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

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**January 1989**

# **OIL RESERVE**

## **Status of Strategic Petroleum Reserve Activities as of September 30, 1988**



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Resources, Community, and  
Economic Development Division

B-208196

January 25, 1989

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

Dear Mr. Chairman:

Pursuant to your December 9, 1985, request and subsequent discussions with your office, we are reporting on the Department of Energy's (DOE) progress in developing, operating, and filling the Strategic Petroleum Reserve (SPR) and in complying with the requirements of applicable law. These reports are now made semiannually.

This fact sheet covers DOE's progress in developing, operating, and filling the SPR during the second half of fiscal year 1988. These events and activities are highlighted below. Details are provided in sections 1 and 2 of the fact sheet.

- As of September 30, 1988, the SPR inventory totaled 554.7 million barrels of oil. During the past 6 months, DOE added 9.7 million barrels of crude oil to the SPR at an average fill rate of about 53,100 barrels per day. During fiscal year 1988, a total of 20.8 million barrels was added.
- During the past 6 months, DOE disbursed \$130 million for oil acquisition and transportation. For all of fiscal year 1988, payments were \$338 million. All oil purchases were from PEMEX--the Mexican National Oil Company.
- Public Law 100-446 (Sept. 27, 1988) appropriated \$173 million for fiscal year 1989 for development, operation, and management of the SPR and \$242 million for oil acquisition and transportation to permit an average fill rate of approximately 50,000 barrels per day. The appropriation language for the SPR Petroleum Account also provides an additional \$92 million to be made available on October 1, 1989. This provision is intended to permit orders of oil to be delivered in the first quarter of fiscal year 1990.

- With regard to continuing instrumentation and control system problems, DOE has appointed a Management Oversight Committee and asked the Sandia National Laboratories to review and assess hardware and software at SPR sites.
- The Military Sealift Command has determined that past overcharges on demurrage payments for oil delivered to the SPR, which were described in our previous report as an unresolved matter, represent improper payments. Military Sealift Command calculates that demurrage claims total \$189,893 and is taking steps to recover this sum from shipowners.

SCOPE AND METHODOLOGY

By agreement, we limited our review to providing primarily statistical information and highlights of major activities that occurred during the period April 1, 1988, to September 30, 1988. To obtain this information, we reviewed DOE and contractor program documents, publications, and studies, and interviewed DOE managers and operations personnel responsible for planning and managing activities associated with developing and operating the SPR facilities. We did not verify the volume or quality of oil that DOE received or the available capacity of SPR storage facilities. We discussed the information provided in this fact sheet with DOE program officials, who verified its factual accuracy. Their comments have been incorporated as appropriate.

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As arranged with your office, unless you publicly announce its contents earlier, we plan no further distribution of this fact sheet until 7 days after the date of this letter. At that time, we will provide copies to the Secretary of Energy and other interested parties and make copies available to others upon request. Major contributors to this fact sheet are listed in appendix I.

Sincerely yours,



Keith O. Fultz  
Senior Associate Director

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## ABBREVIATIONS

DOE	Department of Energy
FY	fiscal year
GAO	General Accounting Office
I&C	Instrumentation and Control
MSC	Military Sealift Command
PEMEX	Petroleos Mexicanos
RCED	Resources, Community, and Economic Development Division
SPR	Strategic Petroleum Reserve
WHA	Walk, Haydel, and Associates, Inc.

## SECTION 1

### STATUS OF STRATEGIC PETROLEUM RESERVE ACTIVITIES AS OF SEPTEMBER 30, 1988

The Energy Policy and Conservation Act (P.L. 94-163, Dec. 22, 1975), as amended, authorized the creation of the Strategic Petroleum Reserve (SPR) to store up to 1 billion barrels of crude oil for use if an oil supply disruption occurred. To meet the act's goals, the Department of Energy (DOE) established a three-phase plan to develop capacity to store 750 million barrels of oil. The schedule for completing this capacity depends upon budgetary decisions now before the Congress and the administration. However, under proposed budget requests, DOE expects to have all storage capacity developed and available for oil fill by 1992.

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

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

- Seaway complex: The Bryan Mound storage site is connected to the Phillips Petroleum Company's terminal in Freeport, Texas, and to the ARCO terminal in Texas City, Texas.
- Texoma complex: The West Hackberry and Sulphur Mines storage sites are connected to Sun Oil Company's terminal in Nederland, Texas. The Big Hill storage site was connected to the Sun Oil terminal when the oil pipeline tie-in was put in service on September 20, 1988.
- Capline complex: The Weeks Island and Bayou Choctaw storage sites are connected to DOE's St. James marine terminal.

