange for Storage (EFS) crude oil. To recap the EFS program, beginning in April 2020, the SPR started receiving crude oil deliveries. On June 30, 2020, the SPR held approximately 21 MMbbl for the EFS program. In August 2020, the SPR began returning stored EFS program oil, and as of December 31, 2020, had returned approximately 19.5 MMbbl to EFS customers. At its conclusion, the EFS program successfully delivered 19.86 MMbbl of crude oil to its partners from July 2020 through February 2021. In total, the EFS program netted the SPR inventory 1,220,747.9 million barrels in additional crude oil.

The Consolidated Appropriations Act of 2021 (Public Law 116-260) appropriated $188 million to the SPR Account for operating and maintaining the SPR. Congress also appropriated $1 million for the SPR Petroleum Account to fund the cost of the SPR mandatory crude oil sales. Obligations for the SPR in FY 2021 totaled approximately $205 million. From this amount, the SPR obligated $21.4 million for Federal program management, $162.8 million for contractual goods and services to operate and maintain the reserve, and $20.8 million for the Northeast Gasoline Supply Reserve's (NGSR) storage costs and administrative oversight. The SPR Petroleum Account spent $4.3 million related to the cost of moving oil in CY 2021.

Changes to Performance Capabilities

Vapor Pressure Mitigation Program

The use of deep underground solution-mined salt caverns for long-term storage of crude oil subjects the oil to geothermal heating and gas intrusion from the surrounding salt. That exposure tends to increase the crude oil vapor pressure. During a drawdown, SPR oil delivered to storage tanks at terminals may contain toxic and flammable gases at levels that can present environmental and health risks to terminal personnel and the public. The SPR mitigates these risks by using a customized, portable degasification unit that reduces the crude oil vapor

pressure in the caverns for safe crude oil delivery. The unit moves among the SPR sites every 2–5 years, as necessary, to degas caverns that show high levels of vapor pressure.

A new, modern unit is under design as part of the SPR Modernization Program's Life Extension Phase 2 (LE 2) Project. The new degasification unit should be operational in 2025.

Environment, Safety, and Health

The SPR continued to enhance safety and health at the sites. During 2021, the SPR achieved a Total Recordable Case (TRC) Rate of 0.51 and a Days Away/Restricted/Transferred (DART) Rate of 0.34. These low accident rates positioned all four SPR storage sites for noteworthy achievements in the Occupational Safety and Health Administration's (OSHA) Voluntary Protection Program (VPP). The VPP program is OSHA's official recognition that the employers and employees at a site have implemented an exemplary occupational safety and health system and maintained injury and illness rates below the averages for their respective industry. The Big Hill, Bryan Mound, and Bayou Choctaw storage sites each received the "Star Award" for achieving incident rates at or below the national average. The West Hackberry site received an additional VPP award, the "Star of Excellence," for achieving incident rates at least 90 percent below the national average.

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

STRATEGIC PETROLEUM RESERVE ANNUAL REPORT TO CONGRESS FOR CALENDAR YEAR 2021

Table of Contents

I. Legislative Language 1

II. Program Mission 2

Introduction 2

Legislative Activity 2

III. Program Management 3

Organization 3

Contractual Support 5

IV. Crude Oil Storage Program 6

Strategic Petroleum Reserve Storage Facilities 6

Cavern Maintenance 7

Bryan Mound Site Status 8

Big Hill Site Status 8

West Hackberry Site Status 9

Bayou Choctaw Site Status 9

St. James Marine Terminal Status 9

V. West Hackberry Hurricane Damage 9

VI. SPR Modernization Program – Life Extension Phase 2 Project 10

VII. Petroleum Acquisition……11
Oil Acquisition Market Assessments……11
Crude Oil Exchange……11
Crude Oil Inventory Status……11
Fill of Reserve……12
VIII. Emergency Response Capabilities……16
Sale of Oil……16
Competitive Sales Procedures……16
Drawdown Capabilities……17
Drawdown Readiness Activities……19
Distribution Capabilities……20
Distribution Assessment……22
Base-Year Assessment……22
Future Year Assessments……23
International Energy Program Requirements……24
IX. Commercial Activities……24
Commercial Leases……24
Bayou Choctaw Pipeline……24
St. James Marine Terminal……25
Bryan Mound Pipelines……25
X. Budget and Finance……27
Appropriations through Fiscal Year 2021……27
SPR Account and SPR Petroleum Account……29
SPR Petroleum Account……29
Performance Measurement……30

XI. Other Program Activities....31
Congressionally-Mandated SPR Crude Oil Sales....31
Crude Oil Exchange....32
Northeast Gasoline Supply Reserve....32
Northeast Home Heating Oil Reserve....33
Quality and Performance Assurance....34
Vapor Pressure Mitigation....35
International Organization for Standardization (ISO) 14001....36
Environment, Safety, and Health....36
Pollution Prevention....37
Hazardous Waste....3737
Non-Hazardous Waste....37
Construction and Demolition Debris....38
Exploration and Production (E&P)....38
Environmental Improvement Measures....38
Security and Emergency Operations....38
Safety and Health Improvement Areas....39
Safety and Health Maintains Best Practice Performance....39
DOE and Occupational Safety & Health Administration's Voluntary Protection Program....39
Accident Rates for the SPR....40
Integrated Safety Management....40
Annual Safety Summit and Tripartite Safety Council....40
Business Process Re-Engineering....41
Data Security, Accessibility and Resiliency....43
Awards and Certifications....44

International Organization for Standardization 9001 Quality Management System 44

Customer Service 44

Real Estate Actions 45

XII. Conclusion 45

Appendix A. ..... List of Acronyms A-1

I. Legislative Language

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

Section 165 of EPCA, as amended, requires the Secretary of Energy to submit an annual report to the President and Congress on the activities of the SPR. Consistent with this statutory provision, this Strategic Petroleum Reserve Annual Report for Calendar Year (CY) 2021 includes:

- Status of the physical capacity of the SPR and the type and quantity of petroleum products stored in the SPR;
- Estimate of the schedule and cost to complete planned equipment upgrades or capital investments in the SPR, including upgrades and investments carried out as part of operational maintenance or life extension activities;
- Identification of any life-limiting conditions or operational problems at any SPR facility, and proposed remedial actions including an estimate of the schedule and cost of implementing those remedial actions;
- Description of current withdrawal and distribution rates and capabilities, and an identification of any operational or other limitations on those rates and capabilities;
- Listing of petroleum product acquisitions made in the preceding year and planned in the following year, including quantity, price, and type of petroleum;
- Summary of the actions taken to develop, operate, and maintain the SPR;
- Summary of the financial status and financial transactions of the SPR Account and the SPR Petroleum Account for the year;
- Summary of expenses for the year, and the number of Federal and contractor employees;
- Status of contracts for development, operation, maintenance, distribution, and other activities of the SPR;
- Summary of foreign oil storage agreements and implementation status;

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 U.S. to disruptions in the world oil market. One of the purposes of EPCA was to create a petroleum reserve capable of reducing the impact of severe energy supply interruptions.

As of December 31, 2021, the SPR contained 593.7 MMbbl of crude oil. In addition to the SPR's mission to protect the U.S. economy from severe supply, the U.S. relies on the SPR to fulfill its obligations under the International Energy Program.

Legislative Activity

The following laws enacted through the date of this report directly affect the SPR program now or are expected to affect the SPR over the next decade and beyond:

- Section 403 of the Bipartisan Budget Act of 2015 (Public Law 114-74) requires the Secretary to draw down and sell a total of 58 MMbbls of crude oil from the SPR over eight consecutive years, commencing in FY 2018 and continuing through FY 2025.

- Section 404 of the Bipartisan Budget Act of 2015 (Public Law 114-74) authorizes the Secretary to sell crude oil in an amount up to $2 billion for the period encompassing FY 2017–2020. The fourth and final Energy Security and Infrastructure Modernization (ESIM) sale was not completed in 2020 as planned due to the COVID-19 pandemic. Section 14002 of the Coronavirus Aid, Relief, and Economic Security (CARES) Act (Public Law 116-136) provided the Department flexibility to conduct the final ESIM sale in FY 2020, FY 2021, or FY 2022.

- Section 32204 of the Fixing America's Surface Transportation Act (FAST Act) (Public Law 114-94) requires the Secretary to draw down and sell a total of 66 MMbbls of crude oil from the SPR, or a volume, which generates up to $6.2 billion, over three consecutive years, commencing in FY 2023 and continuing through FY 2025.

- Section 20003 of Tax Cuts and Jobs Act of 2017 (Public Law 115-97) directs the Secretary of Energy (the "Secretary") to sell 7 MMbbls from the SPR in fiscal years (FY) 2026-2027.

- Section 30204 of Bipartisan Budget Act of 2018 (Public Law 115-123) directs the Secretary to sell 30 MMbbls in FYs 2022-2025; 35 MMbbls in FY 2026; and 35 MMbbls in FY 2027 from the SPR.

- Section 501 of Division O Consolidated Appropriations Act, 2018 (Public Law 115-141), directs the Secretary to draw down and sell a total of 10 MMbbls of SPR crude oil commencing in FY 2020 and continuing through 2021.

- Section 3009 of America's Water Infrastructure Act of 2018 (Public Law 115-270) requires the Secretary to draw down and sell a total of 5 MMbbls of crude oil from the SPR in FY 2028.

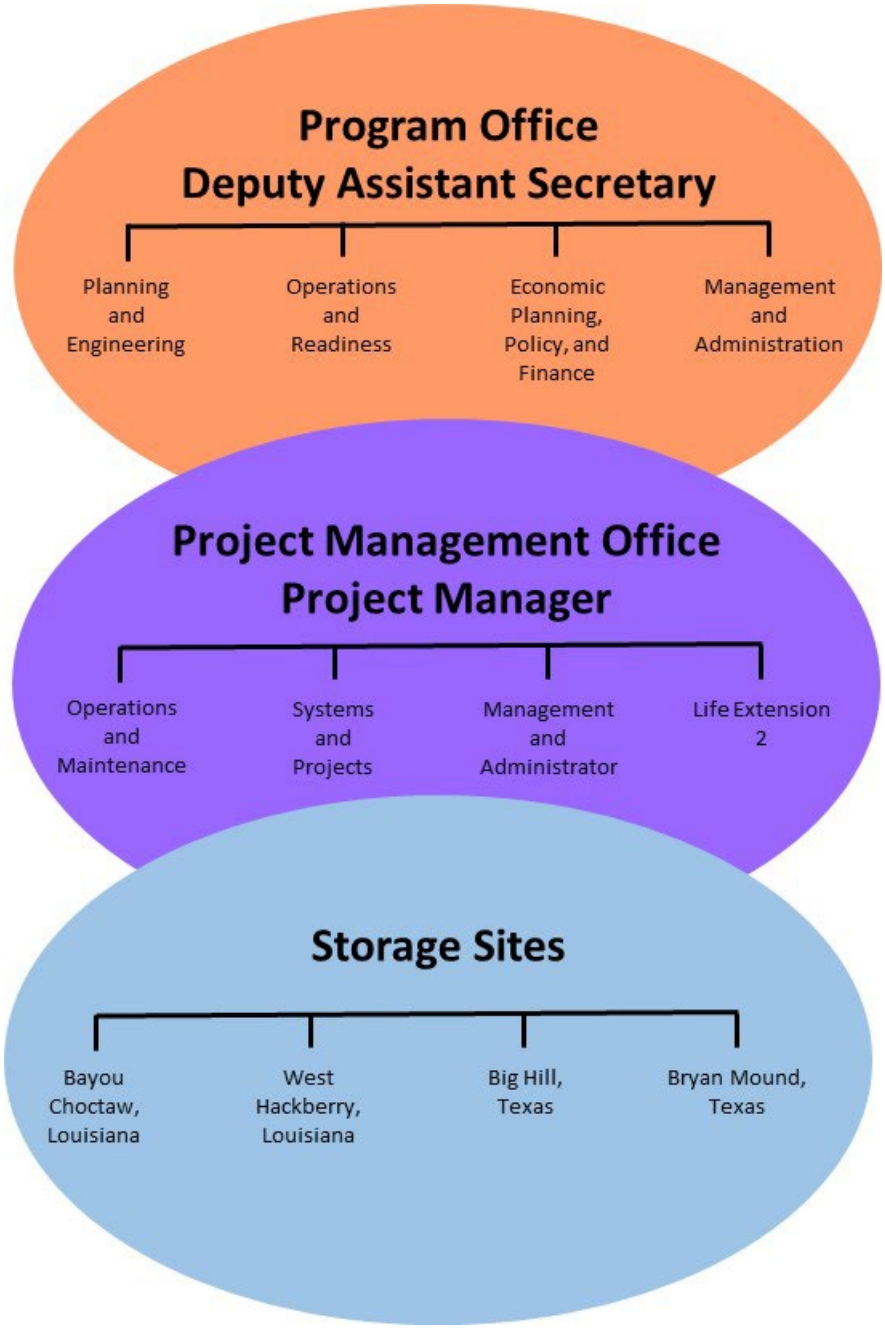
- Infrastructure Investment and Jobs Act (Public Law 117-58) requires the Secretary to draw down and sell a total of 87.6 MMbbls of crude oil from the SPR in FY 2028 – FY 2031.

