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United States General Accounting Office

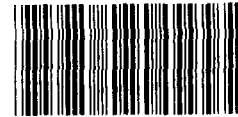
GAO

Fact Sheet for the Chairman,  
Subcommittee on Environment, Energy,  
and Natural Resources, Committee on  
Government Operations, House of  
Representatives

November 1987

# OIL RESERVE

## Status of Strategic Petroleum Reserve Activities as of September 30, 1987



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GAO/RCED-88-59FS



Resources, Community, and  
Economic Development Division

B-208196

November 30, 1987

The Honorable Mike Synar  
Chairman, Subcommittee on Environment,  
Energy, and Natural Resources  
Committee on Government Operations  
House of Representatives

Dear Mr. Chairman:

In your December 9, 1985, letter, and in subsequent discussions between my staff and your office, you requested that we continue to report on a quarterly basis on the Department of Energy's (DOE) progress in developing, operating, and filling the Strategic Petroleum Reserve (SPR) and in complying with the requirements of applicable law.

This fact sheet covers events and activities related to DOE's progress in developing, operating, and filling the SPR during the fourth quarter of fiscal year 1987. These events and activities are highlighted below. Details are provided in sections 1 and 2 of the fact sheet.

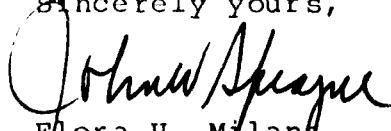
- As of September 30, 1987, the SPR inventory totaled 533.9 million barrels of oil. During the quarter DOE added 6.7 million barrels of crude oil to the SPR at an average fill rate of about 73,000 barrels per day. For fiscal year 1987 as a whole, a total of 27.5 million barrels was added for an average fill rate of about 75,400 barrels per day.
- During this quarter, DOE paid \$132 million for oil purchases. All of the oil was purchased from PEMEX--the Mexican national oil company. DOE also obligated the \$96 million remaining in its oil acquisition account, including about \$59 million for oil deliveries scheduled for the first 2 months of fiscal year 1988.

B-208196

personnel responsible for planning and managing activities associated with developing and operating the SPR facilities. We did not verify the volume or quality of oil that DOE received or the available capacity of SPR storage facilities. We discussed the information provided in this fact sheet with DOE program officials, who verified its factual accuracy. Their comments have been incorporated into the fact sheet as appropriate.

As arranged with your office, unless you publicly announce its contents earlier, we plan no further distribution of this fact sheet until 7 days after the date of this letter. At that time, we will provide copies to the Secretary of Energy and other interested parties and make copies available to others upon request. If you would like further information on this fact sheet, please contact me on (202) 275-8545. Major contributors to this fact sheet are listed in appendix I.

Sincerely yours,

  
Flora H. Milano  
Associate Director

## SECTION 1

### STATUS OF STRATEGIC PETROLEUM RESERVE

#### ACTIVITIES AS OF SEPTEMBER 30, 1987

The Energy Policy and Conservation Act (P.L. 94-163, Dec. 22, 1975), as amended, authorized the creation of the Strategic Petroleum Reserve (SPR) to store up to 1 billion barrels of crude oil for use if an oil supply disruption occurred. To meet the act's goals, the Department of Energy (DOE) established a three-phase plan to develop capacity to store 750 million barrels of oil. The schedule for completing this capacity depends upon budgetary decisions now before the Congress and the administration.

Initially, DOE developed the SPR by acquiring and modifying for oil storage existing caverns in salt deposits at Bryan Mound, Texas; Bayou Choctaw, Sulphur Mines, and West Hackberry, Louisiana; and a salt mine at Weeks Island, Louisiana. Subsequently, DOE developed additional storage capacity at these sites; a new site at Big Hill, Texas; and constructed a marine terminal at St. James, Louisiana. The additional storage capacity was developed through a leaching program that entails pumping fresh water into salt deposits and removing the resultant brine.

The various SPR storage sites are connected by pipeline to the following marine terminal complexes for crude oil deliveries during site development and for oil drawdown and distribution during an oil supply disruption:

- Seaway complex: The Bryan Mound storage site is connected to the Phillips Petroleum Company's terminal in Freeport, Texas, and to the ARCO terminal in Texas City, Texas.
- Texoma complex: The West Hackberry and Sulphur Mines storage sites are connected to Sun Oil Company's terminal in Nederland, Texas. The Big Hill storage site will also be connected to the Sun Oil terminal when the final oil pipeline tie-in is completed.
- Capline complex: The Weeks Island and Bayou Choctaw storage sites are connected to DOE's St. James marine terminal.

The SPR Program Office in Washington, D.C., is responsible for overall program management and planning activities for achieving the goals and objectives of the SPR program. Responsibility for SPR project management and implementation activities is assigned to the Oak Ridge Operations Office in Oak Ridge, Tennessee. These activities, as delegated by the Operations Office, are carried out through the Project Management Office in New Orleans, Louisiana.

