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General Accounting Office

Progress In Filling The Strategic Petroleum Reserve Continues, But Capacity Concerns Remain

During the first three quarters of fiscal year 1982 , the Government filled the Strategic Petroleum Reserve (SPR) at an average rate of 237,000 barrels per day. As of June 30, 1982, the Department of Energy reported that the Reserve contained 264.1 million barrels of oil.

The Government has nearly filled the currently available permanent storage capacity. In the future, the SPR fill rate will depend on the rate at which new capacity can be developed. This report discusses several problems which could affect the development of additional capacity.

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ENERGY AND MINERALS
DIVISION

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

The Honorable Henry M. Jackson
Ranking Minority Member, Committee
on Energy and Natural Resources
United States Senate

This is the first in a series of reports requested by the members of the Senate Committee on Energy and Natural Resources on the administration's progress in filling the Strategic Petroleum Reserve (SPR) and its compliance with applicable laws. (See app. III for the March 25, 1982, letter requesting these reports).

Partially to encourage the administration to resume oil purchases and continue filling the SPR, the Congress enacted the Energy Security Act (P.L. 96-294) on June 30, 1980. Title VIII of the act requires an average SPR fill rate of at least 100,000 barrels per day each fiscal year until the SPR is filled.

Recently, the Senate and the House of Representatives each passed bills which would require the administration to fill the SPR at average rates of at least 300,000 and 200,000 barrels per day, respectively. Currently, the Conference Committee is meeting to resolve the differences in the bills.

This report covers SPR activities which occurred during the first three quarters of fiscal year 1982. It discusses the administration's progress in filling the SPR with crude oil and significant events related to developing and operating the SPR. Specifically, it notes that:

--The Department of Energy (DOE) reported that the SPR contained about 264.1 million barrels as of June 30, 1982. During fiscal year 1982, about 64.8 million barrels of oil have been delivered to the SPR, for an average fill rate of about 237,000 barrels per day.

--The Defense Fuel Supply Center (DFSC), DOE's purchasing agent for most SPR oil, issued a solicitation on July 1, 1982, requesting offers for the sale of 18.25 million barrels, or about 50,000 barrels per day, of low-sulfur crude oils to the SPR during fiscal year 1983. If DFSC contracts for 50,000 barrels per day, this oil combined with the 50,000 barrels per day called for in DOE's multi-year contract with Petroleos Mejicanos (PEMEX--the Mexican State oil company) would satisfy the 100,000-barrels-per-day minimum fill rate requirement for fiscal year 1983.

--In its May 17, 1982, SPR Quarterly Report, DOE noted that it now expects to have 277 million barrels of storage capacity by the end of fiscal year 1982. This represents a 10-million-barrel increase from DOE's previously planned 267 million barrel capacity and would permit an average annual fill rate of 213,000 barrels per day for the fiscal year.

--DOE's ability to maintain, or to accelerate, the SPR fill rate for permanent storage depends on its ability to meet the schedule for developing new capacity. DOE has essentially completed filling the storage capacity acquired during Phase I of the SPR program and is filling Phase II capacity as it is developed. Although DOE is currently ahead of its Phase II schedule for developing additional storage capacity at the Bryan Mound, Texas, site, it has experienced problems which have slowed the development of additional capacity at the West Hackberry, Louisiana, site. In addition, DOE has been unable to certify that 13.1 million barrels of Phase I capacity at the Sulphur Mines, Louisiana, site can be used for oil storage. In the past, the availability of Phase I capacity allowed DOE the flexibility to maintain a high oil fill rate while problems were resolved. Now that permanent storage capacity is being filled as it becomes available, DOE must ensure that current and future problems are quickly identified and resolved.

--As provided in the Omnibus Budget Reconciliation Act of 1981, an off-budget SPR Petroleum Account for oil acquisition and transportation funds was established on October 1, 1981. The account received about $1.8 billion that was carried over from previous fiscal years and about $3.7 billion that the Congress appropriated for fiscal year 1982. Of these funds, DOE spent an estimated $2.6 billion for oil deliveries through June 30, 1982, and committed an estimated $600 million for deliveries during the next quarter. This leaves about $2.3 billion available for future purchases.

Appendix I discusses these topics in further detail, and appendix II presents figures and tables that support the discussion.

This report is based on our review of DOE and DFSC program documents, DOE publications, and studies related to the SPR program. To review the Government's activities in contracting for oil, we obtained data from DFSC on contracts awarded since September 1981. We reconciled a computerized DOE listing of all SPR crude oil receipts during fiscal year 1982 with summary inventory reports for the same period. In reviewing DOE's activities to develop and maintain SPR storage facilities, we obtained data related to program activities such as leaching of Phase II storage capacity and the certification of Phase I storage capacity. We obtained information on the availability and utilization of oil acquisition funds from both DOE and DFSC. We interviewed managers and operating personnel at DFSC who are responsible for the procurement of oil for the SPR. We also interviewed DOE personnel responsible for planning and managing the activities associated with the development and operation of the SPR facilities, and personnel from the private contractors that carry out most of the program activities.

Our review was conducted in accordance with the Comptroller General's "Standards for Audit of Governmental Organizations, Programs, Activities and Functions." We did not, however, verify the data related to oil procurement contracts, the volumes or quality of oil received by DOE, or the available capacity of SPR storage facilities because of the limited time available to conduct the audit work for this report. As part of our continuing work to monitor SPR activities, we plan to evaluate DOE's procedures for developing information on oil deliveries, including the reliability of its computerized system. In addition to monitoring the status of SPR activities on a quarterly basis, we plan to report from time-to-time on issues dealing with the policies and effectiveness, economy, and efficiency of the Government's management of the SPR.

In order to meet the requested time frames for this report, we did not obtain official agency comments. However, we provided DOE and DFSC program officials a draft of this report and discussed its factual accuracy with them. Based on their comments, we made appropriate revisions. Unless you publicly announce its contents earlier, we plan no further distribution of this report until 7 days after its date of issuance. At that time, we will send copies to the Secretary of Energy and other interested parties and make copies available upon request.

J. Dexter Peach
Director

APPENDIX I

STATUS OF STRATEGIC PETROLEUM RESERVE

ACTIVITIES THROUGH JUNE 1982

BACKGROUND

The Energy Policy and Conservation Act of 1975 (P.L. 94-163, December 22, 1975) authorized the creation of a Strategic Petroleum Reserve (SPR) to provide for storage of up to 1 billion barrels of crude oil. To implement this program, the Federal Energy Administration (FEA) submitted its Strategic Petroleum Reserve Plan to the Congress on February 16, 1977. The Plan called for a reserve of 500 million barrels by December 1982. In May 1978, FEA submitted to the Congress an amendment to the SPR Plan which authorized an increase in the SPR size to 1 billion barrels of oil and which presented a plan for developing 750 million barrels of underground storage capacity. Responsibility for the SPR program was transferred to the Department of Energy (DOE) in October 1977, pursuant to the Department of Energy Organization Act (P.L. 95-91).

DOE is implementing a three-phased program to develop the 750-million-barrel SPR. Phase I of the program involved the acquisition of existing underground storage sites at Weeks Island, Bayou Choctaw, Sulphur Mines, and West Hackberry in Louisiana and at Bryan Mound in Texas. The sites have a combined storage capacity of about 257 million barrels. With the exception of a 13.1-million-barrel cavern discussed later in this appendix, Phase I storage capacity is almost completely filled.

In 1979, DOE began developing an additional 290 million barrels of Phase II capacity at three of the Phase I sites. To create underground storage capacity, DOE drills wells into salt formations, pumps in water to leach away the salt, and then disposes of the resulting brine. Currently, the Phase II leaching program is about 28 percent complete.

Phase III land acquisition and construction activities were started at two existing sites during fiscal year 1982. Land acquisition for the third Phase III site, a new facility at Big Hill, Texas, was deferred on February 5, 1982, until fiscal year 1983.

CONGRESSIONAL ACTION ON SPR FILL RATE

From April 1979 until September 1980, SPR oil purchases were suspended as a result of the reduced world oil supplies and high prices that followed the Iranian revolution. At that time, the SPR contained 91 million barrels of oil.

