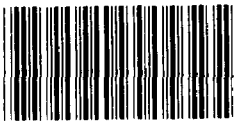
REPORT BY THE U.S.

General Accounting Office

Status Of Strategic Petroleum Reserve Activities As Of March 31, 1985

The Department of Energy reported that the Strategic Petroleum Reserve contained 461.6 million barrels of oil on March 31, 1985. During the second quarter of fiscal year 1985, about 11.1 million barrels of oil were added for a fill rate of 123,000 barrels per day.

This report discusses the progress being made in filling, developing, and operating the Reserve. It also discusses other events and activities affecting the Reserve that occurred during the second quarter of fiscal year 1985.



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WASHINGTON, D.C. 20548

RESOURCES, COMMUNITY,
AND ECONOMIC DEVELOPMENT
DIVISION

B-208196

The Honorable James A. McClure
Chairman, Committee on Energy and
Natural Resources
United States Senate

The Honorable J. Bennett Johnston
Ranking Minority Member, Committee
on Energy and Natural Resources
United States Senate

On March 25, 1982, the Senate Committee on Energy and Natural Resources requested that we report on a quarterly basis, through fiscal year 1985, on the Department of Energy's (DOE's) progress in filling the Strategic Petroleum Reserve (SPR) and in complying with the requirements of applicable law. This is the 12th quarterly report. A list of our prior reports is contained in table 11 in appendix II.

In this report, we discuss events and activities related to the administration's progress in filling, developing, and operating the SPR during the second quarter of fiscal year 1985. Specifically, we note that during the quarter:

--The administration released its fiscal year 1986 SPR budget which proposes an indefinite moratorium beginning in fiscal year 1986 on developing and filling the SPR. The moratorium would stop oil fill at 489 million barrels and development of additional storage capacity. The administration would reassess its position on the moratorium as conditions change. The administration requested no new budget authority for fiscal year 1986. It also announced deferral of over $1 billion in funds available for fiscal year 1985 and proposed to use $175 million of the deferred funds to put the SPR sites in a standby condition for oil drawdown.

--DOE added 11.1 million barrels of oil, bringing the total amount of oil in the SPR to 461.6 million barrels. The oil fill rate averaged 123,000 barrels per day during the quarter.

--DOE paid $498 million for oil acquisition and transportation, had unpaid obligations of about $802 million, and had about $879 million in unobligated funds available for oil purchases.

--The storage capacity development program proceeded without any major problems, generally achieving DOE goals.

--DOE replaced its SPR operations and maintenance contractor with a new management, operation, and maintenance contractor.

This report also presents information on (1) our testimony on the estimated costs and benefits of alternative SPR systems ranging in size between a 489-million- and 750-million barrel reserve, (2) the implementation of recommendations made in the DOE Oak Ridge Operations Office's reports on its baseline assessment of the SPR Project Office and its review of allegations about mismanagement or misconduct within the SPR program, and (3) the Project Office's program to analyze the oil in filled storage caverns. (See app. I for more details and app. II for supporting figures and tables.)

OBJECTIVES, SCOPE, AND METHODOLOGY

We limited our review, because of the time allowed, to providing primarily statistical information and highlights of major activities that occurred during the period covered. To obtain this information we reviewed DOE program documents, publications, and studies, and interviewed DOE managers and operating personnel responsible for planning and managing activities associated with the development and operation of the SPR facilities. We also interviewed personnel from DOE contractors; the Defense Fuel Supply Center, DOE's purchasing agent for most of the SPR oil; and the U.S. Army Corps of Engineers, which is responsible for acquiring pipeline rights-of-way for DOE.

Our review was performed in accordance with generally accepted government auditing standards, except that we did not verify the volumes or quality of oil that DOE received nor the available capacity of SPR storage facilities. We did not do this because the effort required was beyond the scope of this report.

We did not obtain official agency comments because of the required time frame for issuing this report. However, we provided DOE and Defense Fuel Supply Center program officials with a draft of this report and discussed its factual accuracy with them. In addition, we spoke with the Chief, Real Estate Division, U.S. Army Corps of Engineers, Galveston, Texas, on the accuracy of information in our draft report regarding the acquisition of pipeline rights-of-way. We made appropriate revisions as necessary.

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As arranged with your office, we plan no further distribution of this report until 7 days after the issue date, unless you publicly announce its contents earlier. At that time, we will provide copies to the Secretary of Energy and other interested parties and make copies available to the public upon request.

J. Dexter Peach
Director

Contents

ABBREVIATIONS

API	American Petroleum Institute
DCAA	Defense Contract Audit Agency
DFSC	Defense Fuel Supply Center
DOE	Department of Energy
GAO	General Accounting Office
MOM	Management, operation, and maintenance
NPR	Naval Petroleum Reserve
PEMEX	Petroleos Mexicanos
POSSI	Petroleum Operations and Support Services, Inc.
SPR	Strategic Petroleum Reserve

STATUS OF STRATEGIC PETROLEUM RESERVE

ACTIVITIES AS OF MARCH 31, 1985

The Energy Policy and Conservation Act (Public Law 94-163, Dec. 22, 1975) authorized the creation of a Strategic Petroleum Reserve (SPR) to store up to 1 billion barrels of oil for use in the event of an oil import disruption. To meet the act's goals, the Department of Energy (DOE) has been implementing a three-phase plan to store 750 million barrels of oil. However, the administration's fiscal year 1986 budget proposes an indefinite moratorium on SPR oil fill and storage capacity development at the end of fiscal year 1985. At that time, the SPR's inventory will have reached approximately 489 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, as well as constructing a marine terminal at St. James, Louisiana. Phase II, which had been scheduled for completion in 1987, 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. Phase III, which was scheduled for completion in 1990, was designed to create additional capacity to reach the 750-million-barrel goal by expanding three existing storage sites and developing a new site at Big Hill, Texas. Because of the time needed to develop capacity, activities associated with phases II and III had overlapping schedules.

The SPR storage sites are connected by pipeline to three marine terminals for oil fill and for oil drawdown and distribution during an oil-supply disruption:

--Seaway complex: The Bryan Mound storage site is connected to Phillips Petroleum Co.'s terminal (formerly the Seaway terminal) in Freeport, Texas.

--Texoma complex: The West Hackberry and Sulphur Mines storage sites are connected, and the Big Hill storage site was planned to be connected, to Sun Oil Co.'s terminal in Nederland, Texas.

--Capline complex: The Weeks Island and Bayou Choctaw storage sites are connected to DOE's St. James marine terminal.

In June 1983, DOE reorganized the SPR project management structure. Responsibility for project direction was transferred from the Project Management Office (Project Office) in New Orleans, Louisiana, to the Oak Ridge Operations Office (Operations Office) in Oak Ridge, Tennessee. The SPR Program Office in Washington, D.C., retained responsibility for overall program management and planning.