III. Program Management

Organization

In 2021, the Assistant Secretary (AS) for Fossil Energy and Carbon Management (FECM) (located at U.S. Department of Energy (DOE) headquarters in Washington, D.C.) has overall program responsibility for carrying out the SPR's mission and maintaining operational readiness. This responsibility is further delegated to the Deputy Assistant Secretary (DAS) for Petroleum Reserves, who leads the Program Office (PO), also in Washington, D.C. The DAS for Petroleum Reserves executes the SPR mission through the SPR Project Management Office (PMO) in New Orleans, Louisiana. The PMO supervises day-to-day operations of the SPR. As of December 31, 2021, PO staffing stood at 20 Federal employees and 10 contractor employees, while SPR PMO staffing was 94 Federal employees and 762 contractor employees overseeing the base program. Figure 1 depicts the SPR's organizational structure.

Figure 1. Strategic Petroleum Reserve Organizational Structure



Contractual Support

The PMO is responsible for operations, maintenance, design, and construction of the SPR. The PMO primarily fulfills this responsibility through a management and operations (M&O) contractor, currently Fluor Federal Petroleum Operations (FFPO). FFPO provides leadership and expertise to operate and maintain SPR facilities and systems. The period of performance for the current contract is five years and began on April 1, 2014, with one five-year option. On August 15, 2018, the SPR exercised the five-year option period, which extends the contract's period of performance through March 31, 2024.

Vali Cooper International, a Service-Disabled Veteran-Owned Small Business architectural and engineering (A&E) firm, and Tanaka Madison Consulting, a Woman-Owned Small Business A&E firm, are under contract to provide design services for the four SPR storage facilities. The five-year period of performance on each contract is from August 12, 2020 through August 11, 2025.

Several support services contracts exist for management, technical, and computer support. The largest support service contractor is Infinity Technology, a certified 8(a) program certified and Service-Disabled Veteran-Owned Small Business that provides management and technical support services. This contract began on November 1, 2016, with a two-year base period of performance and three one-year options. The contract was extended one month from October 31, 2021 to November 30, 2021, to facilitate the award of the new support services follow-on contract to Chenega Enterprise Systems & Solutions, a certified 8(a) Alaska Native Corporation. This contract began December 1, 2021, with a two-year base period of performance and three one-year options and expires November 30, 2026, should all options be exercised.

Other contractors providing support to the PO in Washington, D.C., in 2021 included Core Laboratories, L.P.; AOC Petroleum Support Services, LLC; and Cyborg, Inc.

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

In CY 2021, the SPR held contracts with three commercial facilities that provided terminal services for fill, drawdown, and storage of crude oil. The SPR has a contract with Sunoco Partners Marketing & Terminals, L.P., Phillips 66 Beaumont Terminal, and Seaway Crude Pipeline Company.

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

IV. Crude Oil Storage Program

Strategic Petroleum Reserve Storage Facilities

The SPR currently operates and maintains four crude oil storage facilities in the Gulf Coast region of the U.S. All oil stored in SPR facilities is stored in large underground caverns created in salt dome formations. Salt dome storage technology provides maximum security and safety for the Nation's stockpile of crude oil and is also the lowest-cost technology for large-scale petroleum storage. The average operational cost for the SPR in FY 2021 was $0.27 per barrel, which includes the cost for operational management, staffing, security operations and maintenance. The average operational cost for the SPR does not include infrastructure-related costs that are funded by the LE 2 project and long-term wear and tear on the caverns due to oil movements.

The SPR has two sites in Texas (Bryan Mound and Big Hill) and two sites in Louisiana (West Hackberry and Bayou Choctaw). The four sites have a combined storage capacity of 713.52 MMbbl and an initial drawdown capability of 4.415 per day MMbbl/d. Shown in Table 1 is the authorized storage capacity and sustained drawdown capability of each SPR site as of December 31, 2021.

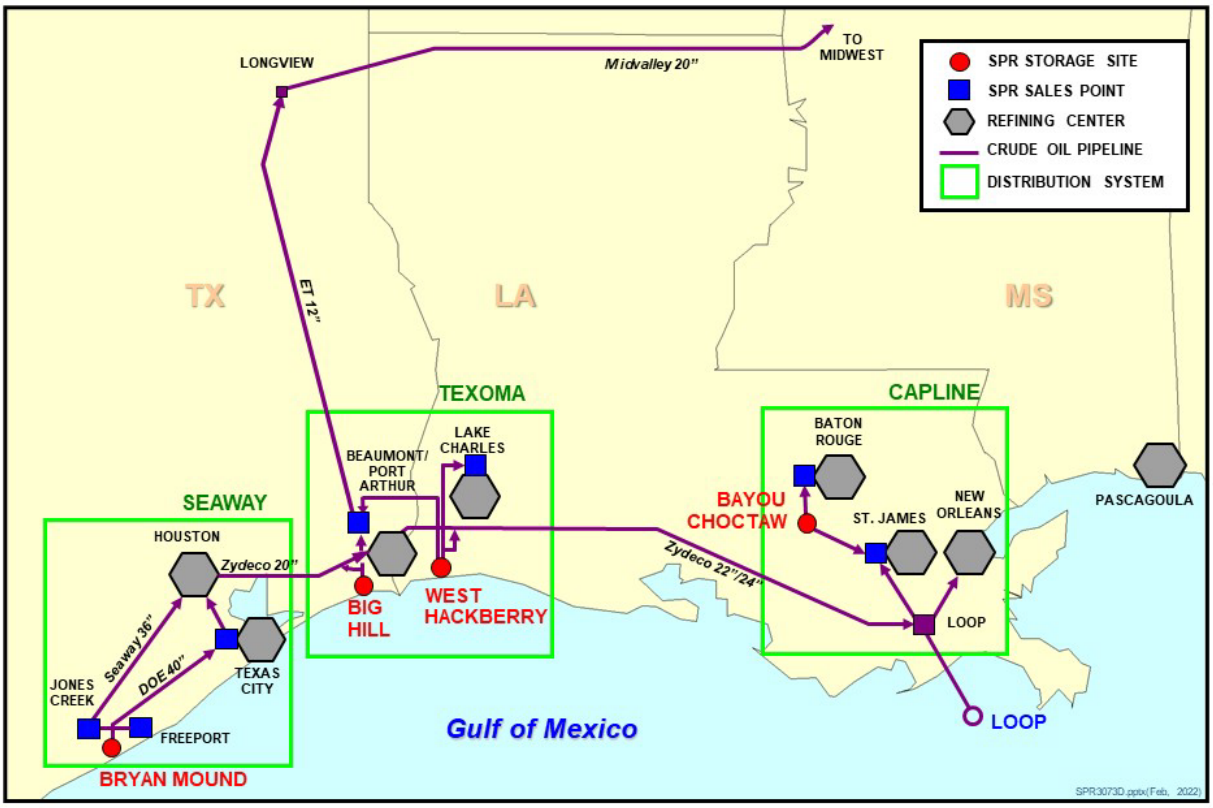
Table 1. Authorized Storage Capacity and Sustained Drawdown Capability (As of December 31, 2021)

CURRENT SITE CAPABILITY			
Storage Facility	**Authorized Storage Capacity (MMbbl)**	**Crude Mix Sweet/Sour (MMbbl)**	**Sustained Drawdown Capability (MMbbl/d)**
Bryan Mound	**247.14**	**67/152.5**	**1.5**
West Hackberry	**220.38**	**102/77.9**	**1.3**
Big Hill	**170.0**	**65/66.5**	**1.1**
Bayou Choctaw	**76.00**	**19/44**	**0.515**
Total Program	**713.52**	**252/386 (43%/57%)**	**4.415**

Sweet = Sulfur content < 0.5 percent; Sour = Sulfur content > 0.5 percent
MMbbl = Million Barrels

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 have 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 respective distribution systems are shown in Figure 2.

Figure 2. Storage Sites and Distribution System



Cavern Maintenance

The Cavern Integrity program is responsible for the maintenance and operation of the SPR's 60 active storage caverns, 117 cavern entry wells, and the 20 brine disposal wells at the two Louisiana sites. The SPR also maintains four decommissioned caverns that are no longer used for crude oil storage. Key responsibilities include ensuring the safe and complete containment of crude oil and brine within the cavern-well systems and maintaining compliance with state regulations promulgated by the Louisiana Department of Natural Resources and the Railroad Commission of Texas. These responsibilities are accomplished through periodic wireline logging of caverns and wells, sonar surveys of caverns, and mechanical integrity testing. The Cavern Integrity program performs annual subsidence surveys of the ground surface of each of the four sites and maintains the wellheads that cap each well. The brine disposal wells are used to inject excess cavern brine during crude oil fill operations and to relieve excess cavern pressure.

The program also operates and maintains the DOE-owned Rig 155 workover rig on a full-time basis. The rig is inspected annually and maintained with minor repairs as needed. The complete, five-year teardown, inspection and repair of the rig was performed in CY 2020 and will be due again in 2025. A supplemental leased rig is used when there is sufficient backlog or situations warrant additional capability. A supplemental leased rig was used in 2021 as described below.

The program also performs diagnostic workovers and repairs in the cavern wells with hanging brine strings that are used to inject brine into the caverns and, when necessary, well remediations to mitigate severe subsurface deformation and restore lost mechanical integrity. During CY 2021, the SPR PMO oversaw a total of 14 diagnostic workovers across all four SPR sites and two well remediations at Bryan Mound. The SPR used two workover rigs running simultaneously for this work: the DOE-owned rig and a leased rig. The number of workovers and remediations varies from year to year depending on regulatory compliance requirements, damage to brine strings, and conditions in the brine disposal wells. A dedicated M&O Rig Project Manager and Safety Specialist supervise all rig activities.

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, 2021, the site had 19 operational storage caverns with a total authorized storage capacity of 247.14 MMbbl and a cavern inventory of 219.3 MMbbl.

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, 2021, the site had 14 operational storage caverns, with a total authorized storage capacity of 170.0 MMbbl and a cavern inventory of 129.8 MMbbl.

In March 2021, the Government of Australia (GOA) purchased an additional 191,829 barrels of sweet crude from the SPR, for a total of 1.691 million barrels of crude oil. The crude oil will remain at Big Hill pursuant to a Crude Oil Storage Lease Agreement between DOE and GOA until needed to respond to an oil supply disruption, and it will assist the GOA with fulfilling its International Energy Agency (IEA) member requirement. In fact, in 2022, Australia did release all 1.7 million barrels as part of their response to the IEA collective action to release 120 million barrels in response to the Russia invasion of Ukraine.

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, 2021, the site had 21 operational storage caverns with a total authorized storage capacity of 220.38 MMbbl and a cavern inventory of 180.1 MMbbl.

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, 2021, the site had six storage caverns, an authorized storage capacity of 76.0 MMbbl and a cavern inventory of 62.5 MMbbl.

St. James Marine Terminal Status

The SPR owns a marine terminal on the Mississippi River in St. James, Louisiana. The facility was built in the late 1970s and began operations in early 1980 primarily to support fill and drawdown of the Weeks Island (decommissioned in November 1999) and Bayou Choctaw SPR sites. The St. James marine terminal has six above ground storage tanks with a total storage capacity of approximately 2 MMbbl. On January 1, 2020, ExxonMobil Pipeline Company (EMPCO) became the new lessee as the tenant operator of the marine terminal. The new lease agreement includes a 10-year base period with two five-year option periods. EMPCO will provide normal operations and maintenance of the terminal, including supporting the SPR as a sales and distribution point in the event of an SPR drawdown.