Since the suspension of oil purchases in 1979, the Congress has acted several times to exert pressure on the administration to fill the SPR at an accelerated rate. Title VIII of the Energy Security Act (P.L. 96-294, June 30, 1980) requires DOE to fill the SPR at an average rate of at least 100,000 barrels per day each fiscal year until the SPR is filled. It also states that no portion of the United States share of Elk Hills Naval Petroleum Reserve (NPR) oil may be sold or otherwise disposed of other than to the SPR during any fiscal year unless the 100,000-barrels-per-day fill rate is achieved or until the SPR contains 500 million barrels. In addition, the Department of the Interior and Related Agencies Appropriation Act for fiscal year 1981 (P.L. 96-514, December 12, 1980) states that the President shall seek to fill the SPR at an average annual rate of at least 300,000 barrels per day or at a sustained average annual rate which would fully utilize appropriated funds. The Omnibus Budget Reconciliation Act of 1981 (P.L. 97-35, August 13, 1981) restates the 300,000-barrels-per-day fill rate goal.

On May 26, 1982, the Senate passed S.2332, a bill to amend the Energy Policy and Conservation Act. Section 4 of the bill would require the President, subject to the availability of funds, to fill the SPR at an average annual rate of 300,000 barrels per day beginning on July 1, 1982, and continuing until the SPR contains 500 million barrels of oil.

On June 23, 1982, the House of Representatives passed H.R. 6337, the National Energy Emergency Preparedness Act of 1982. Section 3 of the bill would require the President to fill the SPR at an average annual rate of at least 200,000 barrels per day beginning on July 1, 1982, and continuing until the SPR contains 500 million barrels of oil.

Currently, the Conference Committee is meeting to resolve differences between S.2332 and H.R. 6337. The impact of the two bills is shown in figure 1 and table 1. (All figures and tables appear in app. II.) H.R. 6337 would require DOE to acquire and store 12.5 million more barrels of oil by the end of fiscal year 1983 than is scheduled by the current DOE plans for creating storage capacity. In fiscal year 1985, the difference is 44 million barrels. S. 2332 would require DOE to acquire and store 58.2 million barrels of oil more than DOE's expansion plan calls for by the end of fiscal year 1983. This difference rises to a peak of 83 million barrels in fiscal year 1984.

Both bills authorize DOE to achieve the higher fill rates by leasing interim storage capacity. In May 1982, we released a report which assesses leasing costs for a 300,000-barrels-per-day fill rate until 500 million barrels of oil are in

APPENDIX I

storage. 1/ The report estimates that interim storage will be available at costs ranging from about $1.20 to $3.65 per barrel per year and that the interim storage program, given DOE's estimates of future oil prices, would cost from about $700 million to $1.1 billion over 4 years.

These interim storage cost estimates depend on DOE's ability to achieve the storage capacity levels cited in the expansion plan. However, DOE officials have stated that the fiscal year 1984 oil fill schedule, which calls for a total of 417 million barrels of storage capacity by the end of the fiscal year, could be as low as 402 million barrels. According to DOE officials, this is mainly because it is unlikely that the 10 million barrels of Phase II storage capacity at Bayou Choctaw will be filled according to schedule in fiscal year 1984. 2/ Also, the 417 million barrels of storage capacity assumes that (1) DOE will exceed the current leaching schedule for Phase II capacity or (2) the 13.1-million-barrel Phase I cavern that DOE has been testing because of leaks will be certified for oil storage. (These issues are discussed in a following section.)

DOE is currently reviewing the capacity expansion and oil fill projections as part of the fiscal year 1984 budget process. DOE officials point out that they can achieve the 417-million-barrel storage level, even without the Phase II Bayou Choctaw cavern, if DOE exceeds the Phase II leaching schedule, which they state is conservative, and if the Phase I cavern is certified.

SPR SIZE STUDY

The Omnibus Budget Reconciliation Act of 1981 required DOE to analyze the costs and benefits of a range of SPR sizes. In preparing its May 1982, "Report to the President and the Congress on the Size of the Strategic Petroleum Reserve," DOE used a number of different scenarios and assumptions to analyze the costs and benefits of four SPR sizes--580 million barrels, 750 million barrels, 1 billion barrels, and 1.25 billion barrels. The report states

> "The Department believes that large strategic oil stockpiles can be cost-effective for coping with oil supply disruptions and recommends continued development of a

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1/"Feasibility and Cost of Interim Storage for the Strategic Petroleum Reserve," GAO/EMD-82-95, May 21, 1982.

2/On June 28, 1982, DOE started to leach a 5-million-barrel cavern at Bayou Choctaw which it plans to exchange for an existing 10-million-barrel cavern owned by Allied Chemical Corporation. DOE would then fill the 10-million-barrel cavern with oil.

750 million barrel SPR * * * The Department does not believe it is necessary or appropriate to change the SPR Plan provisions for an ultimate stockpile size of up to 1 billion barrels on the grounds that increases beyond the planned 750 million barrel SPR system at a future date could provide net economic benefits to the United States."

CURRENT STATUS OF OIL FILL ACTIVITIES

As of June 30, 1982, the SPR contained 264.1 million barrels of oil. This represents more than one-third of the 750 million barrels of oil that ultimately will be stored in the SPR under DOE's expansion plan. (Table 2 shows SPR oil deliveries and the average daily fill rate for each fiscal year of the program.)

During the first three quarters of fiscal year 1982, about 64.8 million barrels of oil were delivered to the SPR at an average fill rate of 237,000 barrels per day. (See figure 2 and table 3 for oil deliveries and fill rates by months and fiscal year quarters, respectively.) This was less than the fiscal year 1981 fill rate of 292,000 barrels per day, but it exceeded the mandatory minimum fill rate of 100,000 barrels per day.

SPR OIL ACQUISITION

DOE has acquired SPR oil through several mechanisms during fiscal year 1982. The Department has mainly relied on the procurement capability of the Defense Fuel Supply Center (DFSC) in the Department of Defense and first year deliveries of a 5-year contract signed in August 1981 with Petroleos Mejicanos (PEMEX), the Mexican State oil company. DOE also has received oil for the SPR through a consent order with Standard Oil Company of Calfornia (Chevron) and through prior year contractual commitments and a Memorandum of Understanding that involve Elk Hills NPR oil. Table 4 shows SPR oil acquisition activities for fiscal year 1982.

Defense Fuel Supply Center

DFSC acquired more than 50 percent of the oil delivered to the SPR during fiscal year 1982 through an open continuous solicitation. DFSC also acquired oil during the year through a one-time contract with the Atlantic Richfield Company (ARCO).

In January 1981, DOE's Deputy Assistant Secretary for the SPR authorized DFSC to acquire oil through an open continuous solicitation. This allows DFSC to regularly receive offers for oil that is available on the "spot," or short-term, market and to make contract awards without readvertising the solicitation. DFSC's practice has been to close the solicitation every 2 weeks, assess the proposals based on a range of market prices paid for

similar types of oil, and make awards, if appropriate. Normally, oil deliveries have been made within 6 weeks after DFSC awarded the contracts.

DFSC has awarded 27 contracts for 38.5 million barrels of oil to be delivered during fiscal year 1982. (See table 5 for details on the contract awards.) However, for the 3-month period from January 12, 1982 through April 13, 1982, DOE instructed DFSC not to award any contracts because existing contractual commitments were sufficient to fill existing SPR storage capacity. (SPR capacity constraints are discussed below.) Since April 13, 1982, DFSC has awarded five contracts for 8.5 million barrels of oil.

At DOE's request, DFSC is also seeking oil deliveries through long-term contracts. In December 1981, DFSC signed a contract with ARCO for 2.14 million barrels of Alaskan North Slope (ANS) oil to be delivered between April 1, 1982, and October 31, 1982. However, in accordance with the contract, DFSC subsequently requested a change in the price for the ANS oil because world oil prices had fallen. DFSC and ARCO were unable to reach agreement on the price change, so on March 25, 1982, the contract was modified to reduce the contract deliveries to 300,000 barrels for a cost of $9.87 million. DFSC terminated the contract on April 30, 1982, and since then, it has made up the difference in contractual deliveries through open continuous solicitation awards.