This report discusses activities which occurred during the quarter ending March 31, 1985, that affect the SPR, including (1) the release of the administration's SPR budget proposal, (2) our testimony on the estimated costs and benefits of alternative SPR systems ranging in size between 489 million and 750 million barrels, (3) the activities associated with adding 11.1 million barrels of oil to the SPR during the quarter, (4) the status of the SPR oil acquisition and transportation account, (5) the cavern leaching program at the SPR storage sites, and (6) the hiring of a new management, operation, and maintenance (MOM) contractor for the SPR and the termination of the SPR operations and maintenance contractor. This appendix provides information about the implementation of the recommendations made in the Operations Office's reports on its 1983 baseline assessment of the SPR Project Office and its review of allegations about mismanagement or misconduct within the SPR program. It also discusses the Project Office's program to analyze the quality of oil in filled storage caverns.

THE FISCAL YEAR 1986 SPR BUDGET PROPOSAL

The administration's fiscal year 1986 budget proposes an indefinite moratorium on developing and filling the SPR at the end of fiscal year 1985. According to the budget, the SPR's permanent storage capacity will be developed to accommodate the proposed SPR oil fill level of 489 million barrels of oil. The fiscal year 1986 budget also announced deferral of $1,098 million of funds available for obligation in fiscal year 1985 for use in later years. According to the administration, the deferral will be reviewed as fiscal and oil market conditions warrant. Principally, the deferral will stop phase II and phase III development beginning in fiscal year 1986. Also, it will stop the acquisition of oil in fiscal year 1985 for delivery during fiscal year 1986. The budget estimates that the moratorium will reduce DOE's budget outlays by $8 billion if it extends between fiscal years 1986 and 1990. About $7.7 billion of this reduction would be realized from stopping crude oil acquisition.

The administration has requested no new budget authority for fiscal year 1986. However, it proposes to use about $175 million in unobligated funds that were appropriated in prior years to prepare for and maintain the SPR sites in a standby readiness

condition for oil drawdown. Approximately $107 million, or 61 percent of the prior year funds, will go toward SPR site operations and maintenance, security, and utilities. The remaining $68 million will be used mainly for capital improvements to the sites and for oil distribution enhancements for the Bryan Mound site and for modifications of the Sun Oil Co. marine terminal. As a part of the moratorium, DOE proposes to reduce its full-time SPR staff for fiscal year 1986 by almost one-third, from 173 to 120. This would involve reducing the Project Office staff by 44 and the Program Office staff by 9.

COSTS AND BENEFITS OF ALTERNATIVE SPR SIZES

On April 1, 1985, we testified before the Subcommittee on Environment, Energy and Natural Resources, House Committee on Government Operations, on the estimated costs and benefits of various sized SPR systems. Our testimony (1) discussed the costs associated with the moratorium and its implications for the sale of Naval Petroleum Reserve (NPR) oil, (2) compared the estimated costs of five SPR size options with the 489-million-barrel system proposed in the administration's budget, (3) discussed how long each of the options would allow the United States to meet its International Energy Agency commitment to maintain a reserve equal to a 90-day supply of the previous year's net crude oil imports, and (4) estimated the potential impact each option would have on the oil price increases that might be experienced during a supply disruption.

We pointed out that DOE has estimated that from fiscal years 1986 through 1990, planned obligations would be about $721 million even if there is no futher development--$689 million for standby operations and $32 million to complete improvements in the oil distribution system started in fiscal year 1985. Under the administration's proposal, this would be the total budget outlay incurred in those years. We also discussed the possibility, however, that by stopping the oil fill at 489 million barrels, DOE may not be able to sell the U.S. share[1] of crude oil from the Elk Hills NPR at current levels. Section 160(d) of the Energy Policy and Conservation Act provides that the U.S. share of the Elk Hills NPR may not be sold unless the SPR fill rate averages 100,000 barrels per day until it contains 500 million barrels. We estimated that if DOE is unable to sell the NPR oil, a potential revenue loss of up to $5.6 billion for fiscal years 1986 through 1990 could occur. We stated that the revenue loss should be considered as an additional cost of stopping the SPR at 489 million barrels.

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[1]The NPR at Elk Hills, California, is jointly owned by the U.S. government and Chevron U.S.A., Inc. The government's share was 108,000 of the 138,000 barrels per day of oil produced in fiscal year 1984.

During our testimony we also noted that our prior work on the NPR[2] had indicated that it may not be possible to completely shut-in, or stop, NPR oil production without risking major long-term damage to the oil field. The act provides that NPR sales can continue at a level necessary to prevent damage to the field or a reduction in the total quantity of oil that could ultimately be recovered. Consequently, completely stopping NPR production and sales may not be possible; however, the production and sales levels could be reduced far below the present levels.

We further noted the incongruity of the administration's collecting annual revenues of over $1 billion from NPR oil sales while indefinitely postponing SPR development and fill. We suggested that the Congress may want to consider setting aside at least part of the NPR revenues for use in filling the SPR and possibly designating a portion of the SPR for military use during a national defense emergency. A larger SPR inventory would provide the capability for releasing large quantities of oil to meet short-term needs during emergencies, whereas the NPR is capable of producing significantly lower quantities over a longer time period.[3]

Our testimony discussed the incremental costs (costs in addition to the basic costs associated with the 489-million-barrel system) that would be involved in developing SPR systems of the following sizes:

--500-million-barrel system: with this system, DOE could continue to sell oil from Elk Hills at current levels.

--550-million-barrel system: this system would involve completion of the planned storage capacity through fiscal year 1986.

--610-million-barrel system: under this alternative phase II and III capacity would be completed at the five existing SPR sites.

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[2]Naval Petroleum Reserve No. 1--An Assessment of Production Alternatives (GAO/RCED-84-180, July 30, 1984).

[3]The SPR is planned to have an oil drawdown capability of 3.5 million barrels per day at the end of phase II and 4.5 million barrels per day at the end of phase III. The Elk Hills NPR's fiscal year 1984 production of 138,000 barrels per day is expected to decrease by about 10 percent per year as the field is depleted.

--750-million-barrel system: this system would expand the 610-million-barrel system to include the Big Hill site.

--750-million-barrel system filled to only 500 million barrels: this option would involve completing the planned SPR storage capacity system and only filling it to the 500-million-barrel level. With this system, DOE could continue to sell Elk Hills oil at current levels, develop capacity for future use, and avoid most of the short-term oil acquisition costs.

The incremental cost of expanding storage capacity would range from $6 million for the 500-million-barrel system to $561 million for the 750-million-barrel system. The incremental oil costs would range from $312 million for the 500-million-barrel system to $7.7 billion for 750 million barrels. (Table 1 shows the costs associated with alternative SPR sizes.)

