GAO

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

March 1987

OIL RESERVE

Status of Strategic Petroleum Reserve Activities as of December 31, 1986

GAO/RCED-87-101FS

GAO

United States
General Accounting Office
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Resources, Community, and
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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 with us, 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. Section 3 contains a list of our prior SPR quarterly reports.

This fact sheet covers events and activities related to DOE's progress in developing, operating, and filling the SPR during the first quarter of fiscal year 1987. However, since December 31, 1986, DOE informed us that the proposed fiscal year 1988 SPR budget does not provide funds for developing oil storage capacity beyond 580 million barrels. These events and activities are highlighted below.

-- As of December 31, 1986, the SPR inventory totaled 511.6 million barrels of oil. During the quarter DOE added 5.2 million barrels of crude oil to the SPR at an average fill rate of about 56,300 barrels per day.

-- For fiscal year 1987, DOE did not request additional appropriated funds for oil-fill acquisition. According to DOE, existing unobligated fund balances were adequate to achieve an average fill rate of 75,000 barrels per day.

-- The fiscal year 1988 budget request of $270 million--$142 million for facilities development and management and $128 million for oil purchases--proposes an oil-fill acquisition rate of 35,000 barrels per day. It also contains proposed legislation that would remove the current legislative requirement that oil sales from the Naval Petroleum Reserve be discontinued if the SPR fill rate drops below 75,000 barrels per day.

-- DOE's purchase of Naval Petroleum Reserve oil for the SPR was discontinued on October 31, 1986, after about 267,000 barrels of oil were transferred to the commercial pipeline system in California for transfer to a storage site in Louisiana.

-- Construction and development of surface facilities at the Big Hill, Texas, site--including construction of the oil, water, and brine pipelines--continued during the quarter. Although pipeline construction was nearly complete, delays were experienced in starting the connection of off-site pipelines to on-site facilities.

-- DOE currently plans to delay closing the Sulphur Mines, Louisiana, site until replacement storage space is available at the Bayou Choctaw and Big Hill sites. This space is expected to be available sometime in the 1990's.

-- DOE signed agreements with Transworld Oil U.S.A., Inc., for the purchase of 3.65 million barrels of domestically produced oil and with Petroleos Mexicanos (PEMEX) for 23.7 million barrels of oil to be delivered during the period November 1, 1986-November 30, 1987.

-- As of December 31, 1986, the oil distribution pipeline from the Bryan Mound, Texas, SPR site to Texas City, Texas, was 70 percent complete with other planned distribution enhancements in the development stage.

-- Boeing, the prime contractor for the management, operation, and maintenance of the SPR, was awarded 65 percent of the $2.6 million award fee available for the second 6-month award fee period.

Details related to these quarterly events and activities are provided in sections 1 and 2.

OBJECTIVES, SCOPE, AND METHODOLOGY

We limited our review, because of the time frame, to providing primarily statistical information and highlights of major activities that occurred during the period. To obtain this information, we reviewed DOE and contractor program documents, publications, and studies and interviewed DOE managers and operations 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 in the report as appropriate.

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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. Milans

Flora H. Milans
Associate Director

C O N T E N T S

ABBREVIATIONS

API	American Petroleum Institute
ARCO	Atlantic Richfield Company
DOE	Department of Energy
GAO	General Accounting Office
NPR	Naval Petroleum Reserve
PEMEX	Petroleos Mexicanos
RCED	Resources, Community, and Economic Development Division
RWIS	raw water intake structure
SPR	Strategic Petroleum Reserve

SECTION 1
STATUS OF STRATEGIC PETROLEUM RESERVE ACTIVITIES AS OF DECEMBER 31, 1986

The Energy Policy and Conservation Act (Public Law 94-163, Dec. 22, 1975), as amended, authorized the creation of SPR to store up to 1 billion barrels of oil for use if an oil supply disruption occurred. To meet the act's goals, DOE established a three-phase plan to store 750 million barrels of oil.

Phase I of the SPR plan involved the storage of about 260 million barrels of oil and is now complete. It consisted of 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. It also involved constructing a marine terminal at St. James, Louisiana.

Phase II involves creating new caverns through a leaching program at three of the Phase I sites to increase SPR capacity to about 550 million barrels. The leaching program entails pumping fresh water into salt deposits and removing the resultant brine. DOE injects oil into the top of the cavern as the leaching process creates the storage capacity.

Although Phase II was initially planned to be completed in 1987, leaching was stopped on December 31, 1985, in anticipation of an administration-proposed moratorium on further SPR development. In addition, SPR oil fill was to be terminated in July 1986 when a 500-million-barrel inventory level was reached. However, in accordance with requirements for filling the SPR in the Consolidated Omnibus Budget Reconciliation Act of 1985, DOE increased the July oil-fill goal to 502 million barrels.[1] In addition, DOE resumed cavern-leaching activities on July 3, 1986. As of December 31, 1986, completion of Phase II storage capacity development was currently scheduled for August 1988.[2]

Phase III, originally scheduled to be completed in 1990, was rescheduled as of December 31, 1986, for completion in 1992. It was designed to create the additional capacity needed to reach the 750-million-barrel goal by expanding three existing storage sites

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[1]The Consolidated Omnibus Budget Reconciliation Act of 1985 (Public Law 99-272, Apr. 7, 1986) stipulated a minimum fill rate of 35,000 barrels per day for the SPR during fiscal years 1986, 1987, and 1988 until the SPR contains at least 527 million barrels of oil.