On June 16, 1982, DOE requested DFSC to issue a solicitation for the delivery of 18.25 million barrels of low-sulfur crude oil during fiscal year 1983. This would be equivalent to 50,000 barrels per day, and, together with the PEMEX contract deliveries, would ensure the achievement of the mandatory minimum SPR fill rate of 100,000 barrels per day of oil.

On July 1, 1982, DFSC published its solicitation. The solicitation closing date is July 22, 1982. The solicitation provides for adjustments based on changing world oil prices and for quarterly evaluations of contract prices.

PEMEX Contract

In August 1981, DOE signed a 5-year contract with PEMEX for the delivery of 110 million barrels of oil to the SPR. According to the contract, 24 million barrels of oil were to be delivered to the SPR by December 31, 1981, and 86 million barrels of oil are to be delivered at an average rate of 50,000 barrels per day from January 1, 1982, through August 31, 1986. Approximately 37.7 million barrels of oil will be delivered by the end of fiscal year 1982.

The original PEMEX contract called for delivery of 6 million barrels of Maya, a heavy, high-sulfur crude oil, and 104 million barrels of a 40 percent/60 percent blend of Maya and Isthmus,

a lighter, high-sulfur crude oil. 1/ (DOE officials considered these terms to be favorable since PEMEX normally requires private companies to buy at least 50 percent Maya crude.) Subsequently, the contract has been modified several times. In November 1981, the ratio of the blend was changed to 25 percent Maya and 75 percent Isthmus, because the 40/60 blend did not meet the contract's maximum sulfur content requirement. Also, in January 1982, the contract was modified to allow the delivery of unblended Maya and Isthmus crudes.

The original contract provided for renegotiating prices before the start of each quarter. In November and December 1981, DOE benefited from this clause because world oil prices went up after the quarterly price was established. However, in March 1982, PEMEX benefited from the clause because world oil prices fell. In March 1982, DOE and PEMEX agreed to negotiate prices on a month-by-month basis during the third quarter of fiscal year 1982. DOE and PEMEX negotiated prices on a quarterly basis once again for the fourth quarter of the fiscal year.

Consent orders

For several years, DOE has been investigating violations of the Federal petroleum price and allocation regulations that were in effect between January 1, 1973, and January 28, 1981. Several of these investigations have resulted in consent orders between DOE and individual oil companies. The means for reimbursing the agreed-upon overcharges in two cases, Chevron Oil Company and Quaker State Oil Refining Corporation, is through delivery of oil to the SPR.

On July 27, 1981, DOE and Chevron signed a consent order in which Chevron agreed to deliver a quantity of ANS oil with a delivered value of $33 million. The consent order was published in the "Federal Register" for public comment before it became effective. Subsequently, Chevron delivered 1.026 million barrels of ANS to the SPR.

On March 5, 1982, DOE and Quaker State signed a consent order in which Quaker State agreed to deliver a quantity of crude oil with a delivered value of $4.8 million, plus any applicable

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1/The PEMEX contract specifies that the Maya crude will have a maximum sulfur content of 3.5 percent and a minimum API gravity of 22 degrees. The Isthmus crude typically has a sulfur content of 1.6 percent and an API gravity of about 32.5 degrees. Chapter 4 of our report, "Strategic Petroleum Reserve: Substantial Progress Made, but Capacity and Oil Quality Concerns Remain" (EMD-82-19, Dec. 31, 1981), discusses the quality of the Mexican crudes in more depth.

interest, to the SPR. (Alternately, Quaker State has the option to pay the money directly to DOE.) Notice of the consent order was published in the "Federal Register," and DOE currently is evaluating the public comments. The consent order will go into effect unless it is modified based on the comments.

Naval Petroleum Reserve oil

During fiscal year 1982, the SPR has received about 400,000 barrels of oil through three separate NPR arrangements. Two of the arrangements were made in 1980, and the deliveries marked the fulfillment of the contracts. The third arrangement was a Memorandum of Understanding with DOE's Office of Naval Petroleum and Oil Shale Reserves, which was entered into pursuant to the authority in section 804 of the Energy Security Act for the SPR to take any or all of the Nation's share of NPR oil production.

The Memorandum of Understanding, which was signed on January 27, 1982, states that the SPR will buy all available Elk Hills NPR oil in excess of contractual and equity requirements between February 1, 1982, and April 4, 1982. The SPR reserved $16.3 million to pay for this oil. Of the 496,000 barrels of excess production during the 2-month period, 148,000 barrels have been delivered to the SPR.

QUALITY OF THE DELIVERED SPR OIL

Table 6 shows SPR oil deliveries according to DOE's oil classification. Of the 264.1 million barrels of oil delivered to the SPR as of June 30, 1982, 95.3 million barrels, or 36 percent, is light, low-sulfur oil and 168.8 million barrels, or 64 percent, is heavier, higher-sulfur oil. ANS, Isthmus/Maya blend, and Maya crude oils, which are heavier than the other crudes in the SPR, total 56.5 million barrels, or 21 percent of the SPR.

STORAGE CAPACITY CONSTRAINTS

As discussed in our December 1981 report, the SPR fill rate during fiscal year 1982 and in future years will be constrained by the rate at which DOE can create additional storage capacity. DOE has filled almost all of its Phase I storage capacity. However, the Department has experienced difficulties in certifying the integrity of 13.1 million barrels of Phase I capacity at the Sulphur Mines site. Phase II capacity is being filled as it becomes available through the leaching program. (See table 7.)

Currently, the Phase II leaching program is about 28 percent complete. At Bryan Mound, the leaching program is meeting or exceeding DOE's schedule, which has allowed DOE to increase the SPR fill goal for fiscal year 1982 by 10 million barrels to 277 million barrels. However, the West Hackberry Phase II leaching program has experienced brine disposal pipeline and electrical

problems, which have prevented DOE from achieving the planned leaching rate.

Sulphur Mines cavern 2-4-5

At the Sulphur Mines site, DOE has experienced difficulties in certifying the integrity of 13.1 million barrels of Phase I capacity referred to as cavern 2-4-5. This cavern actually consists of three separate caverns which had coalesced, or grown together, before it was purchased from Allied Chemical Corporation. (See figure 3.) Initial tests conducted at the time DOE purchased cavern 2-4-5 indicated that it would be suitable for oil storage. However, by August 1981, DOE had become aware of leaks in the cavern. DOE has conducted several tests of cavern 2-4-5, but has been unable to identify the cause of the leaks or to develop a solution that would enable it to certify the cavern for oil storage.

On June 18, 1982, DOE initiated another test, estimated to cost about $350,000, to resolve the problems with cavern 2-4-5. This test will use nitrogen gas to form an inert gas pad around the wells at the top of caverns 2 and 5. DOE will monitor nitrogen gas pressure and the interface between the nitrogen gas and the salt wall to determine the leakage rates and to evaluate storage alternatives. The potential exists that the nitrogen leakage rate could increase once the cavern is pressurized.

The test is planned to be conducted for a period of 90 to 120 days. If excessive nitrogen leakage does not occur, crude oil storage could begin 90 days later, affording a storage capacity of 13.1 million barrels. However, if serious problems occur, alternatives include prolonging the study or limiting the use of the cavern to about 1.5 million barrels of storage which is available in cavern 4.

Certification of cavern 2-4-5 could become even more important to the SPR program if legislation currently before the Congress is enacted. As table 1 shows, under the 200,000-barrels-per-day minimum fill rate requirement, DOE would need an additional 12.5 million barrels of storage capacity in fiscal year 1983. If Sulphur Mines cavern 2-4-5 cannot be certified, DOE could only use 1.5 million barrels of capacity and would have to lease interim storage to achieve the minimum storage requirement.