Reconciliation Act of 1981 (P.L. 97-35, Aug. 13, 1981) provides that if an SPR oil drawdown occurred, this account would also fund the federal cost of withdrawing the oil from the storage caverns and transporting it to the point where private purchasers would take title. Receipts from the sale of oil would go into this account.

During the quarter, DOE paid \$132 million for oil acquisition and transportation. The SPR Program Office estimated that as of September 30, 1987, DOE had unpaid obligations of about \$96 million. This amount includes about \$59 million of funds that DOE obligated in fiscal year 1987 to pay for oil deliveries to be made during the first 2 months of fiscal year 1988.

On October 1, 1986, the SPR petroleum account contained \$526 million for use in fiscal year 1987. At the end of the fiscal year, no unobligated funds remained from prior appropriations.

CONGRESSIONAL ACTION ON SPR  
FISCAL YEAR 1988 BUDGET

In January 1987 the administration submitted its fiscal year 1988 budget proposal. The budget included \$127 million for filling the SPR at a 35,000-barrel-per-day rate and \$142 million for facility developments. H.R. 2712, an appropriations bill for the Department of the Interior and related agencies for fiscal year 1988, was passed by the House on June 25, 1987. This bill would provide about \$604 million for the oil acquisition and transportation account and about \$164 million for continued development, operation, and management of the SPR. According to DOE officials, at current prices this funding level would permit (1) filling the SPR at an annual average rate of 75,000 barrels per day, (2) continuing to leach additional capacity at the West Hackberry and Bayou Choctaw sites, and (3) beginning leaching at the Big Hill site. The House bill was passed by the Senate on September 30, 1987, with amendments that added an additional \$203 million for oil fill.

The \$807 million approved by the Senate is about \$35 million less than the amount the administration requested on September 18, 1987, when it increased its budget request to \$842 million to allow increasing the SPR fill rate from the earlier proposed rate of 35,000 barrels per day to 100,000 barrels per day. If the Congress enacts the Senate version of H.R. 2712, the \$35 million reduction will require DOE to limit the fill rate to 75,000 barrels per day until early in calendar year 1988, when it will be able to increase the fill to a 100,000-barrel-per-day rate. According to the SPR Director, these are average fill rates that can be attained over a period of time. Current budget and contracting uncertainties however, may prevent these levels from being reached in a particular month.

critical since the valves can be controlled manually. Boeing and DOE have conditionally accepted Coggins' work, subject to resolving any remaining discrepancies and omissions. According to the SPR Director, these deficiencies are minor and will not inhibit leaching in an environmentally sound and efficient manner. A full field test of the Big Hill I&C system is planned for the next site shutdown in March 1988.

As of September 30, 1987, DOE and the Fruin-Colnon Corporation still had not reached a final settlement on the Big Hill I-A construction contract. As we discussed in the last quarterly report, this contract covered site surface construction for the first five caverns and was to have been completed by February 14, 1986. The contract work is 100-percent complete, but DOE assessed Fruin-Colnon \$10,500 per day in liquidated damages (a financial settlement based upon late performance of contract) from February 15, 1986, to August 20, 1986. The August 20 date is still a point of contention between DOE and Fruin-Colnon. A DOE contracting officer commented that there have been no meetings this quarter between DOE and Fruin-Colnon and that Fruin-Colnon has not provided DOE detailed information on subcontractor claims so that close-out audits may be conducted. DOE is retaining \$2 million dollars of the contract funds pending final settlement.

Other Big Hill contracts are complete or progressing generally as scheduled. Significant details are as follows:

- The contract for the 24.2-mile crude oil pipeline from Big Hill to the Sun Oil terminal is 100-percent complete. However, DOE does not plan to complete the final connection of this pipeline to unloading facilities at the Sun Terminal until May 1989, which will still be in time to permit its use in filling the Big Hill site.
- The contract with EBASCO for surface construction at the remaining nine caverns at the site, including pipeline tie-ins to connect the caverns to the oil, brine, and water systems, was sufficiently advanced to start cavern leaching on October 1, 1987, even though part of EBASCO's work is behind schedule. As of September 30, 1987, EBASCO's work for caverns 101-105 was about 75-percent complete compared with a 100-percent objective, but was on schedule at 30-percent completion for caverns 111-114. EBASCO's current schedule for completing and turning over caverns 101-105 has been coordinated with Boeing's leaching requirement and will not affect the leach plan. According to DOE, coordination/working meetings are held with EBASCO twice weekly to review the status of the cavern work and coordinate activities to assure that leaching proceeds on schedule.

## Bryan Mound

Bryan Mound received no crude oil for this quarter, but the project to improve cavern 5's and the site's drawdown capability, as discussed in previous quarterly reports, was completed in September 1987 when the last of the sweet crude oil remaining in cavern 5 was transferred to the phase III caverns at the site. Engineering tests confirmed that the cavern was empty of sweet oil. This oil transfer now allows DOE to begin refilling 35.4 million barrels of cavern capacity with sour oil.