[2]If the Congress approves the proposed fiscal year 1988 SPR budget, all currently planned site completion dates will be extended indefinitely.

and developing a new site at Big Hill, Texas. The slippage in the planned completion schedule resulted primarily from the administration's attempts at a moratorium on SPR development in 1985 and 1986. Although the President reaffirmed the administration's commitment to a 750-million-barrel SPR in August 1986, the final completion date depends on future decisions by the administration and the Congress on funding levels for oil purchases. Because of the time needed to develop capacity, activities associated with Phases II and III overlap.

The SPR storage sites are connected by pipeline to the following three 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 Phillips Petroleum Company's terminal (formerly the Seaway Terminal) in Freeport, 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, when completed, will also be connected to the Sun terminal.

-- 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. 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 the SPR's day-to-day management.

This fact sheet discusses activities affecting the SPR that occurred during the quarter ending December 31, 1986, including (1) oil-fill activities, (2) the status of the oil acquisition and transportation account, (3) fiscal years 1987 and 1988 SPR funding, (4) DOE actions underway to acquire additional crude oil for the SPR, (5) storage site activities, and (6) contract changes during the period.

SPR OIL-FILL ACTIVITIES

DOE reported that 5.2 million barrels of crude oil were added to the SPR inventory during the quarter ending December 31, 1986, increasing it to 511.6 million barrels. The crude oil received this quarter was comprised of purchases from PEMEX (the Mexican national oil company) and Transworld Oil U.S.A., Inc. About 2.5 million barrels were delivered under the PEMEX I contract, which terminated in November 1986; about 1.5 million barrels were delivered under the November 7, 1986, PEMEX contract; and about 1.2 million barrels were delivered under the October 7, 1986, contract with Transworld for the purchase of domestic West Texas sour (high sulfur) crude oil.

The average fill rate for the quarter was about 56,300 barrels per day. (See fig. 2.1 and table 2.1 for further information on SPR oil acquisition and fill activities.) Of the 511.6 million barrels of oil in storage, 38 percent is sweet (low sulfur) crude, 51 percent is sour crude, and about 11 percent is a combination of lower quality (sulphur and gravity) crude oils. (See table 2.1 for SPR oil quality specifications.)

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; and (4) miscellaneous costs, such as administrative expenses associated with acquiring and transporting the oil. The Omnibus Budget Reconciliation Act of 1981 (Public Law 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 also go into this account. During the quarter DOE made payments of $62 million for oil acquisition and transportation. The Program Office estimated that as of December 31, 1986, DOE had unpaid obligations and commitments of about $382 million and unobligated funds of about $145 million.

FISCAL YEARS 1987 AND 1988 SPR FUNDING

Congress did not provide additional funding in Public Law 99-591 (Oct. 30, 1986) for fiscal year 1987 SPR oil purchases since it had determined that the unobligated balances remaining in DOE's oil account from prior fiscal years were sufficient. However, an additional $147.4 million was provided in new budget authority for the development and management of the SPR. For fiscal year 1988 DOE has requested $270 million in new budget

authority for the SPR--about $128 million for SPR oil purchases and about $142 million for facilities development and management.

In fiscal year 1987, DOE plans to obligate $239 million for facilities development and management and a net of $432 million for SPR oil purchases. These expenditures will enable DOE to continue developing and managing the SPR during the fiscal year and to purchase oil for the SPR--at an estimated average acquisition cost of $15.14 per barrel--at 75,000 barrels of oil per day for the year.[3] During the last 3 months of the fiscal year, DOE also plans to obligate funds to acquire additional oil--at an estimated average acquisition cost of $16.96 per barrel--for deliveries in fiscal year 1988.

For fiscal year 1988, DOE plans net obligations of $165 million for facilities development and management. None of these funds are expected to be used for storage capacity development. In addition, DOE plans net obligations of $221 million in oil purchases for the fiscal year. This obligation level will enable DOE to acquire oil at the 35,000-barrel-per-day level for the year if oil prices remain at $16.96 per barrel or less.[4] In addition, during the last 3 months of the fiscal year, DOE plans additional oil acquisitions at the 35,000-barrel-per-day level at an estimated average cost of $18.53 per barrel. This action is similar to purchase actions planned for fiscal year 1987, whereby funds will be obligated for oil purchases in one fiscal year for delivery in the following fiscal year.