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

V. West Hackberry Hurricane Damage

Supplemental funding of $43.3 million was received in December 2021 for disaster-related repairs at West Hackberry related to two hurricanes in 2020 that damaged the site. On August 27, 2020, Hurricane Laura made landfall in Cameron Parish, Louisiana as a Category 4 hurricane with the eye passing approximately four miles from the site. It caused significant damage to West Hackberry, leaving the site incapable of drawdown. An initial assessment noted large amounts of debris and damage to fences, lighting/power poles, cabling and cable trays, security equipment, multiple buildings, complete destruction of the Spare Parts Warehouse and loss of many spare parts, loss of commercial power, and loss of potable water and sewerage treatment services. The SPR PMO prioritized recovery tasks and assigned them to site contractors to restore the site's drawdown capability.

On October 9, 2020, Hurricane Delta made landfall in southwest Louisiana causing additional impact to the West Hackberry site. The majority included further damage to areas already impacted by Hurricane Laura. The site repaired its operational infrastructure and became fully operational upon commercial power restoration on October 28, 2020.

Site restoration continues with all recovery work projected for completion in 2022.

VI. SPR Modernization Program – Life Extension Phase 2 Project

In 2015, the SPR commenced a program that involved all four SPR storage sites that replaced or upgraded equipment and facilities that approached or already exceeded the projected 25-year life span. This commencement occurred with the signing of Critical Decision-0 (CD-0), Approve Mission Need, in accordance with DOE Order 413.3B, Program and Project Management for the Acquisition of Capital Assets. CD-1, Approve Alternative Selection and Cost Range was approved in December 2016 with a cost range of $750 million to $1.4 billion. In 2018, design efforts continued and procurement of Long Lead Government Furnished equipment began. In 2020, LE2 efforts continued with the assumption of the architect-engineer (A-E) scope by the M&O contractor. In 2020, the SPR's major accomplishment for the LE2 project included a fourth wave of Long Lead Procurement (CD-3C/3D) with an estimated value of $76.5 million.

In 2021, The M&O contractor, FFPO, completed Title II design in Houston, Texas, with design reviews and 3D model reviews being conducted virtually and remotely. The estimated cost based on the completed design exceeded the $1.4B funding. To move the project back to the $1.4 billion budget level approved at CD-1, the design team began a project de-scoping effort. Most significantly, the Project Management Executive approved removal of the 16 secondary cavern wells at West Hackberry from the project as well as the Site-Wide WiFi scope. This reduced project scope by over $450 million and necessitated only a small amount of additional de-descoping. Choosing this course of action had the advantage of leaving nearly the entire planned suite of upgrades and improvements intact (except for the West Hackberry secondary wells) and will accomplish the original goal of preparing the SPR for the next 20-25 years. Critical Decision-2/3 (CD-2/3) was approved in June 2021 for Bryan Mound, Big Hill, and Bayou Choctaw. The Critical Decision-4 (CD-4) dates for Bryan Mound, Big Hill, and Bayou Choctaw are May 2025, February 2025, and February 2025, respectively. An Office of Project Management-led (EIR) will be scheduled for West Hackberry between December 2022 and March 2023. Early works field subcontracts have been awarded at three of the four sites.

Through the interaction and the cooperation between the Office of Project Management and the Integrated Project Team (IPT), certification of an Earned Value Management System (EVMS) for the projects was approved August 10, 2022.

VII. Petroleum Acquisition

Oil Acquisition Market Assessments

Procedures for the acquisition of petroleum for the SPR are found in Title 10 of the Code of Federal Regulations Part 626 (10 CFR Part 626). These procedures require performance of a comprehensive market assessment to ensure SPR acquisition activities will not unduly impact current market conditions.

Crude Oil Exchange

In February 2021, the SPR returned the remaining .312 Mbbl of Exchange for Storage (EFS) crude oil. To recap the EFS program, beginning in April 2020 under direction from the President in response to low oil prices and domestic industry issues resulting from COVID-19 market condition impacts, the SPR began receiving crude oil deliveries. By June 30, 2020, the SPR held approximately 21 MMbbl of commercial inventories under the EFS program. In August 2020, the SPR began returning stored EFS program oil, and as of December 31, 2020, had returned approximately 19.5 MMbbl to EFS customers. At its conclusion, the EFS program had successfully delivered 19.86 MMbbl of crude oil to its partners from July 2020 through February 2021, with remaining barrels kept by the SPR as payment for the temporary storage.

In response to a lack of crude oil supply due to Hurricane Ida, the SPR negotiated with impacted customers and commenced an emergency exchange of SPR crude oil in September 2021. The total barrels shipped in response was 3.29 MMbbl from September 10, 2021 through September 29, 2021. These barrels are anticipated to be returned to the SPR in CY 2022 or when conditions allow.

The SPR also initiated the FY 2022 Winter Exchange starting December 16, 2021. The program was a response to the high oil prices subsequently impacting gasoline and other fuel prices U.S. consumers were experiencing. The purpose was to supplement the crude oil market with additional supply. From December 16, 2021 through December 31, 2021, the SPR delivered 4.14 MMbbl over 17 shipments to its FY 2022 Winter Exchange partners. Additional barrels were made available in CY 2022. Due to the scope of this program, the exchange barrels are anticipated to be returned in CY 2023, 2024, and 2025.

Crude Oil Inventory Status

As of December 31, 2021, the SPR's crude oil inventory was 593.7 MMbbl, a decrease of 44.4 MMbbl from CY 2020. The net decrease resulted from conducting three congressionally mandated crude oil sales, the Hurricane Ida Emergency Exchange, and the FY 2022 Winter Exchange in December 2021.

Fill of Reserve

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

- **Table 2: Year-End Inventories and Oil Fill History**, lists year-end inventories and average daily fill rates for the years 1977–2021 (by FY and CY)
- **Table 3: Crude Oil Receipts (As of December 31, 2021),** lists crude oil receipts by country of origin since 1977
- **Table 4: Crude Oil Inventory (As of December 31, 2021),** 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

	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)
2004	670.3	126[5]	675.6	102[5]
2005	693.7	64[6]	684.5	25[6]
2006	687.8	(16)[7]	688.6	11[7]
2007	692.8	14	696.9	23
2008	702.4	26[8]	701.8	13[8]
2009	725.1	62.2	726.6	67.9
2010	726.5	3.8	726.5	(0.2)[9]
2011	695.9	(84)[10]	695.9	(84)[10]
2012	694.9	(3)[11]	695.3	(2)[11]
2013	696.0	3	696.0	2
2014	691.0	(13.6)[12]	691.0	(13.6)[12]
2015	695.1	11.2	695.1	11.2
2016	695.1	0	695.1	0
2017	673.8	(58.4) [13]	662.8	(88.5) [14]
2018	660.0	(37.8) [15]	649.1	(37.53)
2019	644.8	(41.6)[16]	635.0	(38.9)[17]
2020	642.2	(7.1)[18]	638.1	8.5[18]
2021	617.8	(66.8)[19]	593.7	(121.4)[20]

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

1. Fill rates adjusted for oil sales
2. Fill suspended during this period
3. Decrease due to Maya exchange
4. Net decrease due to Exchange 2000
5. Net Hurricane Ivan deliveries and receipts
6. Net Hurricane Ivan receipts & Katrina deliveries
7. Net Hurricane Katrina exchange and drawdown sales
8. Net Hurricanes Gustav & Ike deliveries
9. West Hackberry/Bayou Choctaw Exchange oil costs and degas loss.
10. Drawdown 2011
11. Hurricane Isaac Exchange
12. Test Sale 2014
13. FY17 21st Century Cures, FY17 SPR Modernization, Hurricane Harvey Exchange
14. FY18 Mandatory Sale, Harvey Exchange
15. FY18 Mandatory Sale, FY18 Modernization Sale, Harvey Exchange Returns
16. FY19 Mandatory Sale, FY19 Modernization Sale
17. FY19 Modernization Sale, FY20 Mandatory Sale
18. FY20 Mandatory Sale, FY20 Exchange for Storage
19. FY20 Exchange for Storage, FY21 Mandatory Sale, FY21 Modernization Sale, Ida Exchange
20. FY20 Exchange for Storage, FY21 Modernization Sale, FY21 Mandatory Sale, Ida Exchange, FY22 Mandatory Sale, FY22 Winter Exchange

Table 3. Crude Oil Receipts (As of December 31, 2021)

Source Country	Cumulative (MMbbl)	Percent of Total (%)
Mexico	266.3	30.0
United Kingdom	193.9	21.9
United States*	139.8	15.7
Saudi Arabia	28.3	3.2
Libya	27.5	3.1
Venezuela	25.3	2.9
Angola	25.1	2.8
Russia	25.1	2.8
Iran****	20.0	2.3
United Arab Emirates	19.3	2.2
Nigeria	16.3	1.8
Algeria	15.7	1.8
Cameroon	15.1	1.7
Equatorial Guinea	15.1	1.7
Norway	14.0	1.6
Oman	12.9	1.5
Egypt	8.9	1.0
Ecuador	6.2	0.7
Iraq	3.4	0.4
Gabon	2.4	0.3
Qatar	2.3	0.3
Azerbaijan	2.1	0.2
Columbia	1.2	0.1
Argentina	0.4	0.0
Ivory Coast	0.4	0.0
Peru	0.4	0.0
Total**	887.4	100.0

MMbbl = Million Barrels

* Included receipts from offshore Gulf of Mexico.

** Totals do not add due to rounding.

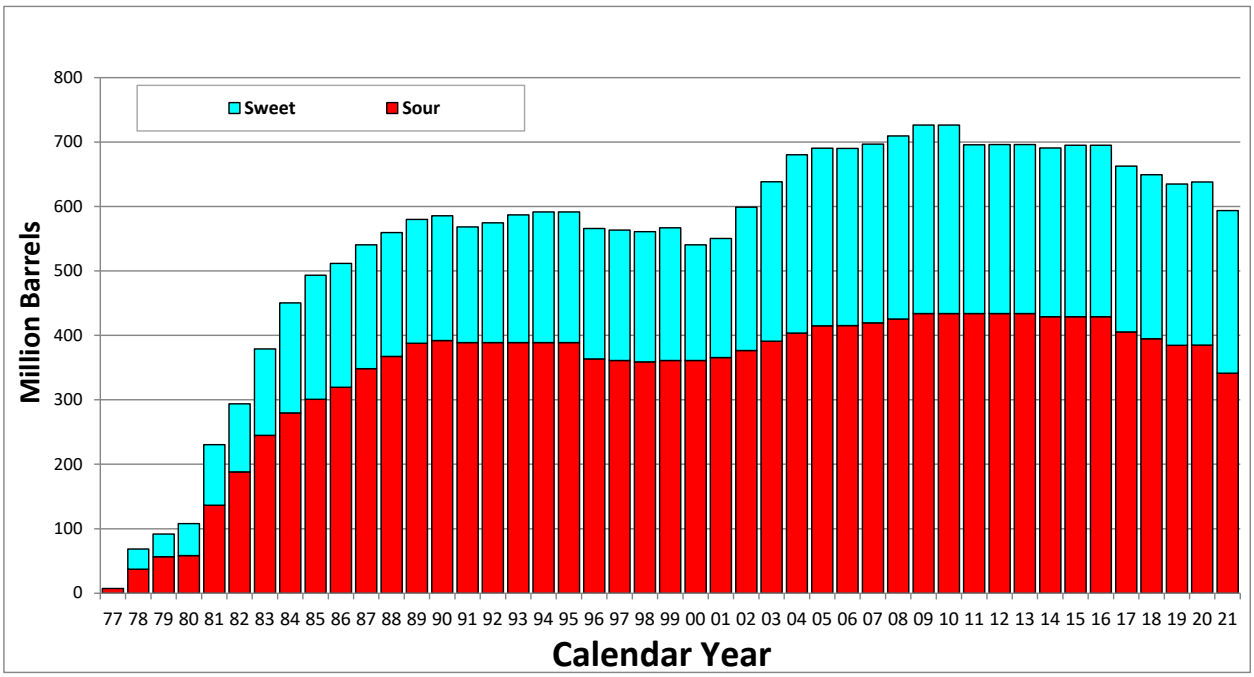
*** Cumulative total receipts unadjusted for sales and operational gains and losses. **** Prior to 1995

Table 4. Crude Oil Inventory (As of December 31, 2021)

Storage Site	Inventory (MMbbl)		
	Sweet*	Sour**	Total***
Bryan Mound, Brazoria County, Texas	66.7	152.4	219.1
Big Hill, Jefferson County, Texas	65.0	66.3	131.3
West Hackberry, Cameron Parish, Louisiana	102.2	77.5	179.7
Bayou Choctaw, Iberville Parish, Louisiana	18.6	43.9	62.5
Subtotal Underground Inventory	252.5	340.1	592.6
Tanks and Pipelines	0.1	1.0	1.1
Total Inventory	252.9	341.1	593.7
Total Crude Oil Accounts Payable	-1.7	0	-1.7
Total Crude Oil Accounts Receivable	0.30	7.38	7.68
Total SPR Book Inventory	251.2	348.5	599.6

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



VIII. Emergency Response Capabilities

Sale of Oil

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

Competitive Sales Procedures

DOE regulations in 10 CFR 625 govern the process for price-competitive sales from the SPR, including the establishment of Standard Sales Provisions for use in SPR sales contracts. The first step in the process is to issue a Notice of Sale identifying the volume, characteristics, and location of the petroleum for sale. The Notice of Sale also provides delivery dates and the requirements to successfully submit offers, as well as measures required for assuring performance and financial responsibilities.