At the end of the oil transfer, cavern 5 was empty, but inventory records showed a shortfall of about 800,000 barrels of oil. A DOE inventory manager stated that the inventory records by cavern are not entirely accurate (plus or minus 10 percent) because each cavern is not metered to measure the oil injected into it. When the phase I caverns--1, 4 and 5--were initially filled, the total quantity of oil delivered to the site was measured and then simultaneously injected into the phase I caverns. Since the phase I caverns presumably contain a known total quantity of oil, DOE management has decided administratively to reallocate in SPR records the sweet crude oil inventory of 800,000 barrels attributed to cavern 5 to caverns 1 and 4.

A Boeing cavern engineer stated that cavern 5 began receiving sour oil in October 1987 from phase II caverns that have been temporarily overfilled and will also receive crude oil under the current PEMEX contract.

The Bryan Mound site was shut down from July 13 to July 24, 1987, to permit a contractor to complete an on-site improvement project, which included tie-in to the ARCO 40-inch pipeline and installation of a sixth meter. During this period oil transfer from cavern 5 was stopped and site maintenance activities were carried out. Also during July, the Coggins Systems, Inc., control room I&C project was put on a 120-day hold to concentrate a special effort on similar work at Big Hill. Coggins' I&C work resumed at Bryan Mound on September 23, 1987. However, the completion time for the contract will be delayed until January 28, 1988.

This quarter, Boeing discovered that Bryan Mound cavern 106, the sole storage cavern exclusively for Maya crude oil,<sup>2</sup> has developed a slow leak in the cemented casing (well pipe) at a point about 60 feet below the surface. A special interior pipe patch was applied at the suspected leak point, but an additional test indicated that the pipe was still leaking. According to a Boeing

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<sup>2</sup>Maya crude is lower quality oil having a minimum sulphur content of 3.5 percent and an American Petroleum Institute standard gravity of at least 22 degrees.

and/or loss. The main objective of the exercise was to determine the gas concentration and composition of the oil using dynamic sampling methods--samples taken during oil flow at various pressures. The data from this dynamic sampling are to be used to evaluate the need for an oil/gas separator and determine the effect of the dissolved gasses on operating equipment, particularly the crude oil pumps and meters.

A synopsis of the test prepared by Boeing described the drawdown exercise as a success. Oil was transferred from cavern 2-4-5 to cavern 7 at the planned rates of 40,000 barrels a day for 8 hours and subsequently at 70,000 barrels a day for an additional 8 hours. The system was then shut down. All planned dynamic samples were taken for further analysis of dissolved gas content. At one point, three raw water/brine pumps shut down with no warning alarm indication and were restarted about an hour later. A total of 50,766 barrels were transferred from cavern 2-4-5 to cavern 7. Seventy-two pressurized samples were taken. Although the site operations model predicted 2 crude oil pumps would be needed to maintain the 70,000-barrel daily rate, only 1 was needed.

#### Bayou Choctaw

Our last report discussed the site construction work at Bayou Choctaw. Cavern 101 work, construction of surface piping and connecting the cavern to existing oil, water, and brine pipelines, was completed July 30, 1987. Leaching began on July 31, 1987.

About 1.1 million barrels of crude oil were added to cavern 17 in July 1987, bringing the total inventory to about 6.2 million. A Boeing cavern engineer stated that, although cavern 17's capacity is 10 million barrels, no more crude oil will be added for the time being. The remaining 3.8 million barrels of space will serve as a cushion to take care of any oil that may need to be displaced from other caverns or from the Weeks Island mine because of salt creep, pigging operations, or any other reason while capacity development is underway.

Boeing currently plans to complete the I&C system in April 1988 and to test it in May during a drawdown exercise. The exercise will test a sour oil proportional drawdown of three caverns at the site design rate of 480,000 barrels per day over a period of 32 hours.

In our previous report, we discussed Boeing's plans to investigate a crude oil pipeline anomaly between the site and the St. James Terminal. A Boeing pipeline engineer said that the contracting process is underway for this investigation. Boeing engineers are working on a cost estimate, after which an invitation for bid will be issued--probably in late October 1987. The actual work to investigate the pipeline is not expected to begin until



last reported on this item. Completion is planned for January rather than June 1989. This pipeline, when completed, will provide a flow rate of 864,000 barrels per day.

DOE expects to conclude a tie-in connection agreement with Capline owners in November 1987. Capline is a crude oil pipeline running from the Gulf Coast to Illinois. It is owned by several companies and operated by Shell Oil Company. The proposed tie-in with the St. James terminal will provide increased oil delivery capability for the Bayou Choctaw and Weeks Island sites.

DOE expects to award a Marine Terminal Services contract on April 30, 1988, for the use of private terminal facilities to supplement the government-owned terminal in the St. James area.

#### OTHER SPR CONTRACT NEGOTIATIONS

During this quarter, DOE continued negotiations with PEMEX concerning previous deliveries under the PEMEX I contract and signed contract extensions with two of its direct support service contractors, Systematic Management Services, Inc. (administrative services) and Walk, Haydel and Associates (architectural and engineering services).