In our testimony, we also noted that, using the Energy Information Agency's projected estimates for oil imports over the 1986-1995 period, a 489-million-barrel reserve would satisfy the International Energy Agency commitment only through 1986. However, a 750-million-barrel system, we found, would meet the commitment through 1994. In addition, we estimated that, based on the results of a GAO-developed oil price model, the release of SPR oil during a supply disruption potentially could dampen an anticipated oil price increase by about 30 percent at the 489-million-barrel level and by about 42 percent at the 750-million-barrel level.

In summarizing our testimony, we stated that the decision before the Congress on the size and fill rate of the SPR revolves around the values associated with the immediate need to reduce the budget deficit as contrasted to the need to achieve the original objective of developing a 750-million-barrel reserve. In this regard, we concluded that:

--Larger budget savings can be realized from decreased oil fill than from stopping facilities development.

--Legislative changes may be necessary to continue selling oil produced from the NPR at current levels. In addition the Congress may want to set aside a part of NPR revenues for filling the SPR.

--Some of the benefits of a larger SPR size such as (1) exceeding the commitment to have 90 days of net oil imports stored , (2) increasing price-dampening effects in the event of an oil import disruption, and (3) increasing drawdown capability, require that serious consideration be

given to continued development of the storage sites for a larger reserve capacity and tailoring the fill rate in future years to oil availability, price, and relevant budget considerations.

In our last quarterly report[4] we noted that if the Congress decides to continue filling the SPR, an oil fill rate for fiscal year 1986 will have to be established. Figure 1 and table 2 show four alternative SPR oil fill rates for a 750-million-barrel SPR. The fill rates are based on the 300,000- and 220,000-barrels-per-day rates cited by the Energy Policy and Conservation Act, a 145,000-barrels-per-day rate, and the rate allowed by the storage capacity development schedule proposed in the administration's fiscal year 1985 budget.

SPR OIL FILL ACTIVITIES

DOE reported that 11.1 million barrels of oil were added to the SPR during the quarter ending March 31, 1985, bringing the total SPR inventory to 461.6 million barrels. The average SPR oil fill rate for the quarter was 123,000 barrels per day (See fig. 2 and tables 3 through 6 for further information on SPR oil acquisition and fill activities.) About 4.9 million barrels, or 44 percent, of the oil delivered in the second quarter of fiscal year 1985 came from DOE's 1981 contract with Petroleos Mexicanos (PEMEX), the Mexican national oil company. About 6.2 million barrels, or 56 percent, were delivered under contracts that the Defense Fuel Supply Center (DFSC, a Department of Defense agency that serves as the purchasing agent for most SPR oil) had awarded through its open, continuous solicitation.[5]

Of the 461.6 million barrels of oil in storage as of March 31, 1985, 38 percent was sweet (low sulfur) crude, 49 percent was sour (high sulfur) crude, and 13 percent was a combination of lower quality crude oils. (See table 4 for SPR oil quality specifications.) On March 1, 1985, DOE directed DFSC to purchase only sweet crude oil to fulfill its remaining acquisition

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

[5]The open, continuous solicitation is a mechanism that DFSC uses to purchase SPR oil. It involves the use of a purchasing solicitation that is not reissued but rather remains open, allowing offers of oil to be made about every 2 weeks. The offers usually involve oil that is available on the "spot," or short-term, market.

requirements of 11 million barrels for fiscal year 1985.[6] According to DOE and DFSC officials, this action will not increase oil acquisition costs since the price of sweet oil has been comparable or marginally lower than that for sour oil. As a result of the DOE decision to purchase sweet crude, the quantity of sweet oil in a 489-million-barrel reserve will be about 39 percent. DOE had planned to have a mix of 35 percent sweet crude and 65 percent sour crude in the 750-million-barrel SPR system.

During the quarter DFSC awarded seven contracts, totaling 7.35 million barrels, through the open, continuous solicitation. On February 14, 1985, DFSC paid $27.25 per barrel for 1 million barrels of "Forties" oil (a sweet crude) delivered to the SPR. According to DFSC officials, that was at a low point of the spot market during the quarter.

STATUS OF SPR OIL ACQUISITION AND TRANSPORTATION ACCOUNT

During the quarter, DOE made payments of $498 million for oil acquisition and transportation. Program Office personnel stated that as of March 31, 1985, DOE had unpaid obligations of about $802 million and unobligated funds of about $879 million. DOE has deferred $827 million for fiscal year 1985, leaving a balance of about $52 million available for obligation. (See table 7.)

STORAGE SITE ACTIVITIES

During the quarter, the phase II storage capacity leaching program proceeded without any major problems, generally achieving DOE goals for capacity development. (See tables 8 and 9.) DOE continued its program to inspect crude oil, water intake, and brine pipelines for corrosion at West Hackberry, Bryan Mound, and Weeks Island. Project Office officials stated that the West Hackberry site instrumentation and control system is in operation and acceptance testing is scheduled to begin in early April 1985. At Bayou Choctaw, the ethane transfer between the DOE and Allied

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[6]DOE will, however, continue to purchase sour oil under its PEMEX contract at 50,000 barrels per day through the end of fiscal year 1985.

Chemical Corp. caverns will begin after the ownership transfer, expected in April 1985, is completed for both caverns.[7]

Program officials stated that all current phase II leaching and related facilities development activities will continue during fiscal year 1985 to achieve an oil storage capacity commensurate with its goal to reach a 489-million-barrel reserve by the end of fiscal year 1985. Beginning in fiscal year 1986, activities during the proposed moratorium would center around preparing the SPR sites for standby operations. At the Big Hill phase III site, however, DOE plans to complete all current contracts by the end of fiscal year 1985 and place the site in a standby condition so that storage capacity development can be resumed in the future.

West Hackberry

The West Hackberry leaching program operated without major problems during the quarter, creating about 9.5 million barrels of permanent oil storage capacity. The site was shut down for 1 day on January 9, 1985, for planned maintenance on instrumentation and control equipment and other electrical components. Of the 16 phase II caverns, 3 are full, 5 are in the final-fill stage, 4 are in the leach-fill stage, and 4 are in the leaching-only stage. One of these 4 leaching-only caverns is out of service because of irregular leaching results and will be closed (no more leaching activity) until DOE decides if sufficient fiscal year 1985 funds can be made available for tests to determine whether the cavern can be developed to store crude oil. Project Office officials stated that the program to test the cavern would require roughly 250 days and $440,000. A decision on this cavern is expected in April 1985.