During a drawdown, the SPR PMO may issue multiple Notices of Sale using a web-based automated oil sales and evaluation system. Each Notice of Sale covers a sales period of one to three months. Offerors may have five days or less from the date a Notice of Sale is issued until offers are due. Delivery of oil could commence as soon as 13 days after the President calls for a drawdown of the SPR. Subsequent sale periods, if necessary, will correlate with standard

industry delivery periods. Because of the possible short initial lead time, DOE maintains a registry of prospective offerors who will receive electronic notification of all Notices of Sale.

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

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

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

Drawdown Capabilities[2]

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

Based on the design drawdown rate, the SPR can draw down crude oil at an initial operational rate of approximately 4.415 MMbbl/d. The drawdown rate then gradually decreases as site inventories decline and a lower number of caverns containing crude oil becomes a constraint. The actual drawdown rate may also be substantially lower than operational drawdown rate due to downstream considerations, such as possible limitations on the market's ability to accept oil at a given moment in time, or capacity limitations on non-DOE owned infrastructure.

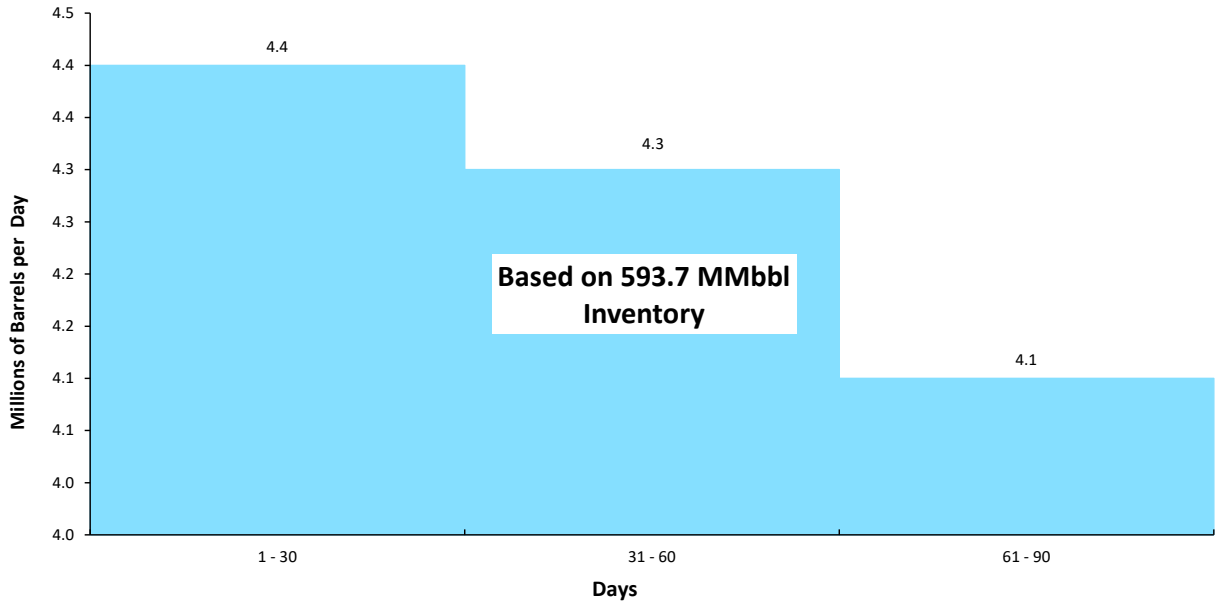
[2] This refers to the ability to displace oil out of the SPR caverns without considering whether the downstream distribution of the oil to SPR customers would accommodate that much oil being pumped out of the SPR caverns.

Table 5. Crude Oil Streams (As of December 31, 2021)

Crude Oil Stream	Gravity (°API)	Sulfur Content (Mass %)	Delivery Mode and Location
Seaway System			
Bryan Mound (Sweet)	36.5	0.37	Pipeline at Jones Creek Tank Farm, Jones Creek, Texas; Tankship at Seaway (Enterprise Products) Terminals, Freeport and Texas City, Texas; Genesis Terminal, Texas City, Texas
Bryan Mound (Sour)	33.3	1.40	
Texoma System			
West Hackberry (Sweet)	36.8	0.34	Pipeline, tankship, or barge at Sun Partners Marketing & Terminals LP, Nederland, Texas; Pipeline at Zydeco-22"/DOE connection, Lake Charles, Louisiana
West Hackberry (Sour)	33.0	1.49	
Big Hill (Sweet)	35.6	0.409	Pipeline, tankship, or barge at Sun Partners Marketing & Terminals LP, Nederland, Texas; Pipeline or tankship at Phillips 66 Terminal, Nederland, Texas; Pipeline at Zydeco-20"/DOE connection, Winnie, Texas
Big Hill (Sour)	30.8	1.43	
Capline System			
Bayou Choctaw (Sweet)	35.3	0.419	Pipeline at Capline, Plains Marketing, or Louisiana Capline Terminals, St. James, Louisiana; Tankship at Sugarland St. James Terminal, St. James, Louisiana; 24-inch site connection to Placid Pipeline, Iberville Parish, Louisiana
Bayou Choctaw (Sour)	31.9	1.43	

Figure 4 illustrates the SPR's operational 90-day drawdown capabilities during 2021, with an inventory of 593.7 MMbbl. These rates can only be achieved if the market has the ability and/or capacity to accept SPR crude oil at designated rates seen below.

Figure 4. Design Drawdown Capability (As of December 31, 2021)



Drawdown Readiness Activities

Below is a list of the SPR drawdown readiness assurance activities performed during CY 2021:

- The Drawdown Readiness Review Program requires and monitors quarterly drawdown readiness. The SPR PMO conducted four reviews in 2021, confirming preparation of all sites and systems for an SPR crude oil drawdown or exchange.

- On a quarterly basis as a part of the Drawdown Readiness Review Program, the SPR PMO publishes Readiness and Capability (RECAP), Reliability Availability Maintainability (RAM) and SPR Exchange (EX) RECAPReports, along with an update to Drawdown Configuration charts.

- The Systems Test Exercise (STE) program assists in validating the drawdown readiness of an SPR site's equipment, procedures, systems, and personnel and collects data to support readiness status. The STE program is multifaceted and involves either a tabletop exercise or a dynamic test performed at each site, which are critical for illustrating SPR site capability if there are no fluid movements in the period(s).

Distribution Capabilities

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

In 2012, the SPR lost connectivity to 10 refineries in the central part of the U.S. with reversal of the Seaway Pipeline's flow direction. The Seaway Pipeline now flows from Cushing, Oklahoma, to Freeport, Texas. In December 2013, Shell reversed a section of one of the pipeline systems, now referred to as the Zydeco Pipeline, to flow eastbound from Houston, Texas, to the Louisiana Offshore Oil Port's terminal in Clovelly, Louisiana. As a result, the SPR's Big Hill site lost connectivity to Houston area refineries, reducing the number of potential buyers that can receive SPR oil by pipeline. The flow of oil eastward now connects the SPR to refineries previously unable to receive pipeline deliveries from the SPR. Refineries along the Mississippi River, such as PBF Energy Chalmette, Shell Norco, Valero Norco, and Valero Meraux, can now receive pipeline deliveries from the SPR.

Due to changing market conditions, the Capline pipeline was shut in during CY 2019 to begin the process of reversing the flow direction from northbound to southbound. As a result of this decision by the pipeline owners, the SPR lost pipeline connectivity to nine Midwestern refineries. Southbound Capline operations, originating in Patoka, Illinois, and ending at the Capline terminal in St. James, Louisiana, commenced in December 2021.

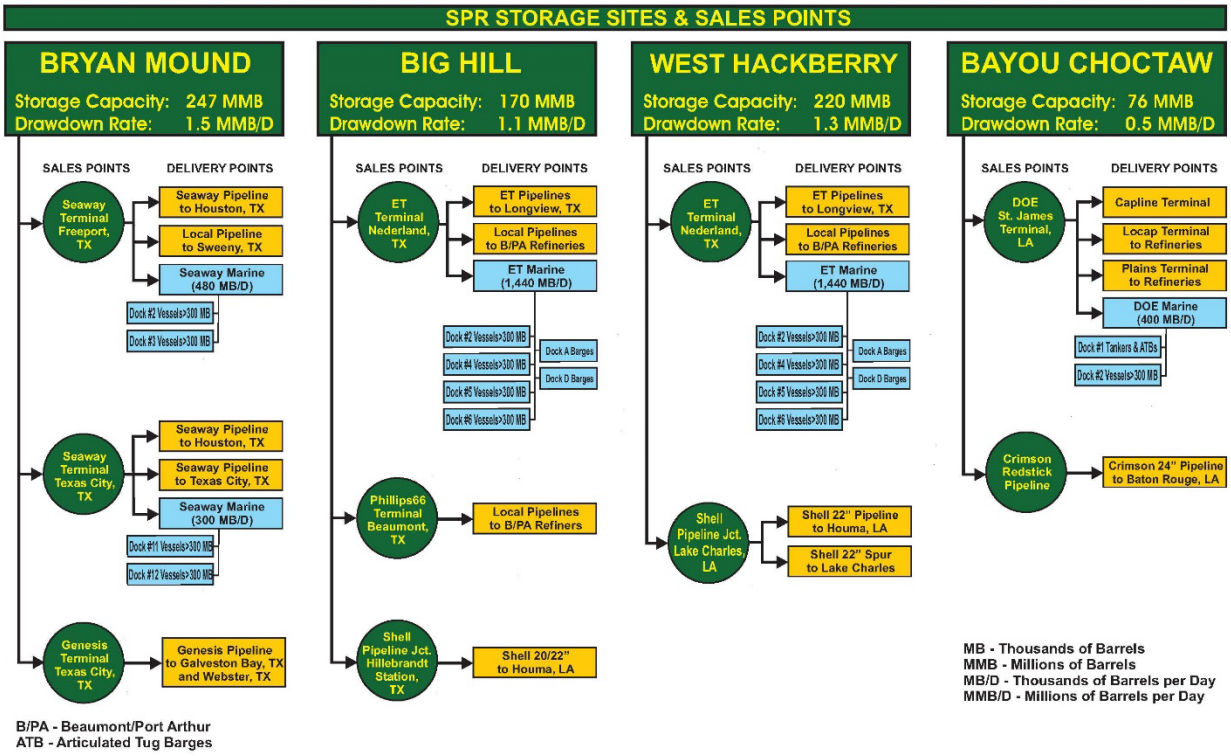
At the beginning of CY 2022, commercial pipeline systems connected the SPR to 31 refineries, accounting for 44 percent of total U.S. refinery operable capacity.

The SPR also connects to three marine terminals that have a combined contracted marine distribution capacity of 2.220 MMbbl/d (million barrels per day), and it owns one marine terminal with a distribution capacity of 400 Mbbl/d (thousand barrels per day). These marine terminals are Seaway Terminal (Enterprise Products), Freeport, Texas; Seaway Terminal (Enterprise Products), Texas City, Texas; Energy Transfer Terminal, Nederland, Texas; and the DOE-owned, St. James Terminal, St. James, Louisiana. EMPCO assumed lease operations at the DOE owned St. James, Louisiana marine terminal by taking over the facility at the beginning of CY 2020. Figure 5 illustrates the SPR's pipeline and marine distribution capabilities.

The crude oil pipeline from Bryan Mound to Seaway Terminal (Jones Creek) is temporarily out-of-service due to water undermining the soil beneath the pipeline. The undermining occurred at the pipeline's Brazos River crossing during Hurricane Harvey in August and September 2017.

Repair method selection and design are ongoing with construction of a new line anticipated to start in FY 2023. This pipeline does not presently impact design drawdown capability of the Bryan Mound site. This DOE-owned pipeline is currently leased to EMPCO, who is responsible for the repair.