Our last quarterly report discussed the disagreement between DOE and PEMEX over a DOE claim of \$287,104 related to the basic sediment and water factor for crude oil delivered under the PEMEX I contract. PEMEX had offered to settle the claim at substantially less than half of the amount sought by DOE, and DOE countered in June 1987 with an offer of \$237,000. According to a DOE contract specialist, PEMEX responded to DOE's settlement offer on August 19, 1987, by reiterating its previous settlement offer of \$103,616.76. DOE developed a response that will be forwarded to PEMEX after it conducts an informal discussion with a PEMEX representative. DOE wants to avoid the disputes process, which would be the next step if a settlement is not achieved.

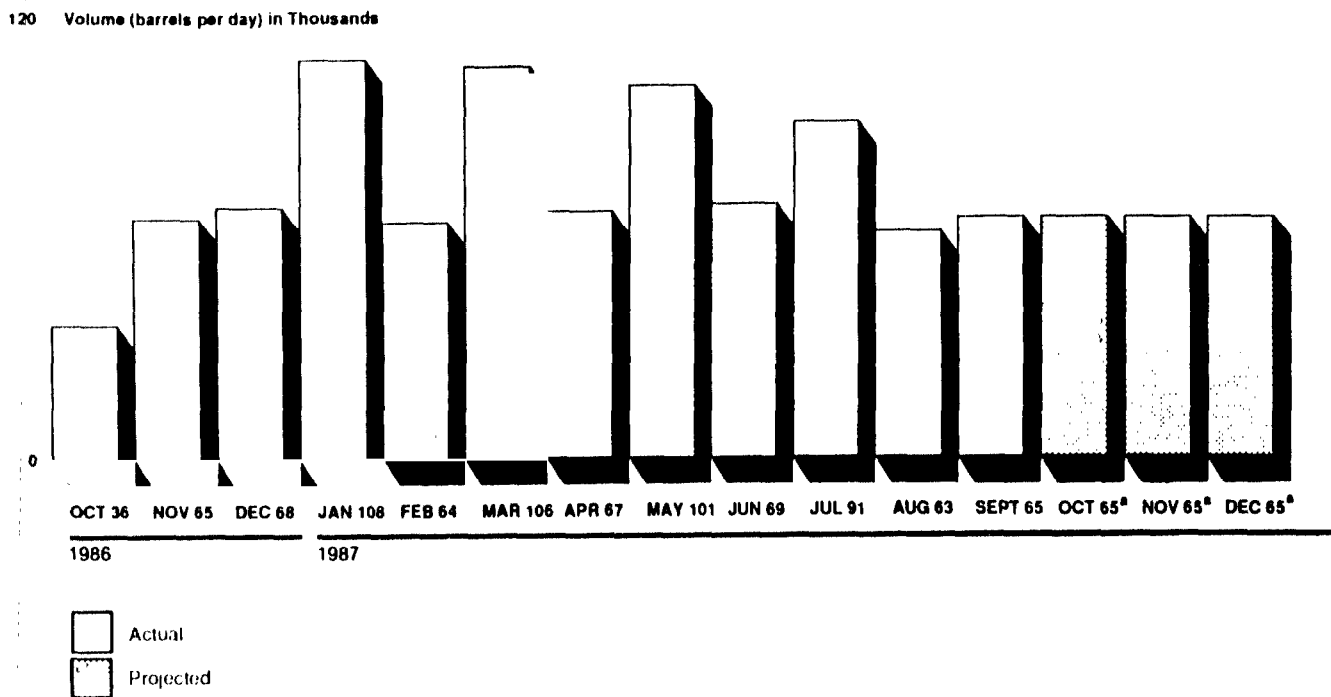
As of October 1, 1987, DOE also was still waiting for a credit from PEMEX for a \$17,000 quantity settlement concluded in April 1987. The DOE contract specialist said that a PEMEX message dated August 3, 1987, indicated that the credit was in process, and that when executed, will be applied to the current PEMEX contract.

On August 28, 1987, DOE exercised its option to extend the contract with Systematic Management Services, Inc. This is the first option period under the contract and covers a 1-year period beginning August 29, 1987. The estimated cost is \$4,516,466 plus a fixed fee of \$345,729. DOE also exercised its contract option with Walk, Haydel and Associates on July 27, 1987, for work on the Capital Improvement Program. This is the second option period for this contract, and covers a 1-year period beginning May 31, 1987. The estimated cost is \$9,345,663 plus a fixed fee of \$682,233.

SECTION 2

DATA ON THE STATUS OF THE STRATEGIC PETROLEUM RESERVE

Figure 2.1: Average Daily SPR Oil Receiving Rate<sup>a</sup>



<sup>a</sup>Daily receiving rate for October and November 1987 based on DOE projection of future deliveries. December projection by GAO. All of these rates are subject to change.