Our December 1984 quarterly report discussed DOE's efforts to complete installation and test the West Hackberry instrumentation and control system that will centrally monitor the flow of crude oil, water, and brine into and out of the storage caverns. Project Office officials stated that this system was completed in March 1985, and that plans call for beginning a 30-day acceptance test in early April 1985. Additional electrical work is planned under a separate contract to make the water intake structure

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[7]According to Project Office personnel, in December 1982, Allied Chemical Corp. settled its lawsuit against DOE, which had used federal condemnation procedures to obtain Allied Chemical's land for the Bayou Choctaw SPR storage site. As part of the settlement, DOE agreed to leach a cavern with at least 4.5 million barrels of usable capacity and then exchange it for a 10-million-barrel cavern that Allied Chemical currently uses to store ethane.

control system compatible with the new instrumentation and control facilities; this work is expected to begin in June 1985. A Project Office official stated that the objective of this work is to convert the raw water intake structure from a manned to a stand-alone or unmanned operation.

Our December 1984 quarterly report also discussed the corrosion survey made by C-E Vetco Services, Inc., on the 42-mile crude oil pipeline between West Hackberry and the Sun Oil Co. marine terminal that identified two potential problems: a physical deformation in the wall of the pipe and possible corrosion penetrating 50 percent or more of the pipe wall. A Petroleum Operations and Support Services, Inc. (POSSI) official stated that its engineers had prepared the scope of work to investigate these problems.[8]

Our December 1984 quarterly report also discussed ultrasonic testing planned for the water intake and brine disposal lines. POSSI officials stated that these tests were completed under contract by Technical Welding Labs, Inc. in March 1985 at seven locations on the West Hackberry site. Two of these locations were above ground and five were below ground in pits excavated around pipelines. The pipelines tested were the raw water intake line, the brine line to the Gulf of Mexico, and all on-site brine and water lines. The POSSI officials stated that the preliminary results received from the contractor indicate no abnormal corrosion at any of the points tested. A final report will be issued by the contractor during the next quarter.

Our June 1984[9] quarterly report discussed two electrical equipment malfunctions that interrupted leaching for a total of 23 days in April 1984, and our September 1984[10] quarterly report discussed the causes of these electrical malfunctions included in a DOE preliminary draft report issued in August 1984. DOE issued the final report Investigation of West Hackberry Motor Controller Failures on January 31, 1985. This report confirmed that the causes of these failures were computer software error and

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[8]On March 28, 1985, DOE awarded a contract to Boeing Petroleum Services, Inc. (a subsidiary of Boeing Company) to manage, operate, and maintain the SPR. DOE negotiated a termination of its operations and maintenance contract with POSSI effective April 1, 1985, when Boeing took over responsibility for scheduling all work, such as the West Hackberry pipe corrosion survey. (See p. 13 for further information.)

[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).

inadequate electrical circuit design, quality assurance, testing, and preventive maintenance.

Byran Mound

The Bryan Mound leaching program operated without major problems during the quarter, creating about 5.9 million barrels of permanent oil storage capacity. The site was shut down 1 day on January 10, 1985, for planned maintenance to replace and repair valves and perform preventive maintenance on pumps and motors. Of the 12 phase II caverns, 8 are filled, 3 are in the final-fill stage, and 1 is in the leach-fill stage. Of the 4 phase III caverns, 1 is in the leach-fill stage and 3 are in the leaching-only stage.

The phase II cavern in the leach-fill stage has had no leaching activity since June 1984, at which time the cavern contained over 7 million barrels of crude oil. Project Office officials said that the leaching for this cavern was interrupted because well pad subsidence (sinkage and settlement) precluded bringing the heavy equipment (work-over rig) on the well pad to change the cavern's piping configuration to continue leaching. Subsidence had occurred because the well pad was constructed over an old garbage dump 20 feet below the surface. Leaching operations for this cavern are planned to resume in early June 1985.

Our December 1984 quarterly report discussed a corrosion survey by AMF Tuboscope of the crude oil pipelines connecting Bryan Mound to the Phillips Petroleum Co.'s marine terminal and storage tank farm at Jones Creek. The report identified two potential problems, both of which have been investigated by POSSI. As we reported in December 1984, POSSI uncovered a box of welding rods left alongside the pipeline during construction. The second problem, according to POSSI officials, was attributed to other conditions which caused distorted survey readings. According to the contractor's report, no corrosion or deterioration was found in the two crude oil pipelines.

Bayou Choctaw

Our September and December 1984 quarterly reports discussed the Bayou Choctaw cavern exchange between DOE and Allied Chemical Corp. A cavern leached by DOE to 6.1 million barrels capacity is being exchanged for a 10-million-barrel cavern owned by Allied Chemical that currently contains ethane.

DOE completed the pressure testing of the exchange cavern during this quarter; on January 15, 1985, the cavern was certified and the results accepted by Allied Chemical. Cavern piping

modifications have been made by Allied Chemical, and the ethane transfer is planned to begin as soon as the paperwork transferring the cavern's ownership is complete, probably in April 1985.

Activity also continued with the drilling of two wells for the phase III cavern. However, the invitation for bids for construction work for the cavern has been put on hold under the administration's proposed moratorium on further site development.

A contract was awarded on January 24, 1985, to U.S. Leak Detection, Inc., for hydrostatic testing of the 37-mile oil pipeline between Bayou Choctaw and the St. James marine terminal. Our December 1983[11] quarterly report discussed the results of a corrosion survey of this crude oil pipeline that (1) identified extensive corrosion in 18 joints and (2) recommended DOE test the safety of the pipeline by filling it with water and raising the pipeline pressure. If pipeline joints fail in the test, they would be replaced. This hydrostatic test will not be made until a contract can be signed with an emergency pipeline repair company. This contractor will be available to repair the pipeline in case of a failure during the test. The MOM contractor will be responsible for completing this testing.

Weeks Island

Our December 1984 quarterly report discussed repairs begun in December 1984 to the pipeline connecting the Weeks Island site with the St. James marine terminal. The repairs were completed in late January 1985 and involved replacing a 32-foot section of the crude oil pipeline which had a depression of almost 5 inches, preventing the passage of corrosion survey instruments (electronic measuring tools also known as "instrumented pigs").

The Weeks Island pipeline was surveyed for corrosion by C-E Vetco Services, Inc., with an instrumented pig, in March 1985. The survey pig completed the 67-mile pipeline run from Weeks Island to the St. James marine terminal on March 13, 1985. The contractor's report is expected to be issued in April 1985. However, preliminary information from the contractor indicates that the pipeline has only one minor corrosion point, which is no cause for concern from an operational standpoint.

Big Hill

During the quarter, DOE proceeded with some of the activities associated with the development of the phase III Big Hill storage

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

site. Work is proceeding on drilling wells for the last 4 of the 14 caverns at Big Hill. These wells are scheduled for completion in August 1985. However, the administration's budget submission proposed that all current construction activities at Big Hill be brought to an orderly conclusion by the end of fiscal year 1985. After that time, the Big Hill site is to be maintained in a condition that would permit resumption of construction at a later date as oil market and fiscal constraints warrant.