Phase II leaching program

In our December 1981 report, we stated that DOE was having problems achieving the designed flow rates through the pipeline used to dispose of the brine generated during Phase II leaching at Bryan Mound. Unexplained resistance in the pipeline leading to the Gulf of Mexico was limiting the flow to about 490,000 barrels per day as opposed to a baseline rate of 600,000 barrels per day. In December 1981, the baseline was increased to 900,000

barrels per day; however, DOE did not achieve this level on a monthly basis until February 1982. (See table 8.) This was accomplished by planned improvements to the system supplying fresh water for leaching and to the pumps used on the brine disposal line.

Although the resistance in the Bryan Mound brine disposal pipeline still exists, DOE sustained a brine disposal flow rate of 927,000 barrels per day in June 1982, and the leached cavern capacity at Bryan Mound is slightly ahead of DOE's baseline. However, the status of the system is being monitored, and additional actions may be necessary in the future.

In the December 1981 report, we also stated that the brine disposal rate at the West Hackberry site was below the 1.1-million-barrels-per-day design rate because of problems with the electrical system and with the disposal of undissolved solids in the brine. Although these problems have been resolved, a restriction in the brine disposal system similar to the one at Bryan Mound has developed at West Hackberry. For a 4-month period, from February through May 1982, the average disposal rate was about 750,000 barrels per day--75 percent of the baseline schedule. A DOE subcontractor that tested the system has reported that the design flow rate of the brine disposal line cannot be achieved because of the restriction. In addition, the subcontractor's report stated that corrective actions will also have to be taken to relieve a restriction in the raw water intake pipeline. The report recommends that DOE undertake an operation termed "pigging" in which scrapers are sent through a pipeline to clean it out. In order to accomplish this, the brine disposal system must be shut down while the pipelines are modified to allow for the insertion and removal of the scrapers and during the scraping operation. A Request for Proposals (RFP) was issued for this work on May 20, 1982, and seven bids were received by the June 23, 1982, closing date. However, a contract for this work had not been awarded by the end of the quarter.

During June 1982, a series of problems occurred with the electrical system that supplies the power for the leaching and brine disposal systems at West Hackberry. On June 11, one of the three electrical transformers failed. A DOE electrical engineer told us that the remaining two transformers are capable of supplying enough power to operate the system up to the design rates. (DOE officials estimate that a replacement transformer will be operating by August 1, 1982.) Additional electrical system problems required the shutdown of the leaching system between June 19 and June 30. As a result, the average brine disposal rate at West Hackberry in June was reduced to 264,000 barrels per day.

As of June 30, 1982, the West Hackberry leaching program was slightly behind the baseline schedule. DOE must maintain

the scheduled brine disposal rate because, as a general rule, seven barrels of brine are disposed of for each barrel of new capacity and the new capacity is being filled as it is developed. Therefore, current problems, such as those at West Hackberry, and any future problems that occur must be quickly identified and resolved.

SPR PROGRAM FUNDING

Since the SPR program began in fiscal year 1976, the Congress has appropriated about $12.2 billion. Of this total, $10.4 billion was appropriated for oil acquisition and transportation, $1.7 billion was appropriated for storage facilities development and operations, and $100 million was appropriated for planning and program direction.

Oil acquisition and transportation

Section 167 of the Omnibus Budget Reconciliation Act of 1981 establishes an off-budget "SPR Petroleum Account" for oil acquisition and transporation funds. This means that, beginning in fiscal year 1982, these funds are no longer considered in the Federal budget totals.

Table 9 shows the budgetary history for the SPR oil acquisition and transportation account for fiscal years 1977 through 1981. The 199.3 million barrels of oil delivered to the SPR by the end of fiscal year 1981 cost approximately $5.4 billion. (In addition to $4.9 billion spent for oil before the end of fiscal year 1981, about $500 million was paid from the new SPR Petroleum Account in fiscal year 1982 for oil deliveries made in September 1981.)

Table 9 shows that $1.8 billion in obligated but unexpended balances from previous years appropriations was carried over into fiscal year 1982 and placed into the SPR Petroleum Account. An additional $17 million, which had not been obligated by the end of fiscal year 1981, remains on-budget in accordance with section 167 of the Omnibus Budget Reconciliation Act of 1981.

On December 23, 1981, the Congress enacted the Department of the Interior and Related Agencies Appropriation Act of 1982 (P.L. 97-100), which appropriated approximately $3.7 billion for the SPR Petroleum Account. Table 10 shows the funding, outlays, and commitments for oil acquisition and transportation in fiscal year 1982. Of the $5.5 billion available, an estimated $2.6 billion was spent for oil delivered as of June 30, 1982, and an estimated $600 million has been committed for oil deliveries in the fourth quarter of fiscal year 1982. An additional $2.3 billion is available for oil acquisition.

On May 10, 1982, DOE submitted a request to the Senate and House Committees on Appropriations for approval of a reprogramming of $4.3 million from the $17-million on-budget oil acquisition and transportation funds. The reprogramming, which would be used to settle a claim by Banister Pipelines America (a subcontractor for the SPR program), was approved by the Chairman and ranking minority member of the Subcommittee on Interior and Related Agencies of the House Committee on Appropriations. The Subcommittee on Interior of the Senate Committee on Appropriations has not acted on the reprogramming.

Other SPR program funds

P.L. 97-100 also appropriated $191.4 million for program direction, planning, and storage facilities development and operations. However, on February 5, 1982, DOE announced the deferral of $52.9 million for land acquisition and long-lead equipment procurement for the Phase III Big Hill storage site. The deferral extends the completion date of the 750-million-barrel SPR from 1989 to 1990. Because of the long lead times involved in developing a new underground storage site, the deferral will not affect the planned SPR capacity and resulting fill rates until fiscal year 1987. Then, additions to capacity will drop by 13 million barrels. In fiscal year 1988, the deferral will allow DOE to add only 25 million barrels of new capacity and will result in an average daily fill rate of only 68,000 barrels--32,000 barrels less than the mandatory fill rate of at least 100,000 barrels per day.

The Impoundment Control Act of 1974 (P.L. 93-344) states that a deferral will take effect unless either House of the Congress passes an impoundment resolution expressing its disapproval of the deferral. In June, the Subcommittee on Interior of the House Committee on Appropriations voted to disapprove the deferral. The full Committee has not voted on the deferral.

OTHER ISSUES

During the course of our review, we became aware of two additional issues, both involving DOE's St. James terminal. Our reporting date did not allow sufficient time to develop these issues in depth for this first quarterly report. However, we plan to study these issues and report on them, if warranted, in the next quarterly report.

Future use of the
St. James terminal

DOE built the St. James terminal primarily to receive oil that is sent by pipeline to the Bayou Choctaw and Weeks Island storage sites as part of the Phase I oil fill program. In addition, DOE plans to acquire 10 million barrels of Phase II capacity at Bayou Choctaw, which would receive oil through the