FISCAL YEAR 1987 CRUDE OIL ACQUISITIONS

The SPR has made various arrangements for the purchase of crude oil for fiscal year 1987. DOE signed a contract with Transworld Oil U.S.A., Inc., for the purchase of West Texas sour domestic crude oil and signed an agreement to continue purchasing crude oil from PEMEX. Under terms of the memorandum of understanding signed between the SPR Program Office and the Office of Naval Petroleum and Oil Shale Reserve on September 30, 1986, the SPR purchased about 267,000 barrels of oil from the

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[3]On October 21, 1986, the President signed the Omnibus Budget Reconciliation Act of 1986 (Public Law 99-509) that requires DOE to fill the SPR for fiscal years 1987, 1988, and 1989 at the highest practicable fill rate achievable subject to the availability of appropriated funds. The act also tied the sale of Naval Petroleum Reserve oil to having either 750 million barrels of oil stored in the SPR or an average fill rate of 75,000 barrels per day.

[4]DOE, in its current budget request, is seeking authority to return to a 35,000-barrel-per-day minimum acquisition level for the SPR.

Naval Petroleum Reserve during October 1986 and can take additional deliveries if conditions warrant.

Domestic purchases of crude oil for the SPR

A contract was signed between DOE and Transworld on October 7, 1986, for the purchase of 3.65 million barrels of domestically produced sour crude oil to be delivered over a 1-year period at a minimum average rate of 10,000 barrels per day. The base price estimated for these purchases is $14.48 per barrel, or an initial estimated cost of $55 million. Under the contract terms, however, the base price is adjusted to prevailing market prices at time of delivery, and the total cost could change. The purchase price of oil under this contract includes delivery to the SPR. All quantities received will be measured by tank-gauging at the Sun Oil Marine Terminal, Nederland, Texas.

SPR purchases of PEMEX crude oil

On November 7, 1986, DOE signed a sales agreement for the purchase of crude oil from PEMEX for delivery to the SPR. Under the agreement DOE will purchase an average of 65,000 barrels of crude oil per day with the option to increase or decrease the average quantity by about 10 percent if PEMEX agrees. On an annual basis, this agreement provides for a minimum of 21,352,000 barrels and a maximum of 26,097,500 barrels. The price per barrel will be calculated according to an agreed-upon formula, based on U.S. oil price levels. On the basis of the agreement, DOE initially obligated $296 million to acquire this crude oil. Deliveries under the agreement began early in December 1986 and will continue through November 30, 1987, or until such time as all deliveries are complete.

SPR purchases of NPR oil

During October 1986, in accordance with the terms of the memorandum of understanding between the SPR and the NPR, about 8,600 barrels of crude oil per day were purchased from the NPR at a base price of $13.42 per barrel. Shipment of the oil is currently underway by commercial pipeline from the Elk Hills NPR site near Bakersfield, California, at a cost of $2.62 per barrel. Initially planned for a December delivery to the West Hackberry storage site, the oil was not expected to reach the site until February 1987. The oil transference was delayed because of a decline in the volume of commercially shipped oil currently being carried by the Four Corners Pipeline Company, which is responsible for the rate at which the NPR oil would move to West Hackberry.

Initially DOE planned purchases of NPR oil for the SPR on a test basis for the 3-month period October through December 1986. According to DOE, because of increases in oil purchase prices and

the relatively high shipping costs, however, DOE limited the NPR purchases to a 1-month period. The NPR oil was obtained at a total cost of about $4.3 million, compared to a PEMEX oil cost during the period of about $3.8 million. Part of this cost differential reflects the quality difference between the two types of oil, NPR oil being of generally higher quality.

SPR SITE DEVELOPMENT AND ENHANCEMENT ACTIVITIES

During the quarter, all oil received by the SPR was added to caverns at the West Hackberry site. An oil drawdown exercise, previously delayed because of a lack of available commercial storage tank space, was successfully completed at the Bryan Mound site. At the Big Hill storage site, which is currently under construction, surface facility development progressed satisfactorily, and construction of the oil pipeline was almost complete.

West Hackberry

The West Hackberry site received all 5.2 million barrels of crude oil added to the SPR during the quarter. As of December 31, 1986, 9 of the 16 Phase II caverns were full (containing 89.5 million barrels); 3 were in a final-fill status (containing 20.8 million barrels); 3 were in a leaching status (containing 11.5 million barrels); and 1 cavern was prepared for leaching.

The Phase II cavern prepared for leaching is the cavern that experienced an equipment failure in 1986 while undergoing a test procedure, resulting in some loss of oil and brine. DOE expects to resume leaching activities at the cavern in March 1987.

Our last two quarterly reports discussed an inspection survey and repair work on the crude oil pipeline between West Hackberry and the Sun Oil Terminal.[5] The survey contractor, C. E. Vetco Services, issued on October 30, 1986, the final report on the inspection. The report's cover letter, dated November 19, 1986, and prepared by Boeing (the prime contractor for the management, operation, and maintenance of the SPR), stated that uncovering the pipeline at five points showed that corrosion was not as serious as originally indicated. All anomalies in the pipeline were either light or moderate, in that none exceeded a 50-percent wall loss, which would be considered severe. The Boeing letter acknowledged that five additional areas on the

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[5]Oil Reserve: Status of Strategic Petroleum Reserve Activities as of September 30, 1986 (GAO/RCED-87-49, Nov. 17, 1986); Oil Reserve: Status of Strategic Petroleum Reserve Activities as of June 30, 1986 (GAO/RCED-86-205, July 25, 1986).

pipeline will be investigated, with the work to begin in April 1987.