As we noted in our December 1984 quarterly report, DOE had planned to issue an invitation for bids for Big Hill's crude oil pipeline and award a contract for the water intake and brine disposal pipelines in December 1984. Due to the proposed SPR moratorium, these contract actions were postponed in December 1984. DOE cancelled these procurement actions in January 1985. One result of not having the water intake and brine disposal pipelines in place, as originally scheduled by the fall of 1985, is that DOE will not be able to start leaching the first five caverns by the end of fiscal year 1985, as previously planned. In addition, DOE officials at Big Hill said they may not be able to test the equipment purchased under current contracts on a systemwide basis, even though most, if not all, of these major components will have been tested at the factory. DOE, therefore, will have to place the equipment in some form of storage during the moratorium period, with limited assurance that it will work as planned when restart of site development is authorized.

Because of the proposed moratorium, Project Office officials are studying options for dealing with site equipment installation and maintenance requirements. These options include (1) installing equipment as called for under current contracts, and leaving it in place, (2) installing equipment to assure that it fits and then removing it for storage, and (3) placing uninstalled equipment directly into storage. DOE has modified two equipment contracts with its suppliers to store DOE-purchased equipment until adequate Big Hill storage is available.

On March 15, 1985, we testified before the Subcommittee on Environment, Energy and Natural Resources, House Committee on Government Operations, that site maintenance requirements at Big Hill require a high-quality equipment and facilities maintenance program that will be of prime importance if the Big Hill project is to be resumed after a moratorium period. In most cases, equipment warranties will have expired.[12] Under the administration's indefinite moratorium policy, we stated, it is

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[12]Subsequent to our testimony, an Operations Office official stated that studies are being made to assess various options to extend equipment warranties as they expire.

difficult to envision how decisions on storage and maintenance of equipment at Big Hill can be made with assurance that the actions decided on will be cost-effective.

DOE instructed the Corps of Engineers on December 17, 1984, to suspend all Big Hill land-acquisition activities because of the proposed moratorium. On February 27, 1985, DOE authorized the Corps to resume the acquisition of rights-of-way for the crude oil pipeline from Big Hill to the Sun Oil Co. marine terminal. According to a Corps official, the acquisition of rights-of-way for the crude oil pipeline is scheduled to be completed by the end of April 1985. All rights-of-way for the water intake and brine disposal pipelines were obtained during 1984.

REPLACEMENT OF OPERATIONS AND MAINTENANCE CONTRACTOR

In our September 1984 quarterly report, we noted that DOE exercised a 1-year option to extend POSSI's operation and maintenance contract from October 1, 1984, through September 30, 1985, for an estimated cost of $53 million. Our December 1984 quarterly report discussed the selection of a new contractor to manage, operate, and maintain the SPR, and the bid protest submitted to the Comptroller General in October 1984 by Kaneb Services, Inc., the parent company of POSSI, on the MOM contract selection procedures followed by DOE.

The DOE Project Office letter that exercised the POSSI contract option states that prior to the extension, DOE had attempted to reach an agreement with POSSI so that its contract termination would coincide with the assumption of responsibility by the new contractor. Although DOE and POSSI could not reach agreement at that time, on February 13, 1985, they agreed to a negotiated 6-month contract term that ended March 31, 1985. It provides for an estimated contract cost of $54,885,000 and a fixed-fee of $4 million. The agreement also provides for a 1-year phase-out period with an estimated cost of $3.3 million and a fixed-fee of $214,000.

As part of the contract settlement, POSSI agreed to drop its bid protest and any future claims. On February 15, 1985, the counsel to Kaneb Services, Inc., notified the Comptroller General that the bid protest was being withdrawn.

In December 1984, DOE announced its selection of Boeing Petroleum Services, Inc. as the MOM contractor. On February 27, 1985, DOE and Boeing signed a $1.1 million phase-in contract and on March 28, 1985, they signed the 5-year MOM contract. The contract has a total estimated cost of over $500 million; however, for the first 6 months DOE and Boeing agreed to a cost of

$56,500,000 which includes a fixed-fee of $1.3 million. At the end of the 6-month period, the contract will be converted to a cost-plus-award-fee basis for the rest of the 5-year contract term. At the end of that term, the contract can be renewed for up to 5 more years.

The Boeing contract will consolidate the activities previously performed by a number of separate contractors under Boeing's direction and control. According to DOE, integrating activities and assigning management responsibility to Boeing will result in improved contractor accountability and administration.

POSSI's accounting system

Our June 1983[13] and September 1984 quarterly reports discussed in detail Defense Contract Audit Agency (DCAA) reports on POSSI's accounting system. In summary, DCAA had reported that POSSI's accounting system was not suitable for use under a cost-reimbursable government contract. Subsequent DCAA reports stated that POSSI's actions to correct its accounting system deficiencies had not been adequate to resolve the concerns.

On January 24, 1985, DCAA issued another report on POSSI's accounting system. DCAA stated that the contractor's accounting system, as it was operating during the period October 1984 through January 1985, provided adequate assurance that only reasonable, allowable, and allocable costs were claimed for reimbursement. This opinion did not include the accounting system operating at the contractor's corporate office. Additionally, according to the DCAA report, POSSI's treatment of bid and proposal costs associated with its original contract was not in accordance with generally accepted accounting principles and federal procurement regulations. POSSI's comments on the DCAA report stated that the accounting treatment for bid and proposal costs had been directed by DOE's contracting officer. This matter will be resolved when DCAA conducts a close-out audit of the POSSI contract.

OTHER ISSUES

During our review we also obtained information on (1) DOE's implementation of the recommendations made in the Operations Office's baseline report and its report on allegations about mismanagement or misconduct within the SPR program and (2) DOE's analysis of oil samples from filed storage caverns.

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

Implementation of Operations Office recommendations

Subsequent to being assigned responsibility for SPR project management and direction in June 1983, the Operations Office evaluated the status of the SPR Project Office and, in October 1983, issued a baseline assessment report on the Project Office. This report made 170 recommendations, which predominately sought to redirect overall SPR priorities, realign Project Office and contractor responsibilities, and implement existing DOE procedures. The Project Office currently is implementing the recommendations. According to the Project Office, as of March 31, 1985, implementation actions had been proposed for all 170 recommendations. As of that date the operations office had accepted 146 of these proposals.

In March 1984 the Operations Office issued its report on allegations of mismanagement or misconduct in the SPR program. The report made 25 recommendations, which the Project Office currently is implementing. According to the Project Office implementation plan, proposed actions to implement all recommendations were scheduled for completion by March 31, 1985. As of that date, the documentation had been completed for all recommendations and the Operations Office had accepted 21 of these proposed recommendations.