Figure 5. Pipeline and Marine Design Distribution Capabilities



Distribution Assessment

The SPR performs an annual distribution assessment based on established technical and performance criteria. The assessment evaluates the SPR's crude oil distribution system capabilities for adequate connections to commercial distribution systems and to identify the need for workarounds if capability is lacking in any areas. The 2021 Distribution Assessment Report (April 2021) evaluated the SPR's distribution capability at a sustained drawdown rate to replace oil imported during the base year (2020) and in future years as well (2025, 2030, 2035, and 2040). CY 2020 is the base year due to the timing of the distribution report, which relies on the most recently finalized refinery oil import demand data (CY 2020) as well as CY 2020 petroleum data from U.S. Energy Information Administration's (EIA's) Annual Energy Outlook 2021.

Level I Technical and Performance Criteria[3] governing the SPR's distribution capabilities requires that the physical distribution system infrastructure - both DOE-owned and commercial - is capable of distribution rates exceeding 120 percent[4] of the combined site drawdown rates to provide sufficient allowances for terminal operational delays and commercial demand variances. The SPR measures performance in this area via the Distribution Capability performance measure.[5] This performance measure can be calculated for the SPR distribution system as a whole or by the three individual distribution systems. The performance measure can also be calculated at various points in time.

The distribution assessment and the results summarized below are based on a study of the physical distribution capacity, which is the total capacity of all physical connections from SPR storage sites to commercial pipelines and marine terminals, including the DOE-owned St. James marine terminal. It assumes that during a commercial supply disruption, the SPR is capable of using 100 percent of contractual terminal services to move oil from the DOE pipelines to contracted marine terminals, the St. James marine terminal or to third-party pipelines via the contracted terminal's existing connections. The assumption provides a best-case situation and is unlikely to reflect actual distribution capability during an emergency oil disruption event.

Base-Year Assessment

The base year assessment indicates that none of the three SPR crude oil distribution systems were compliant with Level I Performance Criteria. However, the distribution system has

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

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

[5] The Distribution Capability performance measure is calculated using the ratio of the SPR physical distribution capability (defined as interstate pipeline non-Canadian crude oil import demand plus locally connected refinery non-Canadian crude oil import demand plus SPR marine terminal capacity) divided by the SPR Operational Drawdown rate.

enough capacity to meet disruption levels as have been experienced in the past. The Level I Performance criteria for the aggregated total SPR has remained below 120 percent for seven years in a row, as a result of increased domestic production, petroleum infrastructure additions by the private sector, commercial pipeline reversals and the resulting marine terminal and pipeline congestions. Table 6 provides the performance measures for the base and previous year.

Table 6. Base-Year Distribution Assessment

System	Sustained Drawdown Rate (Mbbl/d)	Physical Distribution Capability (Mbbl/d)	Performance Measure As of 12/31/2020	Performance Measure As of 12/31/2019
Seaway	**1,500**	**1,239**	**83%**	**85%**
Texoma	**2,400**	**1,967**	**82%**	**81%**
Capline	**515**	**512**	**99%**	**88%**
Total	**4,415**	**3,719**	**84%**	**83%**

Mbbl/d = Thousand Barrels per day

Future Year Assessments[6]

For future years 2025, 2030, 2035 and 2040, the SPR performed an assessment from the 2020 perspective using the U.S. petroleum refining supply and demand projections from the EIA's Annual Energy Outlook 2021. One of the key issues facing the SPR is the congressionally mandated sale of approximately 387 MMbbl of crude oil between FY 2017 and FY 2031 and the impact of these sales on drawdown rates and final configuration of the SPR storage sites. At that point in time (2031), due to reduced inventory within the caverns at each operational storage site, the SPR sustained drawdown rate will be below 4.415 MMbbl/d. Based on the Annual Energy Outlook 2021 projections for U.S. petroleum imports, the Distribution Assessment concluded that the distribution capability of the SPR will fall below Level I Performance Criteria in the out years for all three distribution systems. The SPR's Level I performance measure for distribution is an important indicator of sufficient private sector commercial pipeline and marine terminal capacity to distribute SPR crude oil at the SPR sustained drawdown rate over a 90-day period. Table 7 provides the performance measures by distribution system for each forecast period.

[6] This analysis does not include emergency sales that took place in 2022 and should be replenished by the end of 2027.

Table 7. Forecasted Performance Measures

System	2025	2030	2035	2040
Seaway	86%	86%	85%	84%
Texoma	79%	79%	77%	77%
Capline	95%	87%	90%	102%
Total	83%	82%	81%	82%

International Energy Program Requirements

The U.S., 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 IEA member nations' stockpile requirements are based on both publicly and privately held stocks, and net imports are defined as the average daily level in the previous year. The U.S. is, and has always been, in compliance with this requirement.

In the event of a petroleum supply reduction, 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 that nation's share of total IEA oil consumption. For the U.S., this share was 41.5 percent as of December 2021.

IX. Commercial Activities

Commercial Leases

By design and purpose, the SPR's infrastructure is for emergency use. In between periods of emergency use, SPR's infrastructure is underutilized. The SPR has commercialized underutilized crude oil distribution facilities to be more cost-effective, leasing three crude oil pipelines and a marine terminal to private industry. The contracts for these leases require that the facilities be maintained in good condition, and, in the event of a presidentially ordered emergency drawdown, use of the leased facilities will be returned to DOE within five days following notification. Receipts from the leases go to the U.S. Treasury.

During CY 2021, receipts to the General Fund of the U.S. Treasury from the commercial leases of the SPR's distribution facilities and pipelines totaled $6,286,709.31. Table 8 summarizes commercial revenues from 1996 –2021.

Bayou Choctaw Pipeline

In 2020, lease revenue totaled approximately $11,000 as this was the final payment from the previous contract held with Shell. Pursuant to the new lease with EMPCO, the Bayou Choctaw pipeline is now under the general lease of the St. James Facility. In the early 1990s, the SPR determined that leasing the Bayou Choctaw pipeline would be advantageous to the U.S. government and in the public's interest because it would eliminate operating costs for the government and provide a means to generate revenue. Total lease payments in FY 2021 for both the pipeline and the St. James Facility totaled about $2.2 million.

Through a competitive bid process, the SPR leased the pipeline to Shell Pipeline Company LP on May 1, 1997, on a revenue-sharing basis. The lease payments were based on a percentage of Shell's gross revenue with a minimum of $11,000 a month. The initial term of the lease was through April 13, 1998, with automatic annual lease renewals thereafter until December 2019. In May 2017, the SPR PMO negotiated a two-year lease extension for potential modernizing of the St. James Marine Terminal in anticipation that the Bayou Choctaw Pipeline and St. James Marine Terminal would revert to government maintenance and operations. However, the proposed Marine Terminal enhancement strategy was eventually canceled. In September 2018, the SPR PMO issued solicitations for a new lease that included the Bayou Choctaw Pipeline and the St. James Marine Terminal. EMPCO was awarded the lease agreements for both the pipeline and marine terminal in June 2019. The lease agreements with EMPCO, effective January 1, 2020, are for 10 years with two five-year options. Revenue earned from May 1997 through December 2020 totaled $5.5 million, with a maintenance cost avoidance of $500,000 per year.

St. James Marine Terminal

In 2021, St. James Marine Terminal lease revenue was $2,113,254.43. EMPCO was awarded the lease agreement for the terminal in June 2019, on a revenue-sharing basis with an effective date of January 1, 2020, for 10 years with two five-year options.

Bryan Mound Pipelines

In 2021, lease revenues totaled $4,173,454.88. EMPCO leased two of the three Bryan Mound pipelines on January 14, 1999, and began using the pipelines in June 2000 as part of its onshore distribution system for the Diana Hoover production in the Gulf of Mexico. This lease extends for a term of 10 years and will expire on May 31, 2030. The extension supports the lessee time for repair and replacement of the Bryan Mound to Jones Creek pipeline, removal of the damaged pipeline segment and provides the opportunity to mitigate any potential loss of revenue.

Table 8. Summary of Commercial Revenues (December 31, 2021)

Calendar Year	Bryan Mound Pipelines (Actual $)	Big Hill Pipeline (Actual $)	Bayou Choctaw Pipeline (Actual $)	St. James Terminal Lease (Actual $)	Total Revenue Generated (Actual $)
1996	102,606	472,809	0	0	575,415
1997	0	429,824	0	133,300	563,124
1998	12,500	402,525	0	481,010	896,035
1999	679,393	400,000	163,030	546,125	1,788,548
2000	652,146	493,359	217,573	748,986	2,112,064
2001	1,054,297	33,104	212,738	1,227,021	2,527,160
2002	1,468,613	0	249,708	1,285,183	3,003,504
2003	1,647,828	0	168,718	1,863,060	3,679,606
2004	1,546,121	0	174,338	1,700,000	3,420,459
2005	1,132,668	0	730,542	1,700,000	3,563,210
2006	1,091,799	0	337,949	1,700,000	3,129,748
2007	1,128,340	0	218,912	1,700,000	3,047,252
2008	1,211,171	0	321,799	1,700,000	3,232,970
2009	1,141,228	0	232,374	1,700,000	3,073,602
2010	1,091,494	0	169,541	1,700,000	2,961,035
2011	2,124,218	0	318,183	1,700,000	4,142,401
2012	5,838,356	0	312,481	1,700,000	7,850,837
2013	17,270,421	0	274,481	1,975,000	19,519,902
2014	6,513,476	0	188,695	2,000,000	8,703,171
2015	11,243,574	0	236,583	2,000,000	13,480,157
2016	3,902,442	0	360,500	2,000,000	6,262,942
2017	2,564,390	0	462,525	2,000,000	5,026,915
2018	2,523,452	0	182,535	2,000,000	4,705,987
2019	3,229,584	0	164,544	2,000,000	5,394,128
2020	3,019,598	0	11,000	1,976,236	5,006,834
2021	4,173,455	0	0	2,113,254	6,286,709

X. Budget and Finance

With enactment of the Consolidated Appropriations Act, 2021 (Public Law 116-260) Congress appropriated $188 million for the SPR. Congress appropriated an additional $1 million to the SPR Petroleum Account for the cost associated with conducting crude oil sales. Remaining costs for conducting crude oil sales in 2021 were financed by carryover in the SPR Petroleum Account.

Appropriations through Fiscal Year 2021

Over the history of the SPR, Congress has appropriated a total amount of $25.3 billion, net of sales and transfers, for the SPR through FY 2021. Table 9 describes the distribution of this annual appropriation.

Table 9. Appropriations for Storage Facilities Operations and Management and Petroleum Account* (As of December 31, 2021)

Fiscal Year	Petroleum 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	151,88	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	

Fiscal Year	Petroleum Account ($000)	Facilities ($000)	Management ($000)	Expansion ($000)	Total ($000)	Defense SPR ($000)
1996 transfer from SPR Petro Acct	(187,000)	170,173	16,827		0	
1996 Weeks Island Oil Sale	(97,114)	97,114	0		0	
1996 deficit reduction oil sale	(227,000)	0	0		(227,000)	
1996 Total	(511,114)	267,287	16,827		(227,000)	
1997 Total*	(220,000)	193,000	16,000		(11,000)	
1998	0	191,500	16,000		207,500	
1999	0	145,120	14,805		159,925	
2000	0	144,000	15,000		159,000	
2001	0	140,672	15,965		156,637	
2002	0	154,009	16,871		170,880	
2003	1,955	157,823	13,909		173,687	
2004	0	155,044	15,904		170,948	
2005*	43,000	109,946	16,764		169,710	
2006*	(43,000)	190,510**	16,830		207,340	
2007	0	146,950	17,491		164,441	
2008		143,980	18,004	24,773	186,757	
2009	(21,586)	176,255***	18,824	31,507	226,586	
2010	0	199,732	19,091	25,000	243,823	
2011	0	186,873	22,568	0	209,441	
2012*	0	172,914	19,790	0	192,704	
2013*	0	162,975	19,650	0	182,625	
2014*	0	167,514	21,846		189,360	
2015		174,999	25,001		200,000	
2016	0	186,870	25,130		212,000	
2017	0	195,646	27,354	0	223,000	
2018	8,400	232,630****	28,086	0	269,116	
2019	10,000	209,026	25,974	0	245,000	
2020	10,000	168,235	26,765	0	205,000	
2021	1,000	163,980	24,020	0	189,000	

Note: FY 1991 SPR Petroleum Account of $566,318 includes proceeds of $122,681 from the Test Sale recorded as additional budget authority, rather than reductions to obligations, costs, and outlays. It also includes $315,425 in Desert Storm Drawdown proceeds from January 1991, and $19,755, from FY 1991 Naval Petroleum Reserve excess receipts. Thus, the cumulative budget authority is "gross" and not related directly to the inventory of oil on hand.