Our previously cited 1986 reports discussed the brine disposal line rupture that occurred at the site in December 1985 and the repair work subsequently scheduled in June and September 1986. The repair work on the brine disposal line continued during the first quarter of fiscal year 1987. The 2,760-foot section of pipeline installed in September 1986 could not be connected because of pipeline deterioration at the south tie-in location. As a result, an additional 1,510 feet of pipeline was laid during November 1986. More deterioration was identified in a 40-foot section of the pipeline, and it was also repaired. All repair work was expected to be completed in February 1987. An oxygen scavenging system was also installed on the pipeline and began operating on November 6, 1986. The system is designed to remove oxygen from the brine in the pipeline to inhibit the corrosion process that has caused the pipeline to deteriorate.

When the pipeline is returned to service, the flow-rate capability will be restricted to 360,000 barrels per day--significantly below the design flow rate of about 900,000 barrels per day--because according to DOE engineers other sections of this 27-mile pipeline may have corrosion similar to the section replaced. An additional brine disposal capacity of 60,000 barrels per day will be made available, however, by using the site's brine disposal wells, thus raising the site's total brine disposal capacity to about 420,000 barrels per day. According to DOE officials, constraining the brine-disposal-line flow rate will delay the completion of cavern leaching at West Hackberry from May to September 1988, but the currently planned oil delivery rates will not be affected.

Our last two reports discussed ongoing work to complete conversion of the West Hackberry raw water intake structure (RWIS) from a manned (manual) to an unmanned (automatic) operation; the DOE Readiness Review Board's evaluation of the contractor's work; and a software problem adversely affecting the operation of the instrumentation and control system. According to the head of the DOE Readiness Review Board, the software problem has been corrected, but the Readiness Review Board has to review the contractor's drawings and make comparisons with what was built and certified before the RWIS control system can be accepted for contract and warranty purposes. This should be completed next quarter. A Boeing engineer confirmed that the software problem had been resolved, the punch-list items--items warranting corrective actions by the contractor--for the RWIS work had been completed, and contractor drawings continue to be submitted for the review. DOE presently has use and possession of the RWIS, which has been performing in the automatic mode. According to a DOE contract specialist on the RWIS contract, all

RWIS issues will be resolved next quarter and the contract closed.

Bryan Mound

The Bryan Mound site received no oil deliveries this quarter.

On December 18, 1986, Boeing held a drawdown exercise at the site. The drawdown was originally planned for August 1986 but was delayed because privately owned tanks that Boeing planned to use at the nearby Jones Creek Tank Farm were full and no storage space was available. According to a synopsis prepared by Boeing, the December drawdown achieved all objectives except for demonstrating the site's maximum projected drawdown rate capability of 1.3 million barrels per day. A key objective was achieved, however, in that DOE demonstrated for the first time the site's ability to move both sour and sweet crude oil simultaneously at or near the design rates of 350,000 barrels per day for sweet crude oil and 750,000 barrels per day for sour crude oil--a total flow rate of 1.1 million per day. While a peak flow rate of 1,120,000 barrels per day was achieved, oil was moved at an average daily flow rate of 1,060,243 barrels over a 7 1/2-hour period. The maximum drawdown rate objective of 1,300,000 barrels per day was not achieved as planned because two raw water injection pumps experienced high bearing temperatures and vibrations and could not be used throughout the exercise. As a result, the exercise was continued for an additional 3 hours with a different combination of pumps to obtain needed system hydraulics operating data. The crude oil flow rate achieved during this extended period was 1,048,000 barrels per day.

The Bryan Mound project, discussed in prior reports, to improve cavern 5 and the site's drawdown capability continued during the quarter and is scheduled for completion in September 1987.

Weeks Island

DOE plans a reliability, availability, and maintainability test for the Weeks Island storage site in late February and early March 1987. The test will involve recycling oil in the mine storage area for a period of 300 hours using six of the pumps located in the mine and one mainline pump at the surface. The purpose of the test is to collect data on pump and motor reliability. The plan for the exercise was to be developed in January 1987. DOE expects to have a final report by April 30, 1987.

Bayou Choctaw

Our last report discussed DOE plans to integrate the instrumentation and control systems at the Bayou Choctaw control room. On January 14, 1987, DOE issued an invitation for bid for the work and is expected to award the contract on February 27, 1987.

The site construction work continues for Phase III Bayou Choctaw cavern 101 to construct surface piping at the cavern tying the cavern to existing oil, water, and brine pipelines. The completion date for the work has been changed, from May 17, 1987, to June 24 because of bad weather.

The site construction work connecting the Phase II cavern to the existing system continues and, according to DOE, is ahead of schedule. The contract completion date is set for May 22, 1987, but DOE expects to obtain "use and possession" of the cavern by March 31. At that time the cavern will be available for oil fill.

Our last two reports discussed plans to replace a 30-foot section of the brine disposal line. A contract was awarded to L. S. Womack on January 30, 1987 for $71,269 and the contractor given notice to proceed on February 10. DOE expects to complete the project by March 20.