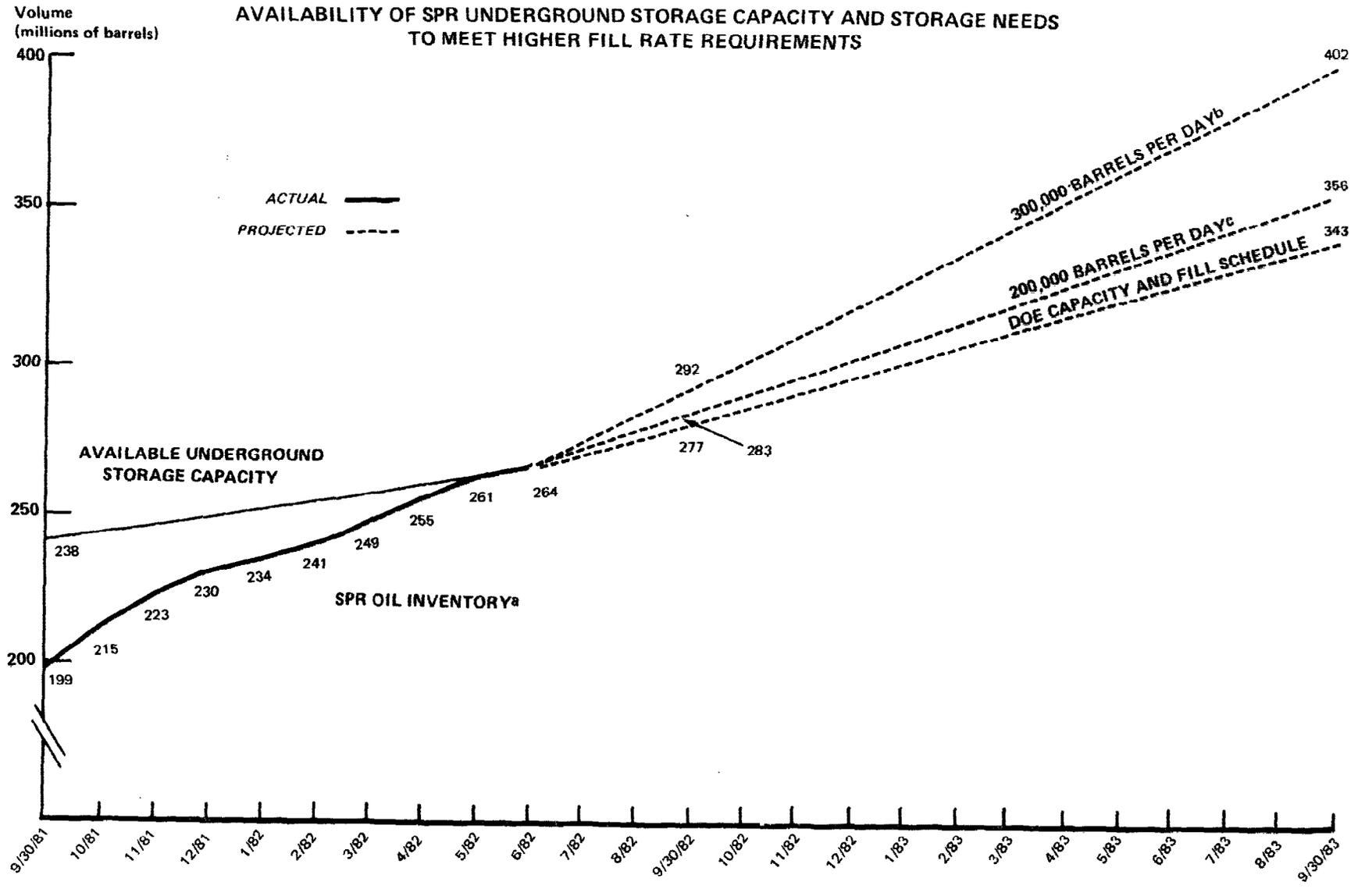
St. James terminal. However, it is unlikely that this capacity will be available before fiscal year 1985. All of the storage capacity at Weeks Island has been filled, and only 700,000 barrels of the Bayou Choctaw Phase I capacity remain to be filled. Current activities at the St. James terminal include completing the fill of the Phase I caverns and the performance of overdue maintenance. In addition, occasional tests of the SPR readiness capability involving oil withdrawals from the two storage sites will be conducted.

The St. James terminal contains dock facilities and about 2 million barrels of storage capacity. Given the limited amount of activity planned for the terminal, we intend to review DOE's assessment of use and cost alternatives for our next quarterly report.

Incorrect measurements of oil deliveries

From September 1980 to November 1981, the mathematical tables used to convert the levels of crude oil in each storage tank at the St. James terminal into an equivalent number of barrels were incorrect. This caused the oil receipts and SPR inventory totals, which are determined by using the tables, to be incorrect. The problem, which essentially resulted from incorrect information about the configuration of the tanks, overstated the receipts and inventory by about 436,000 barrels. DFSC and 14 oil suppliers were involved, and total overpayments were about $15.8 million. (DFSC and one contractor have reimbursed DOE.) Collection of the overpayments is being directed by DFSC, and the overstated SPR inventory was corrected in May 1982. The delivery contractors have been notified of the overpayments and are in varying stages of either making the reimbursements, requesting additional information, or questioning the overpayments. During the next 3 months, we plan to monitor DFSC's efforts to collect the overpayments.

FIGURE 1



[a]THIS REPRESENTS OIL IN UNDERGROUND STORAGE FACILITIES PLUS OIL IN TANKS AND PIPELINES BY MAY 1982, DOE FILLED THE SPR AS OIL CAPACITY BECAME AVAILABLE

[b]MANDATORY FILL RATE OF S. 2332.

[c]MANDATORY FILL RATE OF H.R. 6337

APPENDIX II

Table 1

Alternative SPR Oil Fill Schedules

(millions of barrels)

Fiscal year	DOE expansion plan (note a)	H.R. 6337 fill rate requirement (note b)	Additional storage requirement	S. 2332 fill rate requirement (note c)	Additional storage requirement
1982	277	282.5	5.5	291.7	14.7
1983	343	355.5	12.5	401.2	58.2
1984	417	428.5	11.5	500.0	83.0
1985	456	500.0	44.0	d/518.3	62.3
1986	538				
1987	598				
1988	623				
1989	670				
1990	750				

a/See DOE's May 17, 1982, SPR Quarterly Report (p. 5). Fiscal 1982 capacity was increased from 267 million barrels to 277 million barrels.

b/H.R. 6337 would require an average fill rate of at least 200,000 barrels per day beginning July 1, 1982, and continuing until 500 million barrels of oil are delivered to the SPR. There were 264.1 million barrels of oil in storage as of June 30, 1982.

c/S. 2332 would require an average fill rate of at least 300,000 barrels per day beginning July 1, 1982, and continuing until 500 million barrels of oil are delivered to the SPR.

d/Under the 5-year PEMEX contract, 18.3 million barrels of oil are to be delivered to the SPR in fiscal year 1985. These deliveries would require additional storage capacity over the previous fiscal year.

Source: DOE and GAO calculations based on the fill rate requirements in H.R. 6337 and S. 2332.

APPENDIX II

Table 2

SPR Oil Deliveries

Fiscal year	Mechanism for oil acquisition	Oil delivered during fiscal year (millions of barrels)	Average daily fill rate for fiscal year (note a) (barrels)	Total SPR inventory (millions of barrels)
1977	DFSC Solicitation	1.1	3,000	1.1
1978	DFSC Solicitation	48.0	132,000	49.1
1979	DFSC Solicitation	42.1	115,000	91.2
1980	Competitive Exchange of NPR Oil	1.6	4,000	92.8
1981	Competitive Exchange of NPR Oil	34.9		
	DFSC Open Continuous Solicitation	67.4		
	PEMEX Contract	3.6		
	NPR Oil Delivered by Pacific Refining Company	.6		
	Total for fiscal year 1981	106.5	292,000	199.3
1982	DFSC Open Continuous Solicitation	34.1		
	PEMEX Contract	29.0		
	Chevron Oil Co. Consent Order	1.0		
	DFSC Long-Term Contract with ARCO	.3		
	Competitive Exchange of NPR Oil	.2		
	NPR Memorandum of Understanding	.1		
	NPR Oil Delivered by Pacific Refining Company	.1		
	Total as of June 30, 1982	64.8	237,000	264.1