The SPR Program Office in Washington, D.C., is responsible for overall program management and planning activities for achieving the goals and objectives of the SPR program. Responsibility for SPR project management and implementation activities is assigned to the Oak Ridge Operations Office in Oak Ridge, Tennessee. These

activities, as delegated by the Operations Office, are carried out through the Project Management Office in New Orleans, Louisiana. Under a 5-year management, operation, and maintenance contract, Boeing Petroleum Services, Inc., provides the necessary qualified personnel and services to run the government-owned SPR facilities. DOE retains responsibility for overall project management and technical direction, while Boeing is responsible for the SPR's day-to-day management.

This fact sheet discusses activities affecting the SPR that occurred during the 6-month period ending September 30, 1988. It includes (1) oil-fill activities, (2) the status of the SPR Petroleum Account, (3) congressional action on the SPR's fiscal year 1989 budget, (4) storage site development activities, (5) oil distribution improvements and enhancements, (6) Coggins instrumentation and control contract work, (7) other SPR contract negotiations, (8) drawdown evaluation and exercise plans, and (9) progress towards settling demurrage overcharge issues.

#### SPR OIL-FILL ACTIVITIES

DOE reported that 9.7 million barrels of crude oil were added to the SPR inventory during the 6 months ending September 30, 1988, increasing it to 554.7 million barrels. During fiscal year 1988, a total of 20.8 million barrels was added. The crude oil received during this period was purchased from Petroleos Mexicanos, the Mexican national oil company (PEMEX).<sup>1</sup>

These crude oil purchases were under an agreement (PEMEX IV) executed in November 1987 for a 2-year period that runs through November 1989. The price is determined cargo by cargo on the basis of a formula, which is standard for all U.S. imports of Mexican crude. DOE plans to continue purchases under this contract for fiscal year 1989. No other sources of oil procurement are anticipated in fiscal year 1989.

The average fill rate for the period was about 53,100 barrels per day. (See sec. 2, fig. 2.1 for further information on SPR oil acquisition and fill activities.) Of the 554.7 million barrels of oil in storage, about 35 percent is sweet (low sulfur) crude, about 55 percent is sour (high sulfur) crude, and about 10 percent is a combination of lower quality (sulphur and gravity) crude oils.

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<sup>1</sup>As the result of a claim against a prior supplier, 6,451 barrels of oil were received. See Oil Reserve: Status of Strategic Petroleum Reserve Activities as of June 30, 1987 (GAO/RCED-87-194FS, Aug. 26, 1987).

## STATUS OF SPR PETROLEUM ACCOUNT

According to DOE, its SPR Petroleum Account (oil acquisition and transportation) provides funds for (1) SPR oil procurement; (2) associated transportation costs, such as pipeline, tanker, and marine terminal activities; (3) U.S. Customs duties; (4) Superfund taxes; and (5) miscellaneous costs, such as administrative expenses associated with acquiring and transporting the oil. The Omnibus Budget Reconciliation Act of 1981 (P.L. 97-35, Aug. 13, 1981) provides that if an SPR oil drawdown occurred, this account would also fund the federal cost of withdrawing the oil from the storage caverns and transporting it to the point where private purchasers would take title. Receipts from the sale of oil would go into this account.

During the past 6 months, DOE payments for oil acquisition and transportation were \$130 million. For all of fiscal year 1988, payments were \$338 million. This figure includes \$96 million of fiscal year 1987 obligations. The SPR Program Office estimated that as of September 30, 1988, DOE had unpaid obligations of about \$197 million. This amount includes about \$162 million of funds that DOE obligated in fiscal year 1988 to pay for oil deliveries to be made during fiscal year 1989.

The SPR petroleum account contained \$439 million for use in fiscal year 1988. At the end of that fiscal year, no unobligated funds remained.

## CONGRESSIONAL ACTION ON THE SPR'S FISCAL YEAR 1989 BUDGET

The President's fiscal year 1989 budget proposal requested \$173 million for the development, operation, and management of the SPR and \$334 million to fill the SPR at an average rate of 50,000 barrels per day in fiscal year 1989 and to order oil for delivery to the SPR during the first 3 months of fiscal year 1990 at the same rate.