During the period November 10-13, 1986, a contractor, AMF Tuboscope, inspected the crude oil pipeline between Bayou Choctaw and the St. James terminal using an instrumented pig--an electronic survey tool. This is the same pipeline that AMF Tuboscope inspected 3 years ago, when it identified 18 points as being severely corroded. We reported the results of that inspection and the actions taken by DOE in January 1984.[6] At that time, the pipeline had corrosion in about 20 percent of the 5,000 joints; at 18 of the joints, over 50 percent of the original pipe thickness had corroded. The contractor completed a hydrostatic test of the pipeline in September 1985, and the pipeline was certified to operate at the pressure required to deliver the Phase III drawdown rate of 480,000 barrels per day.

The AMF Tuboscope report on the latest inspection of the pipeline was due in February 1987. AMF Tuboscope's preliminary results, however, indicate no change in the corrosion found 3 years ago and no worsening of the condition of the pipeline since earlier corrective action was taken.

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[6]Status of Strategic Petroleum Reserve Activities as of December 31, 1984 (GAO/RCED-84-92, Jan. 13, 1984).

Sulphur Mines

According to DOE officials, the Sulphur Mines site, which has a current storage capacity level of 26 million barrels, will not be closed for at least 2 to 3 fiscal years; the site closing may take place as late as 1990-1995. A recent DOE study showed that savings of up to $90 million could result over a 20-year period from closing the site and developing alternative storage capacity at the Bayou Choctaw and Big Hill sites.

According to DOE officials, abandoning the Sulphur Mines site is contingent on how fast SPR oil-fill and storage capacity development takes place. Also according to the officials, the abandonment would probably not take place until replacement storage space is available at the Bayou Choctaw and Big Hill sites. They also told us that the economic and technical advantages of closing Sulphur Mines will remain, however, whether the site is closed now or at a later date, because the savings that result would be largely in decreased operating costs.

Big Hill

At the Big Hill site, various facility development activities advanced significantly during the quarter. Construction work on the oil pipeline was almost completed. The I-B contract for the RWIS was settled, and settlement negotiations on the I-A contract for on-site surface facilities continued, with additional meetings to be held with the contractor, Fruin-Colnon, in January 1987.

On February 18, 1986, DOE began assessing the I-A and I-B contractor $20,500 per day in liquidated damages for delays in completing the contracts as scheduled. These liquidated damages continue to accrue until DOE has accepted all work as substantially complete. As of December 31, 1986, five punch-list items warranting corrective actions remained open on the I-A contract, of which two are considered to be in the "substantial completion" category. The two items involve work and tests on the portable meter prover and the check valve closure operation. On the I-A contract, negotiations are underway to determine the amount of liquidated damages to be assessed against the contractor and to resolve the open punch-list items. On the I-B contract, all open punch-list items have been resolved and liquidated damages of $650,000 have been assessed against the contractor.

DOE estimates the $20.9 million contract entered into on May 13, 1986, with Michael Curran Associates for the construction of a 24.2-mile crude oil pipeline from the Sun Oil Terminal in Nederland, Texas, to the Big Hill site, to be 98 percent complete as of December 31, 1986. All that remains to be done by the contractor is final cleanup work, some site restoration, and

final testing of the pipeline's cathodic protection system. Good progress was also being made on the $34.4 million stage I-C contract with the firms of Gregory & Cook and Reading & Bates for constructing a 14.1-mile brine disposal pipeline, a 5.3-mile raw water line, and an overland power transmission line between the RWIS and the storage site. As of December 31, 1986, the contract was estimated to be 94 percent complete. The pipelines are almost entirely complete and the power line poles are being erected.

Contractor delays were encountered, however, on the $32 million Ebasco Services, Inc., contract entered into on August 29, 1986, for surface construction work at nine caverns at the site, including pipeline tie-ins to connect the caverns to the oil, brine, and water systems. Two progress milestones--November 15 and December 15, 1986--were missed. As of December 31, 1986, progress was estimated at 2 percent, as against a 4-percent objective.

The $650,000 contract with W. T. Byler for the closure and capping of drill-cutting ponds at the site was scheduled to be fully complete by January 1987. As of December 31, 1986, progress on the contract was estimated at 92 percent.

SPR OIL DISTRIBUTION ENHANCEMENTS

In our last two reports, we discussed DOE's planned enhancements to correct problems in the SPR oil distribution system that resulted when Texoma Pipeline Company and Seaway Pipeline, Inc., sold their interstate crude oil pipelines.

Distribution enhancements underway at the Seaway complex consist of constructing a 40-inch, 46.2-mile pipeline from Bryan Mound to Texas City, Texas, and modifying the Phillips Petroleum Company's marine terminal at Freeport, Texas, and the Atlantic Richfield Company (ARCO) tank farm and main terminal at Texas City. This project will increase Bryan Mound's current distribution capability of 390,000 barrels per day to 1.1 million barrels per day. The pipeline is being constructed by Kiewit/Tulsa-Houston and, according to DOE, is about 70 percent complete. It is scheduled to be tested and ready for use in February 1987. Pipeline tie-in work is being done at Bryan Mound by L. S. Womack, Inc., and, according to DOE, is about 80 percent complete.