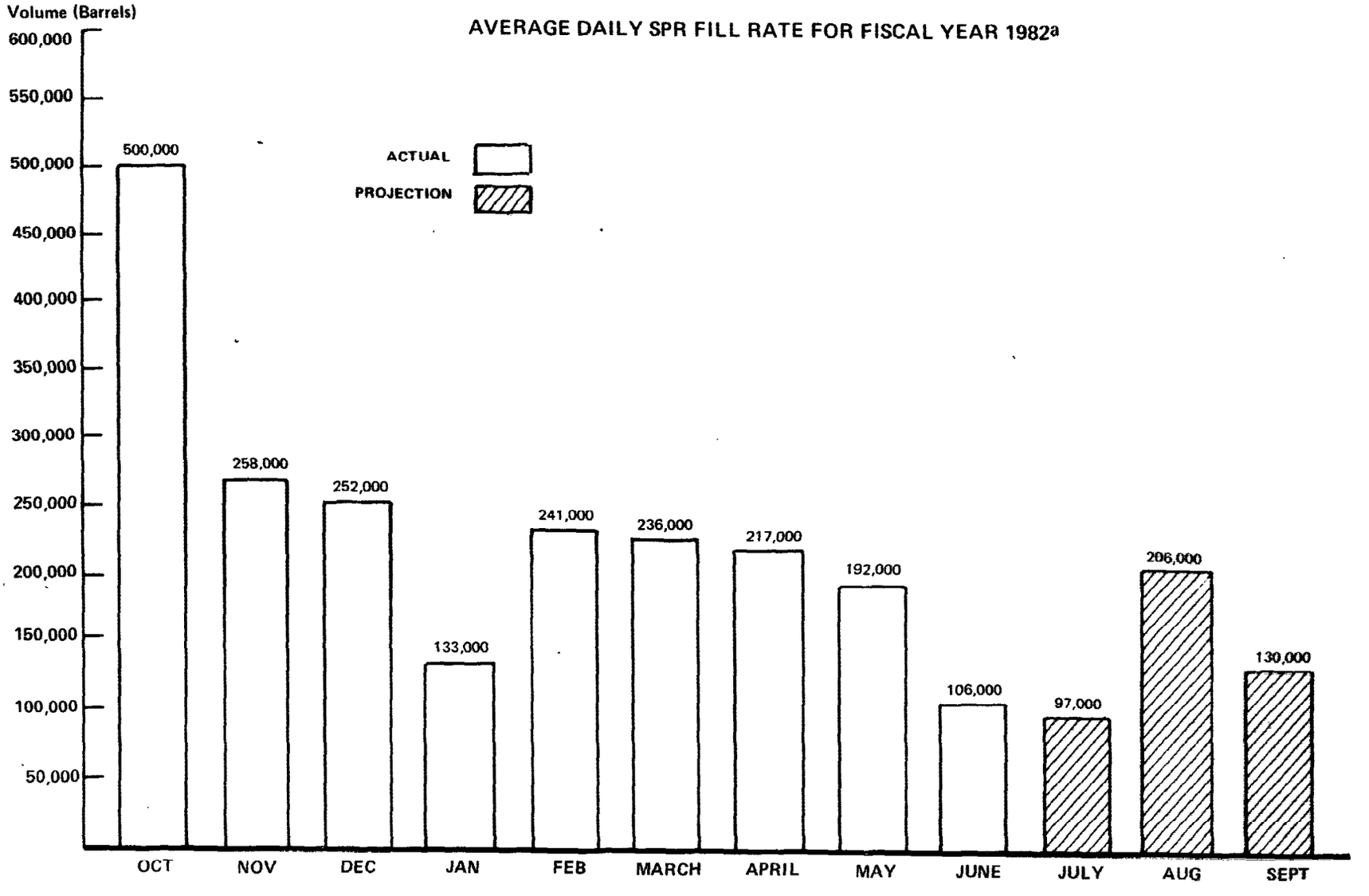
a/On June 30, 1980, the Congress enacted the Energy Security Act, which established a mandatory average fill rate of at least 100,000 barrels per day for each fiscal year beginning with fiscal year 1981.

Source: DOE.

APPENDIX II

FIGURE 2

AVERAGE DAILY SPR FILL RATE FOR FISCAL YEAR 1982[a]



[a]DAILY FILL RATES FOR JULY, AUGUST, AND SEPTEMBER ARE BASED ON DOE PROJECTIONS

APPENDIX II

Table 3

Volume of SPR Oil Stored in Caverns and Other Facilities by Fiscal Year 1982 Quarter

Quarter	Volume of oil at start of quarter	Deliveries	Volume of oil at end of quarter	Average receiving rate For quarter	Average receiving rate Since 10/01/81 (note a)
	(millions of barrels)			(barrels per day)	
10/01/81 through 12/31/81	199.3	31.0	230.3	336,957	336,957
1/01/82 through 3/31/82	230.3	18.2	248.5	202,222	270,330
4/01/82 through 6/30/82	248.5	15.6	264.1	171,429	237,363

a/Title VIII of the Energy Security Act requires a minimum average annual fill rate of 100,000 barrels per day. The Omnibus Budget Reconciliation Act of 1981 states that the President shall seek to fill the SPR at an average annual rate of at least 300,000 barrels per day. DOE resumed oil deliveries to the SPR in September 1980. Since the resumption of oil fill through June 30, 1982, DOE has filled the SPR at an average rate of 268,000 barrels per day.

Source: DOE.

APPENDIX II

Table 4

Summary of SPR Contracting Activities

for Fiscal Year 1982

Activity	Number of contracts	Value of contracts (millions)	Date of contracts	Volume of oil contracted for (millions of barrels)	Oil delivered as of 6/30/82 (millions of barrels)	Remaining deliveries (millions of barrels)
Open Continuous Solicitation	27	$1,286.9	9/01/81 to 6/15/82	38.5	34.1	4.4
PEMEX Contract	1	1,417.7	8/26/81	b/34.1	29.0	5.1
ARCO Long-Term Contract	1	9.9	12/04/81	c/ .3	.3	.0
Other (note a)	4	d/49.3	1980 to 1982	1.8	1.4	.4
Total				74.7	64.8	9.9

a/Includes deliveries as a result of a consent order with Chevron Oil Co., a Memorandum of Understanding for surplus NPR oil, and contracts in previous years with the Pacific Refining Company and as part of the competitive exchange for NPR oil.

b/This represents the volume of oil to be delivered during fiscal year 1982. In addition, 3.6 million barrels of PEMEX contract oil was delivered in September 1981 for a total of 37.7 million barrels since the contract went into effect. The contract provides for total deliveries of 110 million barrels through 1986.

c/On March 25, 1982, the contract was modified to reduce the total volume of oil deliveries from 2.14 million barrels to .3 million barrels.

d/Consists of $33 million of oil required by the Chevron Oil Co. consent order and an estimated $16.3 million for the surplus NPR oil under the Memorandum of Understanding.

Source: DOE and DFSC.

APPENDIX II

APPENDIX II

Table 5

Contracts Awarded for Fiscal Year 1982 Deliveries

Under the Open Continuous Solicitation

Supplier	Number of contracts	Total barrels to be delivered	Percent of oil to be delivered
		(millions)	
Amoco	1	1.95	5
Derby & Co.	13	14.27	37
Exxon International	3	11.77	31
Gatoil	3	3.40	9
Texas Energy Reserve	1	.45	1
Tradax	2	1.25	3
T. W. Oil	2	3.90	10
U.S. and S.A. Enterprises	2	1.53	4
Total	27	38.52	100

Contract date	Supplier	Total barrels to be delivered (note a)	Type of oil (note b)	Delivery dates First	Delivery dates Last
		(millions)			
9/01/81	Exxon International	6.00	I	10/81	10/81
9/01/81	Derby & Co., Inc.	1.55	I	10/81	10/81
		.45	III	10/81	10/81
9/15/81	Derby & Co., Inc.	.90	I	10/81	10/81
9/15/81	Derby & Co., Inc.	.05	I	10/81	10/81
9/28/81	Exxon International	3.27	I	10/81	10/81
10/13/81	Derby & Co., Inc.	.38	I	11/81	11/81
11/25/81	U.S. and S.A. Enterprises, Inc.	.63	VI	11/81	12/82
11/25/81	Derby & Co., Inc.	.50	I	12/81	1/82
		1.44	III	12/81	12/82
12/08/81	Derby & Co., Inc.	.95	I	1/82	1/82
		1.05	VI	12/81	2/82
12/11/81	Derby & Co., Inc.	.10	III	12/81	12/81
12/22/81	Derby & Co., Inc.	1.10	I	1/82	1/82
12/22/81	Gatoil International, Inc.	.80	I	1/82	1/82
12/22/81	Tradax Petroleum Ltd.	.60	VI	1/82	2/82
12/22/81	T. W. Oil (Houston)	.90	I	1/82	2/82

Table 5 (cont.)