Public Law 100-446 (Sept. 27, 1988) appropriated \$173 million in fiscal year 1989 for development, operation, and management and \$242 million for oil acquisition to permit an average fill rate of

approximately 50,000 barrels per day.<sup>2</sup> The appropriations language for the SPR Petroleum Account included a provision to make an additional \$92 million available on October 1, 1989. The intention of this provision is to permit placing orders during fiscal year 1989 for oil to be delivered in the first quarter of fiscal year 1990.

#### SPR SITE DEVELOPMENT ACTIVITIES

##### Sulphur Mines

One Sulphur Mines cavern (2-4-5) has a nitrogen blanket to prevent crude oil leakage or loss. Gases absorbed into the oil from this nitrogen blanket may damage equipment used to move and measure the crude oil. This situation might prevent the oil in cavern (2-4-5) from being separately drawn down to tanks at atmospheric conditions. This problem can be avoided by either removing the gas with a separator or reducing the concentration of gases by mixing with oil from other caverns that contain less gas. Under normal drawdown, oil from cavern (2-4-5) would be mixed with oil from other caverns.

As a result of a test conducted in April 1988, Boeing recommended against an oil/gas separator for the site because of its cost (estimated at \$500,000), the need to modify the environmental permit under which the facility is operating, and because a suitable alternative procedure is available. Mixing oil with oil from cavern (2-4-5) with oil from other caverns or other sites would allow oil from the Sulphur Mines site to be drawdown at the rate of 100,000 barrels per day with no gas related problems.

DOE plans to decommission (close or sell) the Sulphur Mines facility, according to a July 25, 1988, press notice. Several factors were cited for this decision.

- Per-barrel operational cost of this oil storage site is 50 to 100 percent greater than any other site.
- The site may be limited to one drawdown; other sites are capable of five drawdowns.

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<sup>2</sup>The Energy Policy and Conservation Act (P.L. 94-163), as amended by the Omnibus Budget Reconciliation Act of 1986 (P.L. 99-509), links the sale of oil from the Naval Petroleum Reserve in Elk Hills, California, to filling the SPR at an annual average rate of 75,000 barrels a day until at least 750 million barrels are in storage. However, the fiscal year 1988 appropriations language for the SPR petroleum account waived this linkage for fiscal year 1988, and the waiver has been extended through fiscal year 1989 in P.L. 100-446 appropriations language.

-- Decommissioning, which would cost an estimated \$6 million, according to DOE, would save about \$83 million over 20 years (the designed life of the SPR project); the cost of decommissioning would be recovered in about 2 years.

If the Sulphur Mines site is decommissioned, DOE would transfer the crude oil (26 million barrels) to Big Hill near Beaumont, Texas, and market the site as a commercial operating facility. Decommissioning is scheduled to be completed in September 1992.

#### Bayou Choctaw

The leaching of cavern 101, which began on July 31, 1987, is ahead of schedule. This cavern is scheduled for completion in April 1990.

Our previous report noted that the instrumentation and control (I&C) work by Coggins Systems, Inc., was scheduled to be completed by September 13, 1988. DOE executed a contract modification on September 2, 1988, and added \$90,547 and 60 days to Coggins' Bayou Choctaw contract. The contract completion date now is November 15, 1988.

Several previous reports have discussed the results of tests of the crude oil pipeline between the site and the St. James terminal. These tests, carried out by electronic instrumented tools ("smart pigs") in 1983 and rechecked in 1986, identified several anomalies possibly resulting from corrosion. In August 1988, Boeing selected one anomaly, excavated it, and removed and analyzed a sample of the pipewall. According to a Boeing pipeline engineer, this investigation confirmed that the smart pig had described almost exactly the condition of the pipeline. Another smart pig run through this pipeline, completed September 21, 1988, preliminarily confirmed results obtained previously. Boeing has no plans for changes in the pipeline's functions because in its present condition the pipeline can perform its drawdown mission.

#### Weeks Island

The presence of water in the Weeks Island mine remains an item under continuing investigation by DOE. As we stated in our previous report, Boeing continues to investigate and monitor water level changes. In February 1988, water was moving into the mine's fill hole sump at about 114 gallons per hour. That rate has fallen to under 55 gallons per hour and continues to decrease. According to a Boeing cavern engineer, isotope analyses show no change in the composition (component properties) of the mine water, a good indication that there is no external source for this water and that the water is merely seeking its lowest level. Possible water entry points, such as fill and vent holes, are checked regularly. The quantity of water remaining in the mine that could migrate to the

sump is not known, but estimates range from 15,000 to over 100,000 barrels.