Source: DOE

Table 2.2: Status of SPR Underground Capacity for Crude Oil Storage as of September 30, 1987

<u>Storage facilities</u>	<u>Gross volume planned</u>	<u>Gross volume completed</u>	<u>Permanent capacity planned<sup>a</sup></u>	<u>Capacity available</u>	<u>Capacity filled</u>
	- - - - - (millions of barrels) - - - - -				
Phase I sites:					
Bayou Choctaw	63.0 <sup>b</sup>	48.6	52.0	46.0	46.0
Bryan Mound	74.0	74.0	69.6	69.6	34.4
Sulphur Mines	-	27.3	-	26.0	25.4
Weeks Island	73.0	73.0	73.0	73.0	72.6
West Hackberry	<u>50.4</u>	<u>50.4</u>	<u>47.6</u>	<u>48.2</u>	<u>47.2</u>
Total	<u>260.4</u>	<u>273.3<sup>b</sup></u>	<u>242.2</u>	<u>262.8</u>	<u>225.6</u>
Phase II sites:					
Bayou Choctaw	11.3	11.3	10.0	10.0	6.2
Bryan Mound	139.3	139.3	124.6	124.6	131.3
West Hackberry	<u>179.2</u>	<u>173.3</u>	<u>160.8</u>	<u>151.6<sup>c</sup></u>	<u>137.2</u>
Total	<u>329.8</u>	<u>323.9</u>	<u>295.4</u>	<u>286.2</u>	<u>274.7</u>
Phase III sites:					
Bayou Choctaw	11.2	.3	10.0	-	-
Bryan Mound	36.6	36.6	31.8	31.8	30.0
West Hackberry	11.8	4.8	10.6	.1	.1
Big Hill	<u>180.6</u>	-	<u>160.0</u>	-	-
Total	<u>240.2</u>	<u>41.7</u>	<u>212.4</u>	<u>31.9</u>	<u>30.1</u>
Tank and pipelines	-	-	-	-	<u>3.5</u>
Total for SPR	<u>830.4</u>	<u>638.9</u>	<u>750.0</u>	<u>580.9<sup>c</sup></u>	<u>533.9</u>

<sup>a</sup>Permanent capacity for oil storage is less than gross volume because a certain volume of unoccupied capacity must be provided for brine. Data shown is from DOE's Facilities Development Plan, October, 1986.

<sup>b</sup>DOE acquired and modified existing caverns and a mine containing this gross volume. No leaching was required.

<sup>c</sup>The total capacity available is currently reduced by 2.4 million barrels pending the completion of remedial leaching (sump enlargement) at 3 West Hackberry sweet crude oil caverns.

Source: DOE.

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[A large rectangular area defined by a solid top and bottom border and dashed left and right borders, which is currently empty.]

- H.R. 2712, a bill making appropriations for the Department of the Interior and related agencies for fiscal year 1988 under which the SPR and SPR petroleum accounts are funded, has passed both the Senate and the House but in different versions. It has not been reconciled in conference. The House version provides funding to support filling the SPR at 75,000 barrels per day at current prices. The Senate added enough money for DOE to increase this rate to 100,000 barrels per day in early 1988.
- On September 30, 1987, the Congress approved a joint resolution, H.J. Res. 362 (P.L. 100-120), to continue appropriations for fiscal year 1988. On the basis of this resolution, the Office of Management and Budget apportioned \$59 million to DOE for SPR oil purchases. At current prices this money, along with the funds obligated in fiscal year 1987 for 1988 oil deliveries noted above, will permit fill of the SPR at a 75,000 barrel-per-day rate for about 80 days.
- Cavern leaching at Big Hill, Texas, began as scheduled, with two caverns brought on line on October 1, 1987. This was achieved by diverting resources from SPR sites at Bryan Mound, Texas, and West Hackberry, Louisiana.
- DOE has planned a number of SPR oil distribution enhancements with the objective of increasing the SPR distribution capability. During this quarter modifications were completed at the Phillips marine terminal in Freeport, Texas, to allow the metering of oil withdrawn from Bryan Mound for loading into ships at the Phillips dock. Previously, these meters could only be used for oil going to Bryan Mound. DOE anticipates an early construction start (April rather than September 1988) for a pipeline that will connect the West Hackberry site to the Texas pipeline in the Lake Charles, Louisiana area.

OBJECTIVES, SCOPE, AND  
METHODOLOGY

By agreement, we limited our review to providing primarily statistical information and highlights of major activities that occurred during the period July 1 to September 30, 1987. To obtain this information, we reviewed DOE and contractor program documents, publications, and studies, and interviewed DOE managers and operations

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ABBREVIATIONS

ARCO	Atlantic Richfield Company
DOE	Department of Energy
GAO	General Accounting Office
I&C	Instrumentation and Control
MSC	Military Sealift Command
PEMEX	Petroleos Mexicanos
RCED	Resources, Community, and Economic Development Division
RWIS	raw water intake structure
SPR	Strategic Petroleum Reserve

Under a 5-year management, operation, and maintenance contract, Boeing Petroleum Services, Inc., provides the necessary qualified personnel and services to run the government-owned SPR facilities. DOE retains responsibility for overall project management and technical direction, while Boeing is responsible for SPR's day-to-day management.