Contract date	Supplier	Total barrels to be delivered (note a)	Type of oil (note b)	Delivery dates	
				First	Last
		(millions)			
1/06/82	Gatoil International, Inc.	.80	I	2/82	2/82
1/06/82	T. W. Oil	3.00	I	2/82	2/82
1/06/82	Derby & Co., Inc.	1.63	I	2/82	2/82
1/07/82	Derby & Co., Inc.	.73	I	2/82	2/82
1/20/82	U.S. and S.A. Enterprises, Inc.	.90	VI	2/82	3/82
1/20/82	Tradax Petroleum Ltd.	.65	VI	2/82	3/82
1/20/82	Derby & Co., Inc.	1.20	I	2/82	3/82
1/20/82	Texas Energy Reserve	.45	I	1/82	1/82
4/22/82	Exxon International	1.00	I	5/82	5/82
		1.50	I	5/82	5/82
4/22/82	Gatoil International, Inc.	1.80	I	6/82	7/82
4/22/82	Amoco Oil Co.	1.50	I	5/82	6/82
		.45	I	5/82	5/82
4/18/82	Derby & Co., Inc.	.96	I	6/82	8/82
		.38	III	6/82	8/82
6/15/82	Derby & Co., Inc.	.90	I	6/82	8/82

a/Rounded to the nearest ten thousand.

b/Types I and VI are sour crudes, defined as having between 0.5 percent and 1.99 percent sulfur content. Types II, III, IV, and V are sweet crudes, defined as having less than 0.5 percent sulfur content.

Source: DFSC.

Table 6

Volume and Percentage of the Different Types of Crudes Delivered to the SPR as of June 30, 1982

	Type I (note a)	Types II-V (note b)	Type VI (note c)	Type VIa (note d)	Maya (note e)	Total
Volume of oil delivered to the SPR (millions of barrels)	112.3	95.3	31.4	16.6	8.5	264.1
Percentage of total oil delivered to the SPR	43%	36%	12%	6%	3%	100%

a/High-sulfur crudes (maximum 1.99 percent sulfur content) with an API gravity range of 30 to 36 degrees. Type I oil includes Arabian light and Isthmus crudes.

b/High-quality crudes with a light, low-sulfur content (maximum .5 percent sulfur content) and, with 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 low quality oil, which has a maximum sulfur content of 3.5 percent and an API gravity of at least 22 degrees.

Source: DOE.

APPENDIX II

APPENDIX II

Table 7

Status of SPR Underground Storage Capacity and Fill Activities as of June 30, 1982

(millions of barrels)

Phase I sites	Actual capacity	Capacity certified for use (note a)	Capacity filled
Weeks Island	72.6	72.6	72.6
Bayou Choctaw	44.3	44.3	43.6
Sulphur Mines	26.2	b/13.1	12.4
West Hackberry	48.9	48.9	47.6
Bryan Mound	64.5	64.5	64.4
Subtotal	256.5	243.4	240.6

Phase II sites	Planned capacity	Gross capacity leached	Capacity available for oil fill (note c)
Bayou Choctaw	10	d/0	0
West Hackberry	160	25.5	.6
Bryan Mound	120	55.3	19.8
Subtotal	290	e/80.8	e/20.4
Total for SPR	546.5	324.2	f/261.0

a/Storage facilities certified ready to receive oil.

b/DOE has been unable to certify the remaining 13.1 million barrels of capacity because of pressure losses which may be caused by leaks. DOE is currently conducting cavern tests and expects to have the results in December 1982.

c/The volume of oil in underground storage is the same as capacity available for oil fill.

d/A newly leached 5-million-barrel cavern will be exchanged for an existing 10-million-barrel cavern owned by Allied Chemical Corporation at the Bayou Choctaw site once leaching is completed, which is unlikely to be completed by the end of fiscal year 1984.

e/DOE can inject oil into caverns while leaching continues. In the early stages of cavern leaching, only a small percentage of the leached gross cavern capacity can be filled. In later stages, a much higher percentage of the leached gross cavern capacity can be filled.

f/An additional 3.1 million barrels of oil is in pipelines and surge storage tanks. This brings the total oil in the SPR system to 264.1 million barrels.

Source: DOE.

APPENDIX II

FIGURE 3

SULPHUR MINES CAVERN 2-4-5

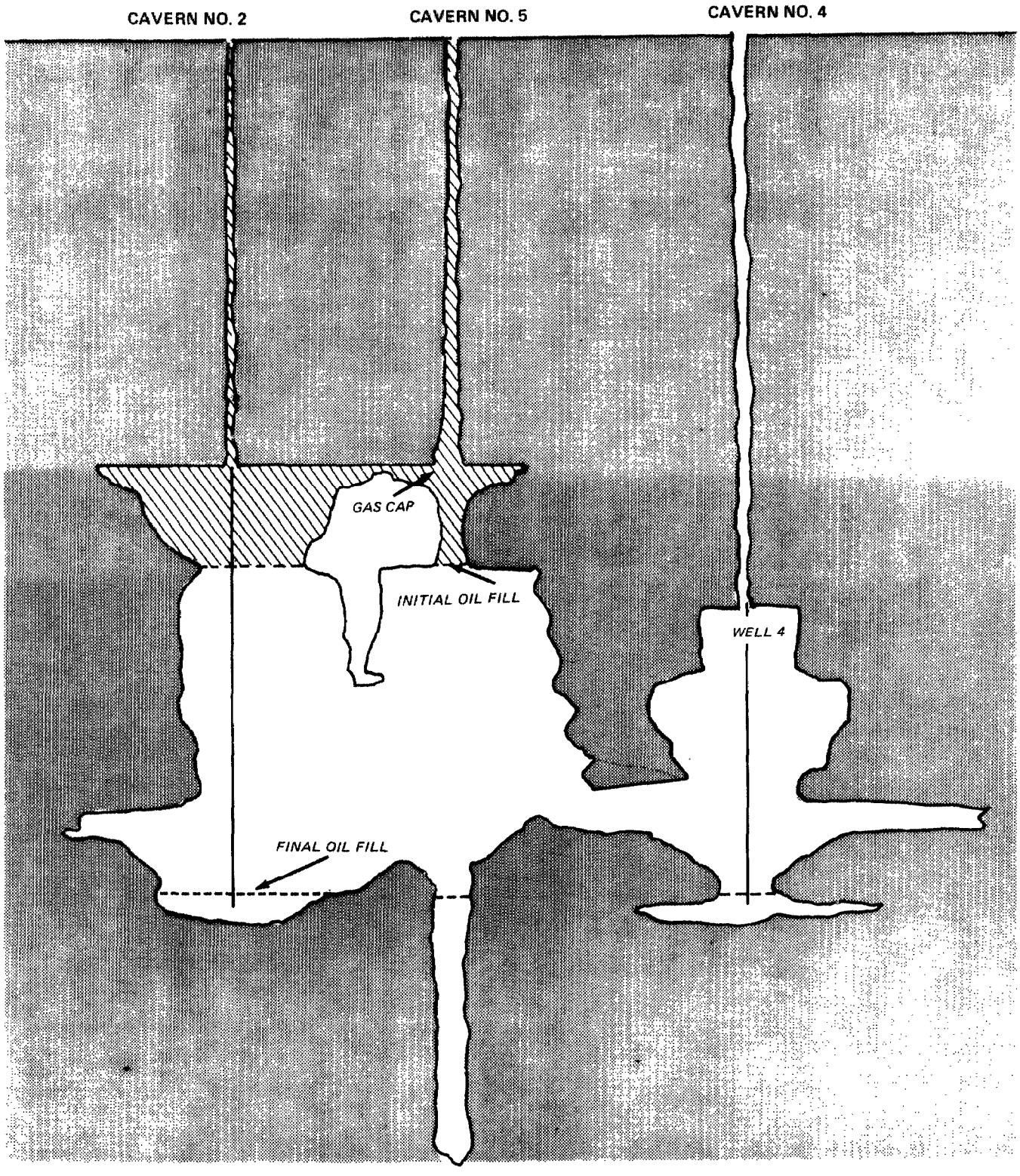


Table 8

Phase II Average Leaching Rates for Fiscal Year 1982

(thousands of barrels per day)

	October	November	December	January	February	March	April	May	June
Bryan Mound									
Baseline	600	600	900	900	900	900	900	900	900
Actual	487	480	583	719	903	924	894	955	927
West Hackberry									
Baseline	600	600	600	600	600	1,000	1,000	1,000	1,000
Actual	a/317	533	520	b/281	750	780	751	749	c/264

a/The leaching program experienced general maintenance problems associated with start-up activities, including problems with pump bearings, seal leaks, and motors.

b/Cavern leaching was stopped for several days as part of routine maintenance to reposition pipes and to clear brine disposal lines.

c/During June, leaching was stopped for 11 days at West Hackberry because of modifications being made to the electrical system.