Boeing plans to continue monitoring the water level in the sump daily through the end of 1988 and to pump out accumulated water in January 1989. If the water inflow rate into the sump continues to abate, Boeing plans to revise the monitoring schedule to a weekly basis.

A risk abatement program is underway that includes (1) installing an air dryer system for the unfilled portion of the mine to reduce condensation, (2) constructing two bulkheads to isolate parts of an old adjacent mine most vulnerable to external leaks, and (3) improving five existing bulkheads. DOE is considering a backup/emergency oil withdrawal system in case, as a result of uncontrolled water entry, the manifold room (location of instrumentation and connection between site pumps and piping) becomes inaccessible.

Next quarter, Boeing plans to examine one area of the Weeks Island/St. James terminal crude oil pipeline for possible severe corrosion identified by a smart pig survey in November 1987.

#### West Hackberry

During the past 6 months, West Hackberry received about 500,000 barrels of crude oil. The site leaching program finished on schedule in September 1988, creating a total crude oil storage capacity of 219 million barrels. As of September 30, 1988, 14 site caverns were full and contained 143.7 million barrels. This left 7 caverns (currently containing 44.3 million barrels) in which filling was incomplete. One cavern is out of service as indicated below.

Boeing is investigating a possible leak in cavern 111. In April 1988, Boeing received indications that this cavern, then in the leaching stage, might have a leak. Since then, the oil (697,528 barrels) has been removed. A nitrogen test of the cavern's well, completed in June 1988, demonstrated no significant well leaks, and a hydrostatic test of the cavern, completed in August 1988, showed no significant leaks. Another leak test is planned. For this test, Boeing will inject about 900,000 barrels of crude oil and, until the end of the year, will track the interface movement between the brine and oil in the cavern. These leak tests should indicate the presence of either general cavern leaks to an external outlet or an internal anomaly.

DOE has decided not to leach cavern 111 any further even though the storage capacity is 640,000 barrels short of design. Assuming no cavern leaks, the cavern 111 storage capacity now developed will be used. DOE has replaced the 640,000 barrel

shortfall by leaching additional capacity in caverns 108 (320,000 barrels) and 115 (320,000 barrels).

According to a Boeing pipeline engineer, Boeing plans to run a smart pig survey of the West Hackberry raw water line in December 1988. Two attempts were made in October 1987 and July 1988, but were not successful because of smart pig malfunctions.

According to DOE, the West Hackberry brine disposal pipeline to the Gulf of Mexico has deteriorated to the extent that its suitability for refill is questionable. Our last report discussed preliminary results of a February 1988 survey of the brine line. The final report of the survey contractor, Pipetronix, confirms that the 36-inch brine line is heavily afflicted by internal channel corrosion at the bottom of the pipeline. DOE has considered several alternatives to deal with this situation. These include

- replacing the entire 36-inch line with a 24-inch line (the most expensive option),
- replacing thin sections of the 36-inch line with 24-inch pipe,
- installing a 30-inch diameter liner inside the thin 36-inch sections,
- replacing thin sections with steel pipe of the same size and grade, and
- delaying repair indefinitely (the least expensive option).

DOE has decided to schedule the brine line repair for fiscal year 1991. The four repair options listed above are under study.

#### Bryan Mound

During this reporting period, about 9.3 million barrels of crude oil were delivered to the Atlantic Richfield Company and Seaway terminals for the Bryan Mound site. This oil was injected into Cavern 5.

Our previous reports discussed an apparent shortfall in the amount of oil that DOE reported to have been stored in this cavern. When the cavern was emptied of sweet crude oil so as to refill it with sour crude, 467,514 fewer barrels of oil were removed than site records indicated should have been in the cavern. According to DOE, this difference was not an oil loss. The SPR Crude Oil Accountability Review Board in June 1988 considered and discounted several possible reasons for the discrepancy, including theft, oil traps, cavern or well integrity, and dissolution of oil in brine. The Board concluded that the oil had actually been placed in

Caverns 1 and 4 because, during initial fill of these Phase I caverns, Cavern 5 was filled simultaneously at times with Caverns 1 and 4, and meter inaccuracies and errors in engineering estimates and prorations led to improper allocation of the oil for record purposes. The Board approved adjustment of these records, transferring 147,267 barrels to Cavern 1 and 320,247 barrels to Cavern 4.