Our last report discussed on-going negotiations between DOE and Phillips Petroleum Company for terminal enhancements and distribution services at the Seaway terminal. Basic agreements had been reached, but contract signing was delayed because of a wage determination conflict requiring coordination with the Department of Labor. Phillips signed the contract on November 26, 1986, and DOE on December 2, 1986. The estimated cost of the

contract is $4.5 million, with modifications expected to be completed by August 1987.

The Capline distribution system enhancements include proposed metering and pipeline modification at the St. James terminal and a direct pipeline connection between the St. James and the Capline terminals. The design work for the terminal connection was scheduled for completion in February 1987 and is estimated to cost about $4.4 million. An additional procurement package is being prepared to obtain marine terminal services in the St. James area, which will require terminal modifications estimated to cost $3.5 million. The request for proposals was scheduled to be issued in January 1987, with completion scheduled for March 1989.

A further enhancement effort involves a pipeline connection linking the West Hackberry site to a Lake Charles, Louisiana, area pipeline. A 12-mile, 30-inch crude oil pipeline is in the design stage at Fluor Engineers, Inc. When construction is completed, the pipeline will connect the West Hackberry site to the Texas Pipeline Company's 22-inch pipeline in the Lake Charles area and add 300,000 barrels per day to West Hackberry's distribution capability. Officials of DOE, Fluor Engineers, Inc., and Texas Pipeline Company met on November 13, 1986, to select the tentative tie-in point to the Texas Pipeline Company pipeline and the site for the meter station. DOE also plans to issue service contracts and modifications to two Lake Charles terminals in fiscal years 1988 and 1989 to distribute up to an additional 400,000 barrels of crude oil per day delivered through the new pipeline. Design of the pipeline is scheduled for completion in March 1988, and construction in June 1989. Terminal modifications are projected for completion in September 1989 and September 1990. The total cost for the enhancement is estimated at about $25 million.

Another enhancement being considered involves modifications to two terminals and a dock expansion in the Beaumont-Port Arthur, Texas, area, to be completed in 1991-1992. The estimated cost for this project is about $58.3 million.

The objective of all these enhancements is to increase the SPR distribution capability to match SPR's 4.5-million-barrel-per-day drawdown capability.

CONTRACT TERMINATIONS AND ANTICIPATED CHANGES

Our last report included discussions of contract changes with PEMEX on oil purchases and with the Aerospace Corporation on engineering and other support services.

The PEMEX I contract under which DOE purchased oil since 1981 expired August 31, 1986, was extended to September 30, 1986, and then to October 31, 1986. Since nearly 900,000 barrels of oil remained undelivered as of October 31, 1986, PEMEX agreed to deliver the remaining quantity in November. These deliveries completed all DOE oil purchases under the PEMEX I contract. However, DOE also continued its negotiations with PEMEX on adjustments for quantity and demurrage under the PEMEX I contract. On December 31, 1986, demurrage claims for the period April 1, 1984, through September 30, 1986, were settled in the amount of $360,770, and a portion of the quantity claims were settled for $214,709. Negotiations are still continuing on the remaining claims.

A new crude oil sales agreement between DOE and PEMEX--PEMEX III--was signed on November 7, 1986. The agreement covers the period December 1, 1986, through November 30, 1987. Under the agreement DOE will be purchasing Isthmus crude oil at an average delivery rate of 65,000 barrels per day. Under the new agreement, about 1.5 million barrels of crude oil were delivered to the SPR in December 1986.

Our last quarterly report discussed DOE's plans to exercise the final 1-year option for the Aerospace Corporation contract. DOE and Aerospace signed the contract option on October 17, 1986, effective October 20, 1986, for a period of 1 year. The estimated cost for the period is $1,024,477, plus a fixed fee of $24,263 for a total of $1,048,740. Under the option, Aerospace continues to provide independent engineering analysis as a support service to the Program Office. Assistance to the Project Office, however, will be on an as-needed basis.

Boeing, the prime contractor for the management, operation, and maintenance of the SPR, was awarded a fee of $1.695 million for the period April 1 through September 30, 1986. The fee represents about 65 percent of the maximum pool of $2.6 million available to DOE for SPR management, operation, and maintenance, and represents, according to DOE, an overall satisfactory performance rating for the three major performance areas of technical execution, technical management, and general management. For the special emphasis area, which deals with subcontracting with small business concerns, DOE rated Boeing's performance as superior.