This fact sheet discusses activities affecting the SPR that occurred during the quarter ending September 30, 1987, including (1) oil-fill activities, (2) the status of the oil acquisition and transportation account, (3) congressional action on the SPR budget, (4) storage site development activities, (5) oil distribution improvement and enhancement activities, and (6) issues related to demurrage charges on oil deliveries to the SPR.

### SPR OIL-FILL ACTIVITIES

DOE reported that 6.7 million barrels of crude oil were added to the SPR inventory during the quarter ending September 30, 1987, increasing it to 533.9 million barrels. For fiscal year 1987 as a whole, a total of 27.5 million barrels was added. The crude oil received this quarter was purchased under the terms of a 1-year contract with PEMEX (the Mexican national oil company).

The average fill rate for the quarter was about 73,000 barrels per day. (See fig. 2.1 for further information on SPR oil acquisition and fill activities.) For fiscal year 1987 as a whole, the fill rate was about 75,400 barrels per day. Of the 533.9 million barrels of oil in storage, 36 percent is sweet (low sulfur) crude, 53 percent is sour (high sulfur) crude, and about 11 percent is a combination of lower quality (sulphur and gravity) crude oils. Oil added to the SPR this quarter changed the relative percentages of these types of oil as follows: sour crude increased 1 percent, sweet remained the same, and the lower quality crude decreased 1 percent.

DOE plans to continue purchases during the first quarter of fiscal year 1988 under the PEMEX contract until it expires at the end of November 1987. Contracts for continuing fiscal year 1988 crude oil purchases have not been executed, but a DOE official anticipates another negotiated PEMEX contract and, possibly, a contract to purchase domestic crude oil.

### STATUS OF SPR OIL ACQUISITION AND TRANSPORTATION ACCOUNT

According to DOE, its oil acquisition and transportation account provides funds for (1) SPR oil procurement; (2) associated transportation costs, such as pipeline, tanker, and marine terminal activities; (3) U.S. Customs duties; (4) Superfund taxes; and (5) miscellaneous costs, such as administrative expenses associated with acquiring and transporting the oil. The Omnibus Budget

On September 30, 1987, the Congress approved a joint resolution, H.J. Res. 362 (P.L. 100-120), making continuing appropriations for fiscal year 1988.<sup>1</sup> On the basis of the continuing resolution, the Office of Management and Budget apportioned \$59 million to DOE for SPR oil purchases and \$22 million for facilities development. At current prices, this additional money, along with the \$59 million obligated in fiscal year 1987 for 1988, will permit fill of the SPR at a 75,000-barrel-per-day rate for about 80 days, or until about mid-December 1987.

#### SPR SITE DEVELOPMENT ACTIVITIES

Cavern leaching at Big Hill began as scheduled with two caverns brought on line on October 1, 1987. DOE accomplished this by diverting contractor personnel working on instrumentation and control (I&C) projects at Bryan Mound and West Hackberry. Also, about 5.6 million barrels of crude oil were added at West Hackberry, and about 1.1 million at Bayou Choctaw.

#### Big Hill

Cavern leaching at Big Hill began as scheduled, with two caverns brought on line on October 1, 1987. DOE's and Boeing's goal is to have 10 caverns in leaching status by the end of October 1987. The first crude oil was delivered to Big Hill on August 14, 1987, by tank truck for use as blanket oil to seal the upper part of the cavern during leaching. Regular pipeline deliveries of oil to the Big Hill site are not expected to start until sometime in 1989.

A Boeing engineer told us that although leaching has begun, a Boeing assessment of the site systems as of September 20, 1987, concluded that the site would not be able to operate in the automatic mode. The distributed control system that operates equipment such as pumps, valves, and the raw water intake structure through remote distributor units was tested repeatedly by DOE's architect/engineer contractor (Walk, Haydel and Associates) and Boeing. These tests revealed that the control system still has software problems and was only marginally suitable for leaching in the automatic mode. The most serious problem is a control screen display function that is supposed to show equipment status, such as pump condition and valve position, but does not currently display information as quickly as specifications require. As of September 30, 1987, Coggins System, Inc. (a site technical contractor) had not located the cause of the problem. In addition, the hydraulic units for flow control valves were not functioning suitably for automatic control, but this was not considered

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<sup>1</sup>As of November 9, 1987, H.J. Res. 394, a resolution to extend P.L. 100-120 from November 10, 1987, through November 20, 1987, had passed the House and the Senate.



-- The Coggins Systems, Inc., I&C work at Big Hill was accelerated to meet the October 1, 1987, ready-to-leach date. The date was met. This was accomplished by delaying until next quarter (November), the planned I&C verification testing at West Hackberry and by suspending all Coggins' I&C work at Bryan Mound for 120 days.