* Includes reprogramming, rescission, and transfer actions.

** Includes the return of $43,000,000 from the SPR Petroleum Account.

*** Includes $21,586 from the SPR Petroleum Account for site maintenance activities.

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

SPR Account

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

Obligations for the SPR Account in FY 2021 totaled approximately $205 million. From this amount, $21.4 million funded Federal program management, and $162.8 million funded contractual goods and services to operate and maintain the SPR.

Funding support for the NGSR comes from within the SPR Account. For FY 2021, NGSR storage and administrative oversight costs totaled $20.8 million, and were financed from carryover in the NGSR subaccount of the SPR Account.

SPR Petroleum Account

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

During an emergency drawdown and sale, as well as congressionally mandated sales, the SPR Petroleum Account is the source of funding for the incremental costs of withdrawing oil from the storage caverns and transporting it to the point where purchasers take title. Receipts from congressionally mandated sales go to the U.S. Treasury (except for receipts from crude oil sales conducted in accordance with Section 404 of the Bipartisan Budget Act of 2015, which go to the ESIM Fund as mandated by law).

The SPR Petroleum Account spent $4.3 million related to the cost of moving oil in CY 2021.

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

For FY 2021, the capitalized cost of the crude oil in the SPR was $18.6 billion, with an average cost per barrel of approximately $30.05 (excluding storage costs) in accordance with Federal Accounting Standards. Inflated to 2021 dollars, the average cost per barrel is $74.95.

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 DOI to DOE through 2009, the last year of the program, is shown by FY in Table 10.

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

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

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

Performance Measurement

In FY 2021, the SPR tracked five critical performance measures as part of the SPR Annual Operating Plan, in accordance with statutory requirements in the Government Performance and Results Act (GPRA) of 1993 and the GPRA Modernization Act of 2010. Table 11 reflects a complete accounting of the Office of Petroleum Reserves' performance measures.

Table 11. SPR Critical Performance Measures

Performance Measure	FY 2020 Actual Performance	FY 2021 Target Output	FY 2021 Actual Performance
Average Annual 90-Day Operational Drawdown Rate	4.14 MMB/Day	4.35 MMB/Day	4.18 MMB/Day
Calculated maintenance performance appraisal report rating	96.94	≥95 out of a possible 100 points	97.91
Operating cost per barrel of storage capacity	$0.254	≤$0.30 operating cost per barrel	$0.254
Multi-Year Oil Sales	0.96%	Annual drawdown costs < 1.5 % of revenue earned	0.4%
SPR Modernization Project	N/A*	≥ 0.85 on both Cost and Schedule Performance Index	N/A*

6* Not tracked and reported since the metric derives from the EVMS that has not been certified by the DOE Office of Project Management.

XI. Other Program Activities

Congressionally Mandated SPR Crude Oil Sales

In CY 2021, the SPR successfully carried out three congressionally mandated crude oil sales. In April 2021, the SPR began crude oil sales in accordance with Section 501(a)(1) of Division O of the Consolidated Appropriations Act, 2018 (Public Law 115-141) and Section 403(a)(4) of the Bipartisan Budget Act of 2015 (Public Law 114-74), to meet the requirements for FY 2021. The sale successfully delivered 10,084,916 barrels over 41 shipments.

In June 2021, the SPR carried out its planned ESIM crude oil sale in accordance with Section 404 of the Bipartisan Budget Act of 2015 (Public Law 114-74), and the Secretary authorized the SPR to draw down and sell an amount of crude oil not to exceed $450 million of crude oil from the SPR in FY 2021. The sale proceeds were deposited in the ESIM Fund and will be used to fund the SPR Modernization Program's Life Extension 2 project. The FY 2021 SPR Modernization Program crude oil sale concluded in June 2021, with 6,580,100 barrels (bbl) delivered over 25 shipments. The SPR deposited $449,999,979.80 of revenue into the ESIM Fund.

From October 2021 through December 15, 2021, the SPR carried out its third congressionally mandated sale in CY 2021. The SPR conducted the crude oil sales in accordance with Section 403 of the Bipartisan Budget Act of 2015 (Public Law 114-74) and Section 30204 of the Bipartisan Budget Act of 2018 (Public Law 115-123). The sale successfully delivered 19,939,093 barrels over 81 shipments.

From the combined sales, the SPR deposited $1,883,479,620.28 of revenue into the General Fund of the Treasury with an additional $249,211,206.64 due from purchasers by January 20, 2022, for December 2021 deliveries, for a total of $2,132,690,826.92.

Crude Oil Exchange

In February 2021, the SPR returned the remaining 0.312 MMbbl of EFS crude oil. As a recap of EFS, beginning in April 2020 under direction from the President as a response to low oil prices and the domestic industry was running out of places to store oil; the SPR started receiving crude oil deliveries. By June 30, 2020, the SPR held approximately 21 MMbbl of commercial inventories under the EFS program. In August 2020, the SPR began returning stored EFS program oil, and as of December 31, 2020, had returned approximately 19.5 MMbbl to EFS customers. At its conclusion, the EFS program had successfully delivered 19.86MMbbl of crude oil to its EFS partners from July 2020 through February 2021, with remaining barrels kept by the SPR as payment for the temporary storage.

In response to Hurricane Ida the SPR commenced an emergency exchange in September 2021. The total barrels shipped in response was 3,296,825 barrels from September 10, 2021 through September 29, 2021. These barrels are anticipated to be returned to the SPR in CY 2022.

The SPR initiated the FY 2022 Winter Exchange starting December 16, 2021. The program was a response to the high oil prices and was designed to supply the crude oil market with additional supply. From December 16, 2021 through December 31, 2021, the SPR delivered 4,148,833 barrels over 17 shipments to its FY 2022 Winter Exchange partners. Additional barrels were made available in CY 2022. Due to the scope of this program, the exchange barrels are anticipated to be returned in CY 2023, 2024, and 2025.

Northeast Gasoline Supply Reserve

The NGSR, a 1 MMbbl stock of gasoline, consists of contracted storage at multiple facilities in the New York Harbor area; the greater Boston, Massachusetts area; and the greater Portland, Maine area. Contracted storage became necessary because the SPR does not own storage facilities suitable for the storage of refined petroleum products. The Administration determined in 2014 that the benefits of contracting the storage of up to 1 MMbbl of refined petroleum products pursuant to the authority granted by Section 171 of EPCA are comparable to the benefits from a similar action undertaken under Title I, Part B of the statute. That Administration also determined the availability of funds in the SPR Petroleum Account would facilitate the creation of a refined petroleum product reserve in time for the 2014 hurricane season. Placing the refined product reserve within the normal supply chain also provides higher product quality, because unlike crude oil, refined products require periodic turnover for strict quality specifications.

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

short-term disruptions as stakeholders resolve issues with the larger supply chain (from crude oil refining through product distribution to consumers).

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

The storage contractors are responsible for maintaining both the quantity and quality of the refined product, including any seasonal changeover of products to comply with EPA Clean Air Act requirements. The contractors must also make available specific facilities in the event a release becomes necessary, including the ability to meet the government's release requirements in the aftermath of an event without commercial electric power. In addition, the contractors must provide detailed information on inventories, activities, and distribution capabilities at the request of DOE if conditions exist for a potential release.

As of the date of this report the NGSR has never been used for its intended purpose, namely, to supplement gasoline supplies to consumers affected by a supply disruption in the Northeast. The SPR PMO did not exercise the third option period due to unavailable funding. As of CY 2021, the SPR PMO was executing one-month extensions as funding became available, which carried the NGSR out until 30 June 2022.

The CY 21 NGSR contract distribution was as follows:

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

For FY 2021, the Administration proposed disestablishing the NGSR and proposed selling the product. With only one million barrels, the volume is less than one day of average gasoline consumption in the Northeast, so it would provide only minimal relief to a shortage condition. Yet it still costs approximately $20 million annually to maintain. However, FY 2022 fully funded the NGSR, and the Administration did not propose disestablishing the NGSR in FY 2023.

Northeast Home Heating Oil Reserve (NEHHOR)

The NEHHOR, a 1 MMbbl stock of Ultra Low Sulfur Diesel (ULSD), consists of contracted storage at multiple facilities in the New York Harbor area; the greater Boston, Massachusetts area; and the Groton, Connecticut area. Contracted storage became necessary because the SPR does not own storage facilities suitable for the storage of refined petroleum products. The Administration determined in 2000 that the benefits of contracting the storage of up to 2MMbbl of heating oil pursuant to the authority granted by Section 181 of EPCA provide an important safety cushion in the event of a severe heating oil disruption in the Northeast. That

quantity was converted to ULSD and adjusted to 1MMbbl in 2011. Placing the NEHHOR within the normal supply chain also provides higher product quality, because unlike crude oil, refined products require periodic turnover for strict quality specifications.

The Northeast region of the U.S. heavily depends on product supplies from the Gulf Coast, as well as local refining and imports. Yet even though SPR crude oil stored along the Gulf Coast helps to mitigate the impacts of crude oil supply interruption(s), vulnerabilities elsewhere in the supply chain could still result in significant regional disruptions. Thus, the establishment of the NEHHOR closer to the point of consumption helps to mitigate the impact of short-term disruptions as stakeholders resolve issues with the larger supply chain (from crude oil refining through product distribution to consumers).

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

The storage contractors are responsible for maintaining both the quantity and quality of the ULSD. The contractors must also make available specific facilities in the event a release becomes necessary, including the ability to meet the government's release requirements in the aftermath of an event without commercial electric power. In addition, the contractors must provide detailed information on inventories, activities, and distribution capabilities at the request of DOE if conditions exist for a potential release.

As of the date of this report the NEHHOR has never been used for its intended purpose, namely, to supplement heating oil supplies to consumers affected by a supply disruption in the Northeast. As of CY 21, the SPR PMO is executing a Firm Fixed Price contract with yearly options, which could carry the NEHHHOR out until 31 March of 2024.

The CY21 NEHHOR contract distribution is as follows:

Buckeye Terminals LLC: Port Reading, NJ	300,000 bbl
Buckeye Terminals LLC: Groton, CT	300,000 bbl
Global Partners LP: Revere, MA	200,000 bbl
Gulf Oil: Chelsea, MA	200,000 bbl

Quality and Performance Assurance

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

The CAS covers four oversight areas mandated by DOE Order 226.1B, *Implementation of DOE Oversight Policy*. These areas are Environment, Safety, and Health; Safeguards and Security;

Cyber Security; and Emergency Management. Additionally, an expansion of CAS now covers Finance, Human Resources, Property and Facilities, Procurement, Cavern Integrity, Data Systems, Engineering, Internal Audit, and LE2.

Personnel from the SPR's Quality and Performance Assurance Division (QPAD) completed ten Technical Assurance Surveillance Reports in 2021. Oversight subject areas included remote witnessing of several supplier product evaluations; oversight of CAS data validation exercises; providing feedback to the contractor on quality of Organizational Assessment results; and participating in the DOE Headquarters Community of Practice webinar on remote supplier oversight and virtual auditing techniques in which the SPR was considered a leader in establishing effective practices. QPAD led and participated in five Remote Site Appraisals. These Site Appraisals assessed 121 topics representing multiple SPR program areas. Twenty-one non-conformances' and twenty-one opportunities for improvement were documented.

QPAD personnel also coordinated the oversight management process for the SPR. Six elements including the Project Manager, General Counsel, Management and Administration, Maintenance and Operations, Systems and Projects, and Technical Assurance developed annual Oversight Management Plans for FY 2021. Each organization performed oversight activities in accordance with these plans and reported quarterly status to QPAD. Meanwhile, QPAD personnel conducted analysis and provided a roll-up status report to the Project Manager each quarter.

Oversight of the SPR's critical few performance measures included 15 objective processes and 9 LE2 measures. A subject matter expert (SME) assessed each measure to verify the M&O contractor's performance based on agreed-to objectives. QPAD then performed an independent assessment to validate the subject matter expert's due diligence. The Performance Fee Board then received both positive and negative results via a summary report from the board secretary. This information assisted the Project Manager, and the Performance Fee Board chairperson in determining appropriate fee distribution to the M&O contractor.

Additionally, QPAD led and participated in a process improvement team that completed the task of restructuring the SPR's Issues Management System by integrating risk into the non-compliance identification process, customizing the SPR's response to non-compliances based on the assigned risk level, and developing new processes for performing causal analyses and effectiveness reviews.