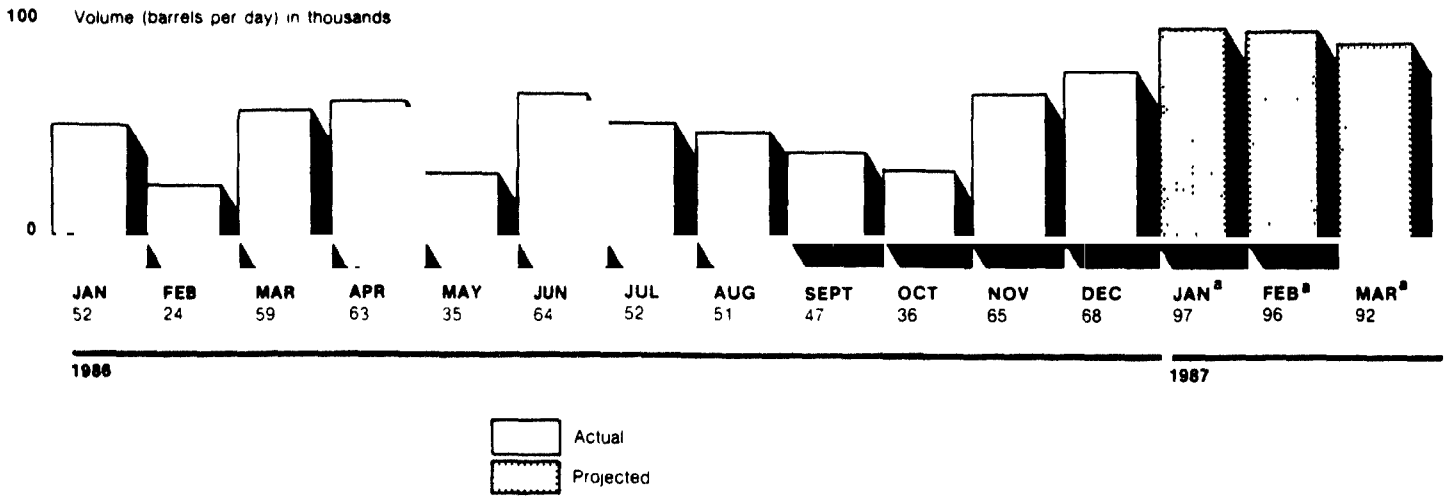
In its analysis of Boeing's performance, DOE cited significant specific Boeing accomplishments, including meeting or exceeding DOE leach and fill requirements; awarding all capital improvement program construction projects; successfully preparing for the security inspection and evaluation review; Boeing's exemplary performance in maximizing contract awards to small, disadvantaged business concerns; the resulting significant cost savings from an energy management program; successful and well

planned drawdown exercises; and the correcting of previously reported procurement system deficiencies.

DOE's analysis also cited areas needing improved performance. These included more fully integrating systems management and engineering activities with the operation and maintenance effort; completing in a more effective manner maintenance tasks assigned to a subcontractor; dealing with fire protection issues and deficiencies; the need for more emphasis on planning and implementing a comprehensive security program; resolving deficiencies identified in the property management system review; and improving the application of systems management to planning and coordinating operational and test activities, including detailed engineering analysis to prevent oil spills as occurred at West Hackberry.

SECTION 2
DATA ON THE STATUS OF THE STRATEGIC PETROLEUM RESERVE

Figure 2.1: Average Daily SPR Oil Receiving Rate[a]



[a] Daily receiving rate for January February and March 1987 based on DOE projection of future deliveries and is subject to change

Table 2.1: SPR Oil Deliveries by Crude Type as of December 31, 1986

	Type I[a]	Types II-V[b]	Type VI[c]	Type VIa[d]	Maya[e]	Total
Volume delivered (millions of barrels)	259.8	192.2	31.4	16.6	11.6	511.6
Percentage of total oil delivered	51	38	6	3	2	100

[a]High-sulfur crude (1.99 percent maximum sulfur content) with an American Petroleum Institute (API) gravity range of 30 to 45 degrees. Type I oil includes Arabian Light and Isthmus crudes. The oil industry uses degrees of API gravity to measure an oil's specific gravity. API gravity measures the mass of a fluid relative to water and ranges from 10 degrees for very heavy crudes to 45 degrees for very light crudes.

[b]High-quality crudes with a low sulfur content (maximum 0.5 percent sulfur content) and an API gravity range of 30 to 45 degrees. These types include some North Sea and West African crudes.

[c]Type VI was established for Alaskan North Slope crude, an intermediate-sulfur crude (maximum 1.25 percent sulfur content) with an API gravity range of 26 to 45 degrees.

[d]Type VIa was established for the Maya/Isthmus blend under the PEMEX contract. The blend is a high sulfur mixture with an API gravity of at least 28 degrees.

[e]Maya crude is a lower quality oil having a maximum sulfur content of 3.5 percent and an API gravity of at least 22 degrees. As of April 1984, Maya crude was no longer being acquired as part of the PEMEX contract.

Source: DOE.

Table 2.2: Status of SPR Oil Acquisition and Transportation Funds as of December 31, 1986[a]

Funds made available	Amount (millions)
Carryover from fiscal year 1981	$ 1,806
Fiscal year 1982 appropriations	3,684
Fiscal year 1983 appropriations	2,074
Fiscal year 1984 appropriations	650
Fiscal year 1985 appropriations	2,050
Total	$10,264
Funds used or committed	
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[b]	62
Estimated DOE unpaid obligations as of Dec. 1986[c]	382
Total	$10,119
Estimated unobligated funds at DOE	$ 145

[a]The Omnibus Budget Reconciliation Act of 1981 (Public Law 97-35, Aug. 13, 1981) established the SPR Petroleum Account, effective October 1981, to pay for petroleum acquisition and transportation. This is an off-budget account.