### West Hackberry

In the final quarter of fiscal year 1987, Boeing continued leaching the last two phase II caverns and the single phase III cavern. Leaching was completed at one of the phase II caverns. West Hackberry received about 5.6 million barrels of crude oil this quarter. As of September 30, 1987, 11 of the 16 phase II caverns at West Hackberry were full, containing about 109.4 million barrels; 4 were in final-fill status, containing 27.1 million barrels; and 1 was in the leaching-only stage, as was the single phase III cavern.

Prior quarterly reports have detailed the breakdown, repair, and return to service of the West Hackberry brine disposal line. This service continued to be limited to 360,000 barrels of brine daily, about one-third of its initial rated capacity. This capacity, combined with that of the site's brine disposal wells of about 60,000 barrels per day, provides 420,000 barrels of disposal capacity. The brine disposal rates achieved during this quarter were near this capacity and, according to the SPR Director, were consistent with DOE's leaching plans for the site.

Our last quarterly report addressed a verification test of the entire site I&C system, including the raw water intake structure. Since an earlier test attempted in April 1987 was shutdown after one day because of software problems, the test was rescheduled for this quarter. A Boeing engineer stated that it was further delayed because of higher priority work at Big Hill. Boeing reassigned contractor personnel from West Hackberry to Big Hill in order to accelerate the I&C work there. As a result, the West Hackberry site I&C test will not occur until next quarter, possibly beginning in November 1987.

Our last report also discussed Boeing's plans to investigate anomalies at four points on the crude oil pipeline between the site and the Sun Oil Company terminal in Nederland, Texas. A Boeing engineer told us that Boeing decided to assess the pipeline's condition before making this investigation. An electronic instrumented survey tool ("smart-pig") was not successfully run through the pipeline until October 2, 1987. The initial results confirm the points selected for investigation.

On August 4, 1987, Boeing contracted for pipeline investigation work with P.D.Q. Contractors, Inc., for a fixed cost of about \$81,700. The performance period will begin 60 days following the Notice to Proceed on October 5, 1987.

cavern engineer, this was a different leak. He speculated that it was located at a lower point and probably was a thread leak occurring where two pieces of well pipe are screwed together. Boeing plans to conduct an integrity test in October 1987, lasting about 30 days, to evaluate the leak and the amount of oil that could be lost when the cavern is under full pressure. If this test confirms present data that the oil loss is 100 or fewer barrels a year, no corrective action will be required.

In our last quarterly report we discussed Boeing's plans to repair a pipeline anomaly between the site and Jones Creek Tank Farm. Boeing's pipeline engineer specialist stated that this anomaly had been considered for remedial restoration work, but that engineering analysis showed that the pipeline is acceptable in its present condition. The pipewall thickness is within the specification code required for the pressure rating under which the pipeline would operate and can support normal operations at the original prescribed pressure rating.

A DOE industrial specialist and a Boeing engineer told us that a site drawdown test is planned for early fiscal year 1988. Sour crude oil will move from the site through the new 40-inch pipeline at a maximum site drawdown rate to ARCO's Texas City terminal tanks. Boeing plans to run a "smart-pig" in the new 40-inch pipeline during the drawdown exercise to provide a data baseline for that pipeline.

A DOE official informed us that an analysis of possible ways to improve the drawdown capacity of Bryan Mound is underway. Alternatives are under consideration that would facilitate more rapid loading of crude oil into tankers at the Phillips Terminal and/or upgrade the daily drawdown rate of the site from 1.1 to 1.25 million barrels per day. The analysis is expected to be completed in the next quarter.

### Sulphur Mines

In our last quarterly report we discussed an investigation of possible erosion of the Sulphur Mines crude oil pipeline. Three anomalies classified as severe were detected. In Boeing's opinion, repairs were not required at two locations and operation limitations were not imposed because the anomalies were not as severe as the data indicated. The third anomaly had been considered for inspection before December 31, 1987, but Boeing does not plan to investigate this anomaly until after another "smart-pig" has been put through the pipeline in November 1988.

On September 29 and 30, 1987, a Sulphur Mines systems test and exercise involved moving crude oil between cavern 2-4-5 and cavern 7. Crude oil in cavern 2-4-5 contains dissolved gasses from hydrocarbons intruding from the salt formation and from the nitrogen blanket placed on top of the oil to minimize any leakage

January 1988. This engineer stated that Boeing plans to run a "smart pig" through this pipeline in May 1988.

#### Weeks Island

According to a Boeing cavern engineer, water deposits found recently in the Weeks Island mine have again raised concern about leaks and/or seepage. Past attempts to correct the problem have included grouting cracks in the mine walls and installing a bulkhead to contain the water accumulation. Boeing has a monitoring program underway to observe whether water levels in the mine change over a period of several months. Boeing has tentatively concluded that the fill holes used to inject oil into the mine do not leak and that there is no indication of possible leaks. A DOE engineer confirmed these results. He also stated, however, that as a result of condensation of moisture in the air portion of the mine, the identification of other leaks is made more difficult. DOE has formed a Risk Abatement Committee for Weeks Island to isolate the impact of condensation and to identify and control possible shaft leaks.