Source: DOE.

APPENDIX II

Table 9

DOE Funds for SPR Oil Acquisition and Transportation for Fiscal Years 1977 through 1981

(in millions of dollars)

Appropriations Act	Appropriations - Availability	Entitlements	Rescissions	Reprogrammings (note a)	Outlaid funds	Funds available for FY 1982 outlays (note b)
P.L. 94-373 (for FY 1977)	440.0 - until expended				440.0	0
P.L. 95-74 and P.L. 95-247 (for FY 1978)	2,703.5 - until Dec. 31, 1978				c/2,700.9	2.0
P.L. 95-465 (for FY 1979) and P.L. 96-304 (for FY 1980)	2,885.7 - until Dec. 31, 1980		- 2,000	- 529.2 - 20.4 - 1.9	283.8	50.4
P.L. 96-294 Section 805(a)		542.1			508.3	33.8
P.L. 96-369 and P.L. 97-12 (for FY 1981)	2,688.0 - until expended			- 25.3	926.4	d/1,719.3
Total	8,717.2	542.1	- 2,000	- 576.8	4,859.4	1,805.5

a/The reprogrammings were as follows: in 1979, $529.2 million was shifted to SPR storage facilities development and operations; in 1980, $12 million was shifted to SPR planning and $10.3 million was shifted to SPR program direction; in 1981, $25.3 million was reprogrammed for land condemnation awards at Bryan Mound and West Hackberry.

b/These funds were transferred to the off-budget SPR Petroleum Account on October 1, 1981. The total includes $409 million and $103 million that was outlaid in November 1981 for oil that was delivered to the SPR in September 1981 for DFSC and PEMEX contracts, respectively.

c/In 1979, DOE returned $589,000 of lapsed fiscal year 1978 oil acquisition funds to the Treasury.

d/An additional $17 million in unobligated oil acquisition funds was not transferred to the off-budget SPR Petroleum Account, in accordance with section 167 of the Omnibus Budget Reconciliation Act of 1981.

Source: DOE.

APPENDIX II

Table 10

Outlays, Commitments, and Funds Available for Petroleum Acquisition and Transportation as of June 30, 1982

(millions of dollars)

	Funds available from previous fiscal years	Fiscal year 1982 appropriations	Estimated fiscal year 1982 outlays (note a)	Estimated additional fiscal year 1982 commitments	Estimated funds available
Obligated to DFSC (note b)	1,373	1,639	1,542	205	1,265
Obligated to PEMEX contract and for other outlays (note c)	433	1,026	1,024	435	0
Unobligated funds with DOE	d/	1,019	-	-	1,019
Total	1,806	3,684	2,566	640	2,284

a/Actual outlays through May 31, 1982, are available through DOE. Outlays for June deliveries are estimated.

b/Includes PEMEX contract transportation costs and DFSC administrative costs.

c/Includes funds for customs and terminalling costs and for the direct purchase of Naval Petroleum Reserve oil.

d/Seventeen million dollars of unobligated funds remain on-budget.

Source: DOE and DFSC.

APPENDIX II

APPENDIX III

United States Senate
COMMITTEE ON
ENERGY AND NATURAL RESOURCES
WASHINGTON, D.C. 20510

March 25, 1982

The Honorable Charles A. Bowsher
Comptroller General of the United States
General Accounting Office
441 G Street, N.W.
Washington, D.C. 20548

Dear Mr. Bowsher:

The Congress attaches a high priority to the rapid fill of crude oil into the Strategic Petroleum Reserve (SPR). The SPR is an essential element of this Nation's efforts to provide protection against the potential consequences of an international oil supply interruption.

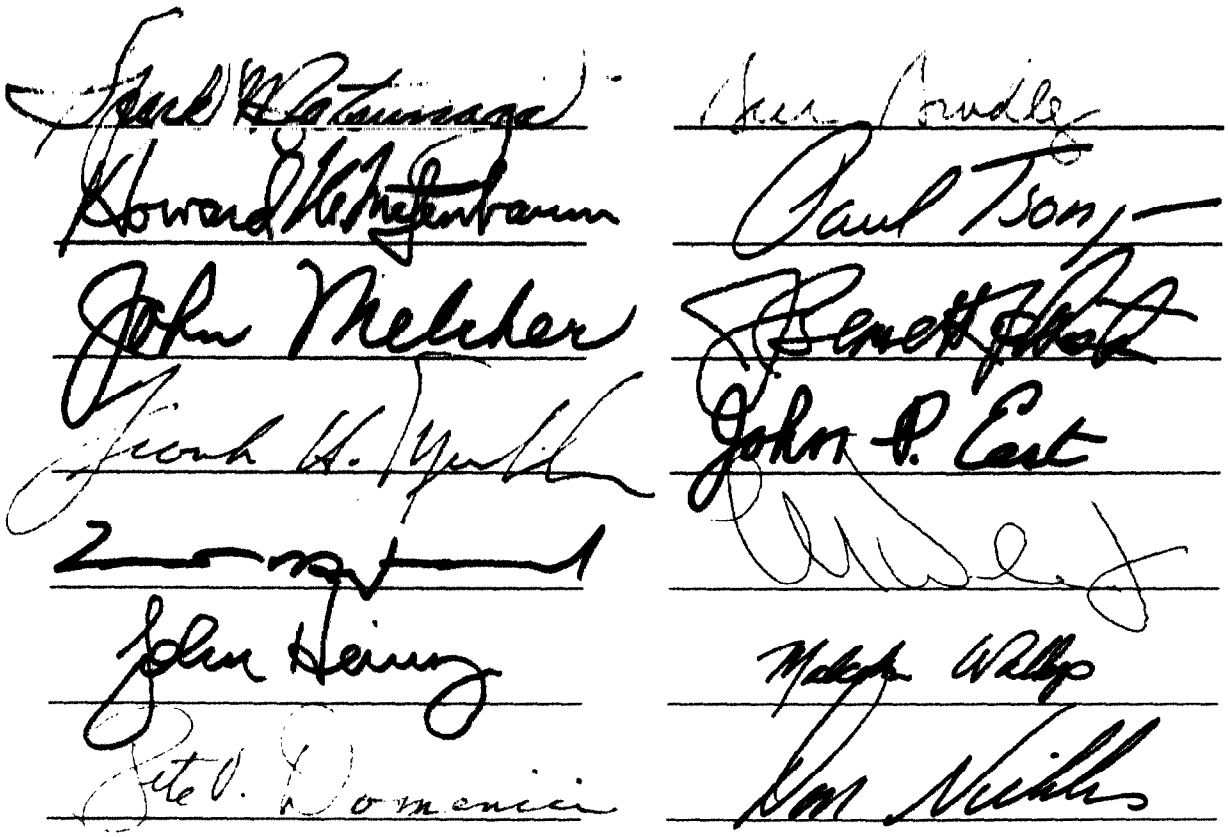
Pursuant to a letter dated July 23, 1980, the GAO issued eleven reports reviewing the Administration's progress and activities in filling the SPR. These reports have proven to be most informative and have provided Congress with information needed for policy formulation.

Accordingly, we are requesting that the GAO further assist Congress by monitoring the SPR program activities and reporting by letter to the Committee on a quarterly basis as to the Administration's progress in filling the SPR and in complying with the requirements of applicable law. These reports should begin in the next calendar quarter and continue through the end of fiscal 1985.

Please let us know if the Senate Committee on Energy and Natural Resources can be of any assistance in carrying out this request.

Henry M Jackson
James A. McClure
Dale Bumpers
John W. Warner
Wendell H. Ford
Gordon Humphrey

APPENDIX III



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