[b]Amount consists of DOE's actual reported payments through November 1986 and DOE's estimated payments for December 1986.

[c]Unpaid obligations primarily represent funds that have been obligated for (1) November and December 1986 oil deliveries under the first and third PEMEX contracts, (2) the Transworld contract for the purchase of domestic oil, and (3) the purchase of oil from NPR or are obligated to Defense Fuel Supply Center for PEMEX oil transportation costs. The Supply Center estimated that $9.75 million had been obligated as of December 31, 1986, for future costs. As of December 31, 1986, $308 million in obligations had not yet been recorded in DOE's official accounting records.

Source: DOE and Defense Fuel Supply Center.

Table 2.3: Status of SPR Underground Capacity for Crude Oil Storage as of December 31, 1986

Storage facilities	Gross volume planned	Gross volume completed	Permanent capacity planned[a]	Capacity available	Capacity filled
	(millions of barrels)				
Phase I sites:					
Bayou Choctaw	48.5	48.5	46.0	46.0	44.9
Bryan Mound	75.0	73.4	69.5	69.5	63.0
Sulphur Mines	27.3	27.3	26.0	26.0	25.9
Weeks Island	73.0	73.0	73.0	73.0	72.8
West Hackberry	50.4	50.4	47.7	48.2	47.4
Total	274.2	272.6[b]	262.2	262.7	254.0
Phase II sites:					
Bayou Choctaw	11.3	11.3	10.0	—	—
Bryan Mound	134.4	139.2	124.6	124.6	131.5
West Hackberry	179.2	162.6	161.2	131.5	121.8
Total	324.9	313.1	295.8	256.1	253.3
Phase III sites:					
Bayou Choctaw	11.2	—	10.0	—	—
Bryan Mound	36.8	36.8	31.9	31.9	1.3
West Hackberry	11.2	2.9	10.1	—	—
Big Hill	156.8	—	140.0	—	—
Total	216.0	39.7	192.0	31.9	1.3
Tanks and pipelines	—	—	—	—	3.0
Total for SPR	815.1	625.4	750.0	550.7[c]	511.6

[a]Permanent capacity for oil storage is less than gross volume planned because a certain volume of unoccupied capacity must be provided for water, sediment, and anhydrites that settle out of the oil and brine.

[b]DOE acquired and modified existing caverns and a mine containing this gross volume. No leaching was required.

[c]The total capacity available is currently reduced by 30 million barrels pending the completion of the Bryan Mound cavern 5 storage configuration enhancement project.

Source: DOE.

SECTION 3

LISTING OF PRIOR GAO SPR QUARTERLY REPORTS

1. Progress in Filling the Strategic Petroleum Reserve Continues, but Capacity Concerns Remain (GAO/EMD-82-112, July 15, 1982).

2. Status of Strategic Petroleum Reserve Activities as of September 30, 1982 (GAO/RCED-83-29, Oct. 15, 1982).

3. Status of Strategic Petroleum Reserve Activities as of December 31, 1982 (GAO/RCED-83-93, Jan. 14, 1983).

4. Status of Strategic Petroleum Reserve Activities as of March 31, 1983 (GAO/RCED-83-136, Apr. 15, 1983).

5. Status of Strategic Petroleum Reserve Activities as of June 30, 1983 (GAO/RCED-83-203, July 13, 1983).

6. Status of Strategic Petroleum Reserve Activities as of September 30, 1983 (GAO/RCED-84-11, Oct. 14, 1983).

7. Status of Strategic Petroleum Reserve Activities as of December 31, 1983 (GAO/RCED-84-92, Jan. 13, 1984).

8. Status of Strategic Petroleum Reserve Activities as of March 31, 1984 (GAO/RCED-84-148, Apr. 13, 1984).

9. Status of Strategic Petroleum Reserve Activities as of June 30, 1984 (GAO/RCED-84-182, July 13, 1984).

10. Status of Strategic Petroleum Reserve Activities as of September 30, 1984 (GAO/RCED-85-40, Oct. 15, 1984).

11. Status of Strategic Petroleum Reserve Activities as of December 31, 1984 (GAO/RCED-85-58, Jan. 22, 1985).

12. Status of Strategic Petroleum Reserve Activities as of March 31, 1985 (GAO/RCED-85-111, Apr. 15, 1985).

13. Status of Strategic Petroleum Reserve Activities as of June 30, 1985 (GAO/RCED-85-149, July 15, 1985).

14. Status of Strategic Petroleum Reserve Activities as of September 30, 1985 (GAO/RCED-86-37, Oct. 15, 1985).

15. Status of Strategic Petroleum Reserve Activities as of December 31, 1985 (GAO/RCED-86-84, Jan. 29, 1986).

16. Oil Reserve: Status of Strategic Petroleum Reserve Activities as of March 31, 1986 (GAO/RCED-86-151, Apr. 18, 1986

17. Oil Reserve: Status of Strategic Petroleum Reserve Activities as of June 30, 1986 (GAO/RCED-86-205, July 25, 1986.

18. Oil Reserve: Status of Strategic Petroleum Reserve Activities as of September 30, 1986 (GAO/RCED-87-49, Nov. 17, 1986).

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