Analysis of oil in storage caverns

Our March 1984[14] quarterly report discussed the storage cavern inventory and integrity control program, where oil samples are taken and analyzed for each cavern about 4 months after it has been filled and every 5 years thereafter. The oil samples are taken at six different cavern levels and are divided so that half is sent to the National Institute for Petroleum's laboratory at Bartlesville, Oklahoma, for analysis, and half is retained at the storage site.

Our March 1984 quarterly report also stated that DOE had sampled and received analysis results for 11 caverns. Since that time, DOE has sampled an additional 14 caverns and has received the results for 6 of these caverns. The analyses showed that the oil sampled was within the specific gravity and sulfur content ranges that DOE has established for SPR oil types. Table 10 shows the results of the laboratory analyses.

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[14]Status of Strategic Petroleum Reserve Activities as of March 31, 1984 (GAO/RCED-84-184, Apr. 13, 1984).

APPENDIX II

FIGURES AND TABLES ON THE STATUS OF THE STRATEGIC PETROLEUM RESERVE

Table 1

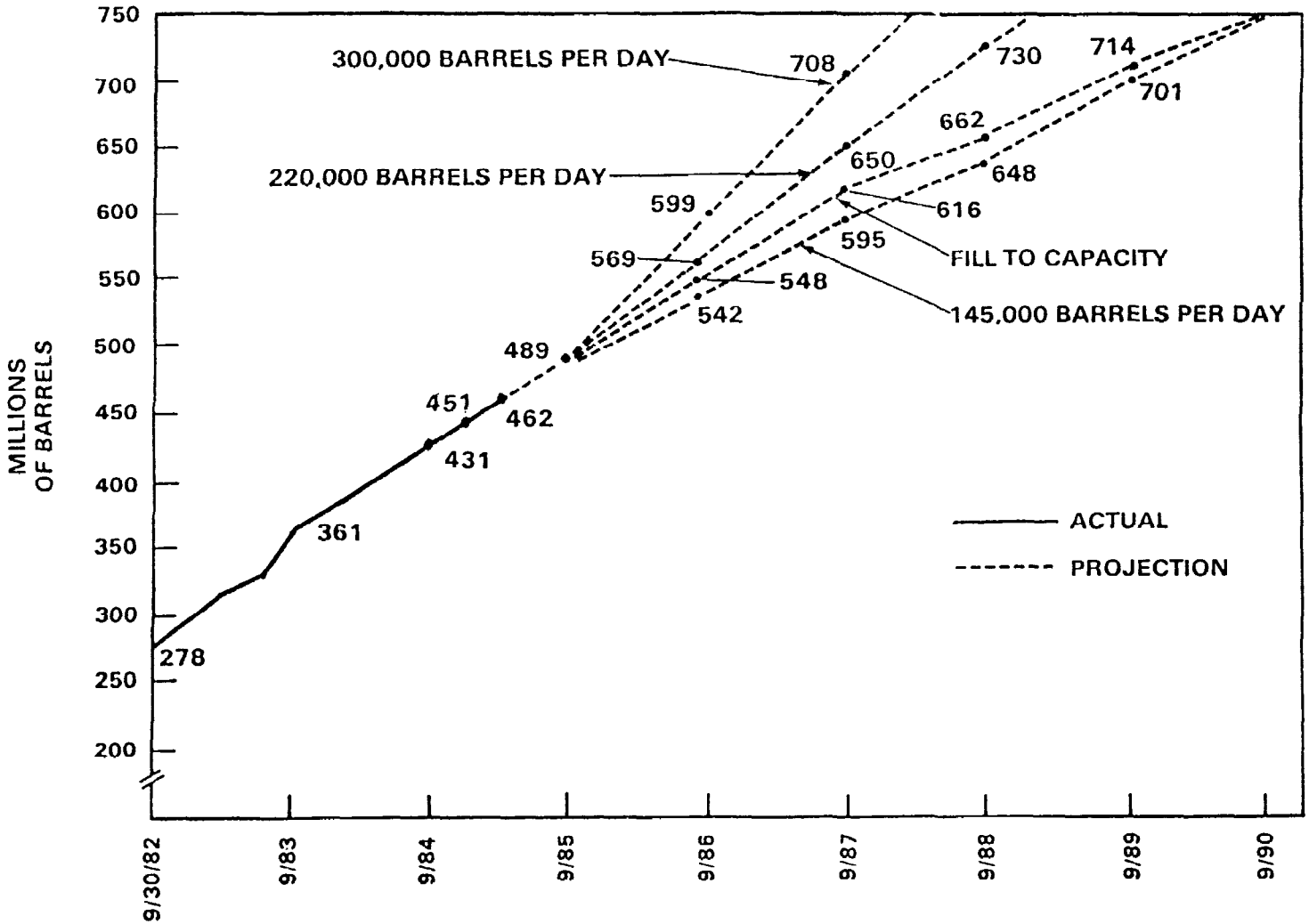
Estimated Total Cost for Alternative SPR Systems
Through Fiscal Year 1990

Size options[a] (millions of barrels)	Prior to 1985	1985	1986	1987	1988	1989	1990	Totals
	Fiscal Years (millions of dollars)							
489								
Oil	13,084.0	1,237.7	0.0	0.0	0.0	0.0	0.0	14,321.7
Other[b]	2,136.4	258.3	175.1	139.2	139.4	136.2	131.4	3,116.0
Total	15,220.4	1,496.0	175.1	139.2	139.4	136.2	131.4	17,437.7
500								
Oil	13,084.0	1,237.7	312.0	0.0	0.0	0.0	0.0	14,633.7
Other[b]	2,136.4	258.3	181.1	139.2	139.4	136.2	131.4	3,122.0
Total	15,220.4	1,496.0	493.1	139.2	139.4	136.2	131.4	17,755.7
550								
Oil	13,084.0	2,050.0	889.0	0.0	0.0	0.0	0.0	16,023.0
Other[b]	2,136.4	267.6	208.7	139.2	139.4	136.2	131.4	3,158.9
Total	15,220.4	2,317.6	1,097.7	139.2	139.4	136.2	131.4	19,181.9
610								
Oil	13,084.0	2,050.0	1,413.0	902.0	303.0	0.0	0.0	17,752.0
Other[b]	2,136.4	268.3	217.1	181.4	170.4	138.2	133.8	3,245.6
Total	15,220.4	2,318.3	1,630.1	1,083.4	473.4	138.2	133.8	20,997.6
750[c]								
Oil	13,084.0	2,050.0	1,413.0	1,528.0	1,577.0	1,572.0	770.0	21,994.0
Other[b]	2,136.4	439.7	276.6	212.9	205.2	200.7	205.6	3,677.1
Total	15,220.4	2,489.7	1,689.6	1,740.9	1,782.2	1,772.7	975.6	25,671.1

[a]Based upon DOE budget authority and assuming annual fill rates of 145,000 barrels per day or less.
[b]All other costs to develop the SPR system include facilities, operations, maintenance, and management.
[c]This size option is for oil acquisition to reach a 750-million-barrel reserve. A cost estimate was not available for a 750-million-barrel system filled only to 500 million barrels.