Vapor Pressure Mitigation

The SPR PMO recognized a need in 1992 for a continuous vapor pressure-mitigation program based on routine oil sampling of the caverns. Long-term storage of crude oil in salt caverns results in gradual geothermal heating that raises the temperature of the oil in caverns from approximately 80°F at the time of injection into the cavern, to a range between 110°F and 130°F over time. In addition, because of operational activities that include occasional injection of raw water into the cavern, gasses encapsulated in the salt release and absorb into the oil while stored. Naturally occurring methane gas may also migrate into the cavern through the

salt matrix discontinuities. Under certain drawdown conditions, increased vapor pressure results in the release of gas into the atmosphere in amounts that may pose environmental, safety, and health risks.

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

A new, modern unit is being designed as part of the SPR Modernization Program's Life Extension Phase 2 Project with expected completion at Bayou Choctaw in 2024. However, there is a possibility that the degas plant will be deployed to Bryan Mound first. If that were to take place, it would likely not happen in 2024.

International Organization for Standardization (ISO) 14001

In May 2000, the SPR became the first bulk petroleum storage organization, public or private, to receive an ISO 14001, Environmental Management System (EMS) certification. The SPR was recertified to the ISO 14001:2015 Standard in 2021 which is valid through 2023.

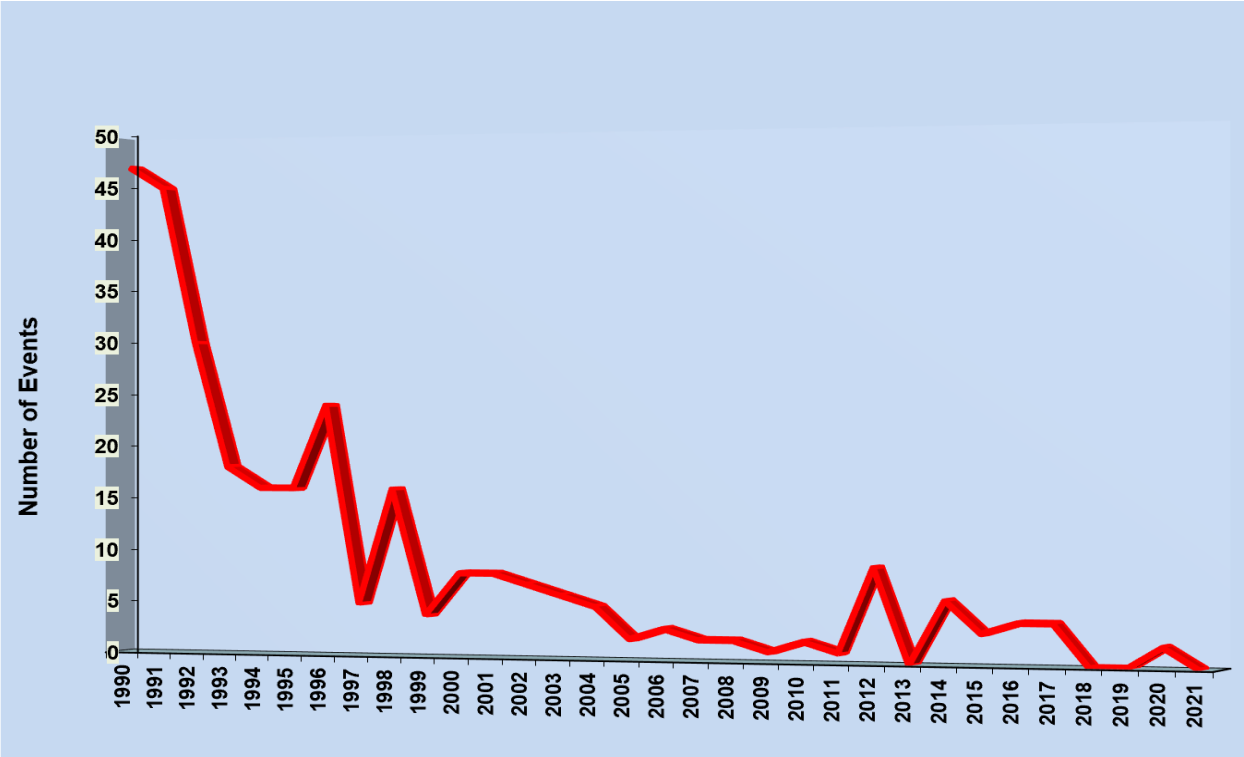
Environment, Safety, and Health

In CY 2021, the SPR had a Total Recordable Case (TRC) Rate of 0.71 and a DART Rate of 0.44.[7] These low accident rates positioned all four SPR storage sites to continue in OSHA's Voluntary Protection Program (VPP). The VPP program is OSHA's official recognition that the employers and employees at a site have built an exemplary occupational safety and health system and maintain injury and illness rates below the averages for their respective industry. The Big Hill, Bryan Mound, and Bayou Choctaw storage sites each received the 'Star Award,' for achieving incident rates at or below the national average. The West Hackberry site received an additional VPP award, the 'Star of Excellence,' for achieving incident rates at least 90 percent below the national average.

Figure 6 shows the SPR's performance for reportable environmental incidents from 1993–2021. During CY 2021, there were zero reportable project events or reportable releases to the environment at the SPR.

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

Figure 6. Environmental Reportable Events 1990 – 2021



Pollution Prevention

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

Hazardous Waste

While the SPR does not set a goal for diverting hazardous waste, the SPR strives to recycle all hazardous waste streams when possible. The SPR recycled 99.7 percent of the hazardous waste generated in CY 2021. The predominant contributing waste stream was brine and crude oil residuals that were reclaimed.

Non-Hazardous Waste

During CY 2021 the SPR maintained waste diversion efforts and achieved a waste diversion rate of 74 percent. Contributing waste streams included soil, used oil, paper, and miscellaneous solid wastes.

The SPR team continued efforts to reduce municipal solid waste by diverting 72 percent of non-hazardous solid waste during FY 2021. The goal was to divert at least 50 percent of non-hazardous solid waste. In FY 2021, the SPR team also continued the strategy to reduce municipal solid waste sent to landfills, which in turn helps achieve DOE greenhouse gas reduction targets.

Construction and Demolition Debris

The SPR generated 6.9 million pounds of Construction and Demolition (C&D) waste in CY 2021. Projects that generated a significant amount of C&D waste in CY 2021 include several LE-2 projects that generated asphalt reused onsite as road base, scrap metal and concrete.

The FY 2021 goal was to divert at least 50 percent of C&D waste generated. The SPR achieved the goal by diverting 98 percent of all C&D waste (6.7 million pounds).

Exploration and Production (E&P)

Although there are no specific goals established for exploration and production (E&P) waste generation or diversion, the SPR continued with the effort to recycle this waste stream whenever possible. During CY 2021, the SPR diverted 98 percent of E&P waste. The generated E&P waste included crude oil-contaminated solids, sludge and soils from remediation and construction activities.

Environmental Improvement Measures

The SPR sites continued to maintain acreage for habitat enhancement of both native wildlife and resident and migratory birds. SPR personnel continued to coordinate US Army Corp of Engineers permit applications to ensure any proposed construction and maintenance activities in surrounding environmentally sensitive areas would have minimal negative impact.

Security and Emergency Operations

The SPR mitigated risk by ensuring the capability to effectively respond to any emergency during day-to-day operations and severe weather conditions. The Continuity of Operations Plan (COOP), Emergency Command Vehicle, communication vehicles, and Emergency Communications Network are the cornerstones for continuing essential work functions under catastrophic conditions. Protective Force personnel assist Emergency response team members as “support responders” for emergency conditions. The SPR built the infrastructure for applying and maintaining a robust Homeland Security Presidential Directive 12-credentialing program that includes training and maintenance. From March 2020 into 2021, the SPR maintained a maximum telework posture for all four storage sites, the Project Management Office, and the Stennis Warehouse. During this time, the SPRPMO modified its COOP pandemic response plan to address the manning shortage and workforce impact caused by the COVID-19 pandemic. The SPRPMO followed Center for Disease Control (CDC) and National and State

Public Health institutional guidance, and guidance from Federal, State and SPRPMO Emergency Management and COOP subject matter experts and was able to successfully execute a pandemic response and continue primary and mission essential functions, operational readiness, and the continuation of daily maintenance and operational activities.

The SPR team continues to build upon its existing Memorandums of Understanding (MOU) and Memorandums of Agreement (MOA) to strengthen its relationships with local, state, and Federal law enforcement agencies, emergency response agencies, and personnel. The SPR program also conducts both security and emergency management exercises with these local agencies and personnel, and it supports local community events.

Safety and Health Improvement Areas

Safety and Health Maintains Best Practice Performance

The SPR continued to enhance safety and health systems throughout the complex during 2021. Various safety and health programs and procedures were maintained due to the COVID-19 pandemic. During 2021, the SPR continued the use of their managed care medical contractor by utilizing an off-the-shelf tool to perform health screenings and manage possible COVID-19 cases. Using this system and a robust COVID-19 communication process, the SPR managed 570+ potential COVID-19 cases during 2021 with zero work-related cases or exposures. The off-the-shelf screening tool expedites the daily health screening while notifying safety personnel of potential COVID-19 concerns.

The Management in Action program was established to allow management to engage in daily work evolutions at the sites. It encourages productive dialogue between managers and employees about relevant safety issues. In FY 2021, it led to more than 511 of these safety interactions, which improved communication and positively impacted workplace safety.

The SPR team also continued to strengthen involvement in the subcontracting selection process. The involvement in the subcontractor selection process is a proactive approach for reviewing performance of adequate risk assessments, and implementation of appropriate hazard controls. This has been and will continue to be particularly important and a key factor during the SPR's LE2 project. This level of oversight will continue through contract closeout with documented lessons learned.

During CY 2021, the SPR planned, prepared, and presented a virtual Health, Safety, and Environmental (HSE) Week in May 2021 with a focus on holistic safety and health, specifically focused on topics focused on returning to work after the pandemic that included a focus on safety by having a healthy mind and body and soft tissue injury prevention.

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

The SPR participates in the OSHA VPP and the DOE VPP. Each SPR site must provide a self-evaluation to OSHA and DOE each year demonstrating continued improvement of the safety

and health management system. The self-evaluation also includes 20 or more answers to specific questions about the in-place Process Safety Management System. Recommendations for improvements made during each of the OSHA on-site assessments must be replicated at all sites. In 2021, all four sites maintained VPP certification. There were no on-site assessments in 2021.

Accident Rates for the SPR

The SPR continued to improve the safety and health systems throughout the complex during CY 2021. The SPR had another safe year in CY 2020. The SPR maintained a low accident rate with a TRC Rate of 0.71 and a DART Rate of 0.44 for CY 2021. The SPR storage sites are recipients of several awards for management quality, environmental stewardship, and safety management systems.

Integrated Safety Management

The SPR completed an annual Integrated Safety Management (ISM) System validation and documentation of performance in the ISM System Annual Review and Update Report of 2021. This report summarized the results of all audits and assessments conducted during the FY and provided senior management with qualitative and quantitative data verifying that the ISM System performed effectively. In 2021, the SPR continued to make improvements to the ISM System Description and Annual Report such as the addition of new performance metrics and the inclusion of program information. The organization analyzed each ISM Core Function to identify possible areas for enhancement.

Annual Safety Summit and Tripartite Safety Council

The SPR team held the recurring annual Environment, Safety, and Health (ES&H) Summit in CY 2021. The ES&H Summit includes briefings by the safety, health, and environmental departments of the M&O contractor, as well as the security contractor. The ES&H Summit was held virtually due to COVID-19 and topics such as welding fume hazard control, industrial hygiene and safety oversight, beehive removal, subcontractor prequalification, environmental management, and LE2 construction management were covered.

The SPR also cancelled the two Tripartite Safety Council meetings in CY 2021 due to COVID-19. The purpose of these council meetings is to give all SPR contractors' representatives an opportunity to address safety issues directly with the SPR Project Manager that have not yet been resolved through normal channels. Each SPR site, the security contractor, and the Architecture & Engineering (A&E) contractor have representatives at the meeting. Action items from these council meetings get tracked through closure. Although the in-person Tripartite Safety Council meetings were cancelled in CY 2021, numerous methods were established to address employee concerns including an anonymous Frequently Asked Question page and town halls. The vast majority of concerns expressed were related to COVID-19.

In FY 2021, the M&O contractor continued the Health, Safety, and Environment Week that began in 2015, conducting virtual events available to all SPR employees at each of the SPR sites during June. After a virtual kick-off by senior management from New Orleans, employees from all sites participated in daily activities highlighting holistic safety and health, specifically focused on topics focused on returning to work after the pandemic that included a focus on safety by having a healthy mind and body and soft tissue injury prevention.