Boeing plans to run a "smart-pig" through the Weeks Island crude oil pipeline in May 1988. Boeing also plans a Weeks Island reliability, availability, and maintainability test in fiscal year 1988. The purpose of this test is to demonstrate the reliability of the crude oil pumps (booster and mainline) and inert gas generators and to increase the confidence in both equipment operation and predicted failure rates.

#### SPR OIL DISTRIBUTION IMPROVEMENTS AND ENHANCEMENTS

As previously reported, DOE has planned for a number of SPR oil distribution enhancements, including plans to rectify problems that resulted when the Texoma Pipeline Company and Seaway Pipeline, Inc., sold their interstate crude oil pipelines. The objective of the planned enhancements is to increase the present SPR crude oil distribution capability of 3.03 million barrels per day to match the SPR's projected 4.5 million-barrel-per-day oil drawdown capability--based on a planned 750-million-barrel reserve.

This quarter, Seaway complex modifications were completed in August 1987 at the Phillips Marine terminal to allow meters to be used for loading ships with Bryan Mound crude oil. These meters were previously unidirectional and thus could function only for unloading ships with crude oil destined for Bryan Mound.

DOE anticipates an early construction start (April 1988 rather than September 1988) for the 12-mile long, 36-inch diameter pipeline that will connect DOE's West Hackberry site to the Texas 22-inch pipeline in the Lake Charles area. The diameter of the new pipeline has been increased from 30 inches to 36 inches since we

## POSSIBLE DEMURRAGE OVERCHARGES

Demurrage is the penalty or fee added to the cost of chartering a vessel if it is delayed more than a specified period of time, usually 72 hours, while loading or unloading. The Military Sealift Command (MSC) is responsible for chartering tankers for the delivery of SPR oil and is, therefore, responsible for evaluating claims for demurrage, which are ultimately paid from the SPR oil acquisition and transportation account. Boeing has recently reevaluated MSC demurrage invoices for the period June 1980 through September 1985. Boeing concluded that "Payments of \$453,057.23 in excess of the calculated liability requires [sic] additional clarification/substantiation."

Boeing asserted that, in the past, MSC calculated demurrage solely on the basis of submissions from the shipowner. Boeing has initiated a practice of providing both DOE and MSC supplementary information on time spent by tankers loading and unloading based upon their own information. This practice is expected to reduce the likelihood that overpayments will occur.

MSC disagrees with Boeing's statement about using only shipowner data for calculating demurrage charges. The Deputy Controller told us that MSC receives detailed data on every shipment that is recorded and certified by a government quality assurance representative on DD-250s. These forms are used by MSC staff to calculate the proper payment. The Deputy Controller further told us that his office has not received the supplementary information on tanker movements mentioned by Boeing. The MSC official said that he could not comment on the potential overpayment because his staff had not completed an analysis of the data provided by Boeing.

Table 2.1: Status of SPR Oil Acquisition and Transportation Funds  
as of September 30, 1987<sup>a</sup>

<u>Funds made available</u>	<u>Amount</u> (millions)
Fiscal year 1977 to 1981 appropriations <sup>b</sup>	\$ 6,665
Fiscal year 1982 appropriations	3,684
Fiscal year 1983 appropriations	2,074
Fiscal year 1984 appropriations	650
Fiscal year 1985 appropriations	<u>2,050</u>
Total	<u>\$15,123</u>
<u>Funds used or committed</u>	
Fiscal year 1977 to 1981 payments	\$ 4,859
Fiscal year 1982 payments	3,687
Fiscal year 1983 payments	1,641
Fiscal year 1984 payments	2,329
Fiscal year 1985 payments	1,621
Fiscal year 1986 payments	397
Estimated fiscal year 1987 payments <sup>c</sup>	490
Estimated DOE unpaid obligations as of September 30, 1987 <sup>d</sup>	<u>96</u>
Total	<u>\$15,120</u>
Estimated unobligated funds at DOE	\$ 0

<sup>a</sup>The Omnibus Budget Reconciliation Act of 1981 (P.L. 97-35, Aug. 13, 1981) established an off-budget SPR Petroleum Account, effective October 1981, to pay for petroleum acquisition and transportation.

<sup>b</sup>Includes lapsed funds of \$2.97 million. As a result of this inclusion, total funds available are greater than total funds used or committed.

<sup>c</sup>Amount consists of DOE's actual reported payments through August 1987 and DOE's estimated payments for September 1987.

<sup>d</sup>Unpaid obligations primarily represent funds that have been obligated for oil deliveries or are obligated to Defense Fuel Supply Center for PEMEX oil transportation costs. DOE estimated that \$0.55 million had been obligated as of September 30, 1987, for future costs.

Source: DOE.

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