Source: DOE and GAO calculations.

FIGURE 1: COMPARISON OF FILL RATES IN REACHING 750 MILLION BARRELS



THE CONTINUING RESOLUTION FOR FISCAL YEAR 1985 (P.L. 98-473) REQUIRES A MINIMUM FISCAL YEAR 1985 FILL RATE OF 159,000 BARRELS PER DAY.

APPENDIX II

Table 2

Comparison of Fill Rates and Storage Requirements in Reaching 750 Million Barrels

Fiscal year	Fill to available storage capacity[a]	300,000 barrels per day[b] Oil volume	300,000 barrels per day[b] Storage requirements[d]	220,000 barrels per day[b] Oil volume	220,000 barrels per day[b] Storage requirements[d]	145,000 barrels per day[c] Oil volume	145,000 barrels per day[c] Storage requirements[d]
	(millions of barrels)						
1985[e]	489	489	-	489	-	489	-
1986	548	599	-51	569	-21	542	+6
1987	616	708	-92	650	-34	595	+21
1988	662	750	-88	730	-68	648	+14
1989	714	-	-36	750	-36	701	+13
1990	750	-	-	-	-	750	-

[a]The available storage capacity is the amount that the administration's fiscal year 1985 budget shows will be available at the end of each fiscal year.

[b]The Energy Emergency Preparedness Act (P.L. 97-229) requires a minimum average annual fill rate of 300,000 barrels per day until at least 500 million barrels of oil are stored. If the President finds that this rate is not in the national interest, the minimum rate becomes 220,000 barrels per day or the highest practicable fill rate achievable with available funds. After 500 million barrels of oil are in storage, the act requires the President to seek to fill the SPR at the minimum average rate of 300,000 barrels per day until at least 750 million barrels of oil are in storage.

[c]The administration's fiscal year 1985 budget proposed to fill the SPR at the 145,000 barrels-per-day rate until the SPR is filled.

[d]A positive amount indicates excess capacity available, while a negative number indicates that additional storage is needed.

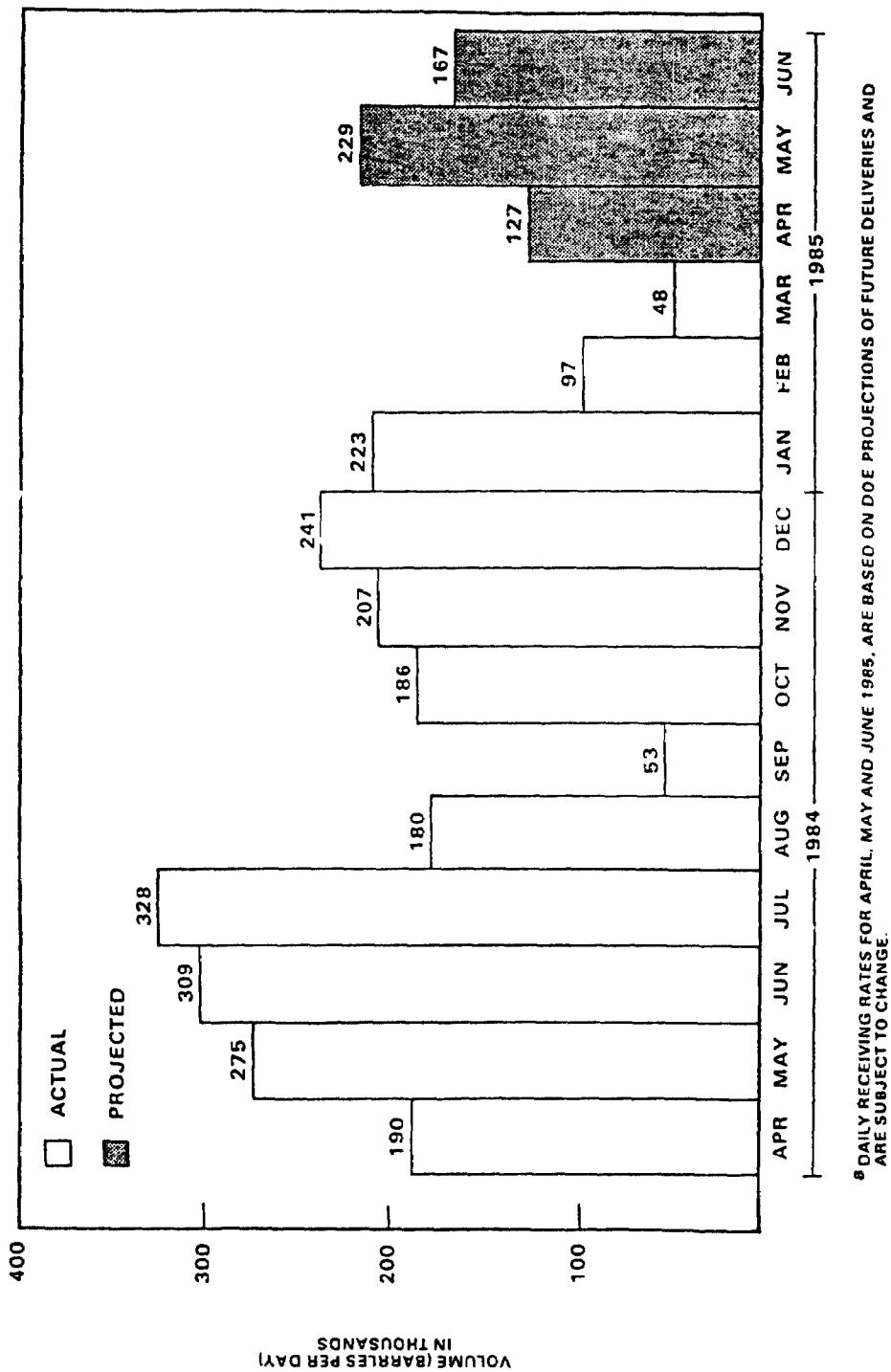
[e]The Continuing Resolution for Fiscal Year 1985 (P.L. 98-473) established the minimum fill rate at 159,000 barrels per day for fiscal year 1985, which would result in an SPR inventory of 489 million barrels at the end of the fiscal year.

Source: DOE and GAO calculations.

APPENDIX II

APPENDIX II

FIGURE 2: AVERAGE DAILY SPR OIL RECEIVING RATE [a]



[a] DAILY RECEIVING RATES FOR APRIL, MAY AND JUNE 1985, ARE BASED ON DOE PROJECTIONS OF FUTURE DELIVERIES AND ARE SUBJECT TO CHANGE.