Business Process Re-Engineering

The SPR information technology function is a leader in the execution and implementation of re-engineering business processes utilizing a combination of Microsoft SharePoint, SAP, and the Nintex workflow engine. The SPR team has developed and deployed more than 93 automated business processes that support timely and consistent task completion. Many new automated processes had to be built. The pandemic highlighted manual processes that relied upon face-to-face interaction. The following workflows were built to reduce the negative impact caused by being away from the office:

Table 12. SPR Process Workflow

Process Name	Workflow Description
Drawing Approval	This process allows DOE Project Engineers to review and accept drawing submissions electronically from prime architecture and engineering contractors.
Property Transfer	This workflow was built to review and approve government property transfers. The new electronic process replaces a paper process that was signed by four reviewers; the process enables DOE to remotely issue laptops while SPR employees work from home. The process assures that the backend inventory system is updated before the workflow finishes.
Building Access Request	This process is used to request access to SPR buildings during the pandemic. Since most workers are required to work from home, this process is used to request access to one of the SPR buildings.
Project Schedule Delivery	Tracks and provides DOE IT with requested Project Schedules related to IT Requests. Provides automated reminders and status updates to accelerate the speed in which IT projects can be completed.
Data Systems Support Monitor	Provides DOE insight on the progress of items sent for Enterprise Change Proposal evaluation and calculates deliverable dates to ensure projects don't fall behind.
Temporary Multi-factor Authentication Exception	Captures the reason, duration, and approval of any occasion where a temporary exception for PIV enforcement is warranted, then tasks the appropriate team to track the exception and ensure enforcement is properly restored.
Bayou Choctaw Inspection Sheets	Captures metrics used for standard site operations. The application provides the ability to centrally record and report on data in real time and alert if thresholds are exceeded allowing Site Personnel to have a preemptive view on any negative trends and ensure continued site operations.
Project Managers Document Approvals	Standardizes and speeds the review and approval process for documents routing to the Office of the Project Manager, providing the SPR with a central source for submittal of documents requiring the signature of the Project Manager.

Process Name	Workflow Description
Travel Request	SPR modified its travel request process to include workflow steps for Safety & Health review and Executive Management review to determine if travel is essential and proper protocols are in place.
IT Acquisition Requests	All non-exempt IT Acquisitions require approval from the DOE CIO. This workflow is used to develop and track the IT acquisition requests that are sent to DOE HQ for approval.
Distributed Control System (DCS) Remote Access	The DCS Remote Access workflow is used by authorized engineers to request remote access to DCS networks. The pandemic impacted direct in-person access to the SPR sites to work in the DCS environment, so a workflow was built to assure appropriate remote access controls were enabled and disabled as required. An approved workflow enables remote access to the DCS.
Vaccination Attestation	The M&O used this workflow to collect vaccination status for its employees in preparation for the vaccination mandate.
DocuSign Use Request	This workflow was created to assign electronic signature software to remote employees so that business documents could be electronically signed.

The other 80+ business processes that were previously automated continued to function during the pandemic. The ability to conduct online meetings was brought to the forefront of conducting business at the SPR. In support of ongoing pandemic response, training sessions were held that demonstrated the capabilities of Microsoft Teams for online collaboration during maximum telework. The sessions showed users across the SPR how to use the tool's most common features. Since the start of the pandemic, all SPR meetings are held using one of the DOE approved web conferencing software tools.

Data Security, Accessibility and Resiliency

The pandemic caused the SPR to support remote work for all SPR employees through a combination of cloud-based Virtual Private Network (VPN) Service (Zscaler) via government-furnished equipment (GFE) laptops, as well as Citrix access using GFE and non-GFE computers. Personal Identity Verification (PIV) card logon was utilized for GFE laptops on the Zscaler VPN, with SPR-issued RSA tokens for access via the SPR's Citrix Gateway. In addition, all DOE executive staff along with key contractor staff have GFE smartphones with access to email through the Microsoft cloud. In 2021, most of the SPR PMO staff continued maximum telework for ongoing pandemic response while continuing to execute the SPR mission.

In 2021, the SPR's Disaster Recovery (DR) environment was thoroughly tested due to the active hurricane season. The SPR's DR site is called the SPR Alternate Data Center (ADC). An ADC activation is usually performed by multiple IT technicians at the ADC facility near Dallas, Texas.

However, the pandemic forced the SPR to activate the ADC remotely. A remote activation was successfully conducted for four different storms that posed a threat to SPR sites.

The SPR team implemented an enhanced cyber security program using innovative approaches, tailored controls, and monitoring of the SPR operational environment. The SPR has a Privileged Account Management solution that improves the security of privileged accounts on the SPR network by requiring usage of multifactor authentication via a PIV card. The SPR utilized the DOE-provided SynAck penetration testing service to evaluate the security of the SPR's internet-facing websites. Security improvements were recommended by the SynAck service, and these have been incorporated into the SPR websites for enhanced security.

Awards and Certifications

During 2021, SPR received the OSHA Region VI Star of Excellence Award for outstanding safety performance at the West Hackberry site, while the Bayou Choctaw, Big Hill, and Bryan Mound sites received Star awards.

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

International Organization for Standardization 9001 Quality Management System

During 2020, FFPO maintained ISO 9001 and 14001 certifications and updated their Environmental Management System to comply with the newer ISO 14001:2015 standard.

Customer Service

The SPR's Customer Service Team typically meets with several refiners, traders, pipeline companies, and other customers during the American Fuel and Petrochemical Manufacturers annual meeting. However, due to COVID-19 restrictions, the annual meeting was cancelled, and the customer service team was not able to meet customers in person during 2021. Despite the lack of in-person meetings, frequent phone conversations, emails and text messages allowed the team members to stay in frequent contact with customers. 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.

To maintain an accurate and current list of customer contacts, the SPR seeks to validate customer contact information and obtain updates on refinery activities, such as expansion plans

and any planned or actual changes to crude oil inputs. Customers also provide operational or administrative issues encountered when dealing with the SPR.

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

Real Estate Actions

During 2021:

- The SPR's Office of Asset Management teamed with the FFPO Property Section to conduct Facilities Information Management System mock validations for buildings, trailers, and other structures and facilities; DOE-owned land; DOE-archived assets; and DOE leases.

- SPR executed the second of two five-year options to amend the Stennis Warehouse Use Agreement for an additional five-year period which will now expire June 30, 2026.

- Acquired the Painters Shed, North Maintenance Area, and South Maintenance Area buildings to replace those damaged from Hurricanes Laura and Delta at the West Hackberry Site located in Cameron Parish, Louisiana.

- The Bus Transit Shelter near the SW Gate was excessed at Bryan Mound located in Brazoria County, Texas.

- The following properties were excessed and are undergoing disposition at the West Hackberry Site located in Cameron Parish, Louisiana: the North and South Maintenance Shed, Painter's Shed, and Guard House buildings along with the Analyzer, Firewater, and Flammable Storage trailers.

XII. Conclusion

DOE Office of Petroleum Reserves and the SPR PMO continue to operate and maintain the SPR's emergency stockpile of crude oil in accordance with EPCA (42 U.S.C. § 6201, et seq.) to meet its primary mission of protecting the U.S. economy from the effects of a severe energy supply interruption and consequences of interruptions in supplies of petroleum products. The SPR entered CY 2021 with 635.0 MMbbl of crude oil and ended with 593.7 MMbbl.

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

Appendix: Strategic Petroleum Reserve Site Information

Bryan Mound

Location

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

Site Description

Authorized 247 MMbbl storage facility with 19 active caverns.

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

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

System Parameters

Design Drawdown Rate:	(Sour)	1,500,000 bbl/d
	(Sweet)	1,000,000 bbl/d
Raw Water Pumping Rate:		1,626,000 bbl/d
Oil Fill Rate:		225,000 bbl/d
Brine Disposal Rate:		240,000 bbl/d

Distribution Facilities

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

Acquisition

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

West Hackberry

Location

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

Site Description

Authorized 220 MMbbl storage facility with 21 active caverns.

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

System Parameters

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

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

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

Distribution Facilities

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

Acquisition

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

Big Hill

Location

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

Site Description

Authorized 170 MMbbl storage facility with 14 active caverns.

Oil, brine, and raw water systems connecting caverns with central plant, water intake structure located on the Intracoastal Waterway, and a 48-inch diameter, 14-mile brine disposal pipeline

extending four miles offshore in the Gulf of Mexico. Forty-eight (48) pumps totaling 46,000 horsepower.

System Parameters

Design Drawdown Rate:	(Sour)	1,100,000 bbl/d
	(Sweet)	1,000,000 bbl/d
Raw Water Pumping Rate:		1,192,000 bbl/d
Oil Fill Rate:		225,000 bbl/d
Brine Disposal Rate:		240,000 bbl/d

Distribution Facilities

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

Acquisition

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

Bayou Choctaw

Location

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

Site Description

Authorized 76 MMbbl storage facility with six active caverns.

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

System Parameters

Design Drawdown Rate:	(Sour)	515,000 bbl/d
	(Sweet)	300,000 bbl/d
Raw Water Pumping Rate:		558,000 bbl/d
Oil Fill Rate:		10,000 bbl/d
Brine Disposal Rate:		110,000 bbl/d

Distribution Facilities

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

Acquisition

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

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

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

Appendix A. List of Acronyms

A&E	Architectural and Engineering
ADC	Alternate Data Center
ASFE	Assistant Secretary for Fossil Energy
BBL	Barrel
BBL/D	Barrels Per Day
BPH	Barrels Per Hour
CAS	Contractor Assurance System
C&D	Construction and Demolition
CY	Calendar Year
DART	Days Away/Restricted/Transferred
DAS	Deputy Assistant Secretary
DOE	U.S. Department of Energy
DOI	U.S. Department of Interior
DR	Disaster Recovery
E&P	Exploration and Production
EAC	Environmental Advisory Committee
EFS	Exchange for Storage
EIR	External Independent Review
EPEAT	Electronic Product Environmental Assessment Tool
EPCA	Energy Policy and Conservation Act
EMPCO	ExxonMobil Pipeline Company
ES&H	Environment, Safety, and Health
ESIM	Energy Security and Infrastructure Modernization
FFPO	Fluor Federal Petroleum Operations
FY	Fiscal Year
GFE	Government Furnished-Equipment
GOA	Government of Australia
H2S	Hydrogen Sulfide
IEA	International Energy Agency
IEP	International Energy Program
ISM	Integrated Safety Management
ISO	International Organization for Standardization
JHA	Job Hazard Analysis
LED	Light-Emitting Diode

LE2	Life Extension Phase 2
MBBL	Thousand Barrels
MBBL/D	Thousand Barrels Per Day
MMBBL	Million Barrels
MMBBL/D	Million Barrels Per Day
M&O	Management and Operations
NGSR	Northeast Gasoline Supply Reserve
OSHA	Occupational Safety and Health Administration
PO	Program Office
QPAD	Quality and Performance Assurance Division
RECAP	Readiness and Capability
RIK	Royalty-in-Kind
SPR	Strategic Petroleum Reserve
SPREX-RECAP	SPR Exchange Readiness and Capability
SPR PMO	Strategic Petroleum Reserve Project Management Office
VOC	Volatile Organic Compound
VPN	Virtual Private Network
VPP	Voluntary Protection Program

List of Tables

Table 1. Authorized Storage Capacity and Sustained Drawdown Capability (As of December 31, 2021) 6
Table 2. Year-End Inventories and Oil Fill History 12
Table 3. Crude Oil Receipts (As of December 31, 2021) 14
Table 4. Crude Oil Inventory (As of December 31, 2021) 15
Table 5. Crude Oil Streams (As of December 31, 2021) 18
Table 6. Base-Year Distribution Assessment 23
Table 7. Forecasted Performance Measures 24
Table 8. Summary of Commercial Revenues (December 31, 2021) 26
Table 9. Appropriations for Storage Facilities Operations and Management and Petroleum Account* (As of December 31, 2021) 27
Table 10. Value of Royalty-in-Kind Transferred by the Department of the Interior 30
Table 11. SPR Critical Performance Measures 31

List of Figures

Figure 1. Strategic Petroleum Reserve Organizational Structure 4
Figure 2. Storage Sites and Distribution System 7
Figure 3. Cumulative Oil Fill 16
Figure 4. Design Drawdown Capability (As of December 31, 2021) 19
Figure 5. Pipeline and Marine Design Distribution Capabilities 21
Figure 6. Environmental Reportable Events 1990 – 2021 37