Table 3

SPR Oil Deliveries
by Fiscal Year 1985 Quarter

Quarter	Oil volume at start of quarter	Deliveries	Oil volume at end of quarter	Average receiving rate For quarter	Average receiving rate Since 10/1/84
	(millions of barrels)			(thousands of barrels per day)	
Oct. 1, 1984 through Dec. 31, 1984	431.1	19.4	450.5	211.3	211.3
Jan. 1, 1985 through March 31, 1985	450.5	11.1	461.6	123.5	167.8

Source: DOE.

APPENDIX II

Table 4

SPR Oil Inventory by Crude Type as of March 31, 1985

	Type I[a]	Types II-V[b]	Type VI[c]	Type VIa[d]	Maya[e]	Total
	(millions of barrels)					
Volume delivered	225.1	176.9	31.4	16.6	11.6	461.6
	(percent)					
Percentage of total oil delivered	49	38	7	4	3	101[f]

[a]High-sulfur crude (from 0.5 to 1.99 percent sulfur content) with an American Petroleum Institute (API) gravity range of 30 to 36 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 crude to 45 degrees for very light crude.

[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 30 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 that has 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.

[f]Numbers do not add up to 100 percent because of rounding.

Source: DOE.

Table 5

Summary of Oil Acquisition Activities for Fiscal Year 1985

	Oil deliveries for quarter ending 3/31/85	Oil deliveries for FY 1985 as of 3/31/85	Oil under contract as of 3/31/85[a]	Oil to be contracted[b]	Total
	(millions of barrels)				
Open, continuous solicitation[c]	6.2	21.1	7.3	11.0	39.4
PEMEX contract	4.9	9.4	9.2	-	18.6
Total	11.1	30.5	16.5	11.0	58.0

[a]Represents the amount of oil that is under contract and to be delivered in fiscal year 1985.

[b]Represents the amount of oil that remains to be contracted for and delivered in fiscal year 1985.

[c]The open, continuous solicitation involves making contract awards without reissuing the solicitation for offers of oil that is available on the "spot," or short-term, market. (See table 6 for individual contract awards.)

Source: DOE and DFSC.

Table 6

Open, Continuous Solicitation Awards for the Quarter Ending March 31, 1985

Contract date	Supplier	Oil type[a]	Total barrels (millions)
2/14/85	BP Oil Development, Ltd.	Sweet	1.00
2/14/85	Coastal States Trading, Inc.	Sweet	.60
2/14/85	Carey Petroleum Ltd.	Sour	.15
2/14/85	T.W. Oil, Inc.	Sour	.65
2/15/85	T.W. Oil, Inc.	Sour	2.00
2/28/85	Amerada Hess Trading Co.	Sweet	1.95
3/29/85	BP Oil Development, Ltd.	Sweet	1.00
Total			7.35

[a]DOE established quality specifications for SPR oil, including a range from 0.5 percent to 1.99 percent sulfur content for sour crudes and a maximum of 0.5 percent sulfur content for sweet crudes.

Source: DFSC.

Table 7

Status of SPR Oil Acquisition and Transportation Funds as of March 31, 1985[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 made available	$10,264
Funds used or committed	
Fiscal year 1982 payments	$3,687
Fiscal year 1983 payments	1,641
Fiscal year 1984 payments	2,329
Estimated fiscal year 1985 payments[b]	926
Estimated DOE unpaid obligations as of 03/31/85[c]	802
Total used or committed	$9,385
Estimated unobligated funds at DOE[d]	$ 879

[a]The Omnibus Budget Reconciliation Act of 1981 (Pubic 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 February 1985 and DOE's estimated payments for March 1985.

[c]Unpaid obligations represent funds that have been committed to pay for fiscal year 1985 oil deliveries under the first PEMEX contract, or are obligated or committed to DFSC for upcoming oil deliveries or purchases and expected transportation costs. DFSC estimates that of the funds obligated to it, about $177 million was available as of March 31, 1985, for future purchases.

[d]DOE has deferred $827 million for fiscal year 1985, leaving a balance of approximately $52 million available for obligation.

Source: DOE and DFSC.

Table 8

Status of SPR Underground Capacity
as of March 31, 1985

Storage facilities	Permanent capacity available	Capacity filled
Phase I sites:	----(millions of barrels)----	
Bayou Choctaw	46.3	45.4
Bryan Mound	67.1	64.4
Sulphur Mines	26.4	26.2
Weeks Island	73.0	73.0
West Hackberry	49.2	46.6
Total	262.0	255.6
Phase II sites:	Planned capacity	Capacity filled
Bayou Choctaw	10.0	(a)
Bryan Mound	120.0	117.6
West Hackberry	160.0	85.3
Total	290.0	202.9
Tanks and pipelines	-	3.1
Total for SPR	552.0	461.6

[a]A newly leached cavern with 4.5 million barrels of usable capacity will be exchanged for an existing 10-million-barrel cavern owned by Allied Chemical Corporation at the Bayou Choctaw site after leaching is completed. DOE completed leaching in October 1984.

Source: DOE.

Table 9

Summary of Leaching Activities for the Quarter Ending March 31, 1985[a]

	Brine disposal		Cumulative oil capacity[b]		Cumulative oil fill	
	Baseline	Actual	Baseline	Actual	Baseline	Actual
	(thousands of barrels per day)		(millions of barrels)			
Bryan Mound:						
January	900	864	110.0	114.4	115.9	115.2
February	900	730[c]	110.4	118.6	117.3	116.4
March	900	579[c]	111.2	118.7	118.1	117.6
West Hackberry:						
January	900	942	82.1	82.5	81.7	81.7
February	900	891	84.8	83.6	82.8	84.1
March	900	852	87.3	89.8	87.9	85.3

[a]This table compares the actual leaching activities with baselines that have been established for the SPR contractor. To allow for contingencies, the contractor baselines are more stringent than the overall baselines established for the SPR program.

[b]Cumulative oil capacity represents the amount of cavern volume available for storing oil.

[c]According to Project Office officials, the actual brine disposal rate has decreased because of declining leaching activities; the baseline rate has not been revised to reflect this decline.

Source: DOE.

APPENDIX II

Table 10

Results of Laboratory Analysis of Filled SPR Caverns

Storage site	Cavern number[a]	Type of oil	Degrees API gravity	Percent sulfur content
Bayou Choctaw	20	Sweet	36.3	0.26
West Hackberry	9	Sour	32.8	1.55
	101	Sweet	36.9	0.21
Sulphur Mines	2	Sour	32.9	1.60
	6	Sour	32.7	1.60
	7	Sour	34.1	1.56

[a]West Hackberry caverns 103, 104, 105, and 107 and Bryan Mound caverns 103, 107, 109, and 110 have been sampled but results are not complete.

Source: DOE.

Table 11

Prior GAO 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).

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