Several Bryan Mound pipelines were inspected this period. The 30-inch crude oil pipeline was surveyed by a smart pig in June 1988. Two of the anomalies that had been identified in prior surveys showed up stronger than before, and Boeing is planning to excavate and examine these two in 1989. A DOE engineer said the pipeline can meet its mission. The 36-inch brineline was inspected in August 1988 by a diver, who inspected 1,000 feet of the pipeline from the upper end on-site and found minor corrosion. Boeing expects a report from the diver before the end of 1988. On the basis of the diver's preliminary data, Boeing rates this brine pipeline as safe for operations. A diver inspected 1,720 feet (about 40 percent) of the raw water line in February 1988 using ultrasonic testing methods to determine remaining wall thickness. This thickness was found to be sufficient to support operating pressure requirements and allowance for corrosion. This inspection confirmed that the pipeline has integrity for drawdown. One girth weld on this pipeline near the site pumps was not in good condition, and DOE plans to repair it during the site shutdown scheduled for June 1989.

DOE plans to increase the drawdown rate of the Bryan Mound site from 1.1 million to 1.25 million barrels per day. This addition will raise distribution capability from the Seaway complex. Boeing completed the conceptual design report for this project in March 1988. The project will require modifications of the raw water and crude oil systems.

The raw water system will be modified by (1) installing larger impellers on the raw water intake pumps and (2) installing a new 36-inch raw water pipeline to operate in parallel with the existing pipeline, and (3) installing one additional raw water booster pump and one injection pump.

The crude oil system will be modified by (1) installing one additional meter so the crude oil metering system can accurately account for the increased flow rate and (2) installing a crude oil transfer pump station consisting of four active pumps and one spare. This station is required to pump oil from the site storage tanks and the caverns in order to fill two ships at the Phillips dock and maintain flow to the ARCO Terminal. The crude oil system will also be modified by modifying the on-site crude oil piping to allow simultaneous drawdown of sweet and sour crude oil. The estimated cost for this project is \$11.7 million. This project is

currently in the design stage. DOE plans to begin construction in January 1989, with completion scheduled for fiscal year 1990.

### Big Hill

As we reported previously, cavern leaching began at Big Hill as scheduled on October 1, 1987, with 10 caverns in leaching status by the end of October 1987. The site's remaining four caverns (111-114) came on line for leaching in June 1988, 3 months behind schedule. A gross volume capacity equivalent to about 30 million barrels has been created, but this process has not yet created permanent storage capacity.

The Big Hill pipeline tie-in and crossover pipeline at the Sun Terminal have been completed, thus connecting the Big Hill and Sulphur Mines sites. Construction was completed on August 23, 1988. Until mid-September 1988, the crude oil injected into the Big Hill caverns during leaching to form the cavern roofs and shapes was transported from Sulphur Mines by tank truck. The initial fill using the new crossover line started on September 20, 1988, and was completed September 22. About 135,000 barrels of oil were transferred from Sulphur Mines and will be stored in cavern 109 until it is needed for cavern shaping.

EBASCO, the contractor for surface construction on nine caverns, should have completed the pipeline tie-ins to connect the caverns to the oil, brine, and water systems by March 14, 1988, but DOE did not accept the contract work as substantially completed until May 27, 1988. This contractor's work was 99 percent complete on September 30, 1988. Work remaining to be done included final site grading and 53 "punch-list" items, such as a missing road sign and a malfunctioning pressure gauge. The work is expected to be completed by December 1988.

### SPR OIL DISTRIBUTION IMPROVEMENTS AND ENHANCEMENTS

DOE plans a number of distribution enhancements to increase the SPR oil distribution capacity to match projected drawdown capability, which is expected to reach 4.5 million barrels per day as the SPR approaches 750 million barrels. These projects include the following:

- A 12-mile, 36-inch pipeline to connect the West Hackberry site to the Texas 22-inch pipeline in the Lake Charles, Louisiana, area. This pipeline, when completed, will provide a flow rate of 864,000 barrels per day. The invitations to bid were issued on May 20, 1988, and the contract for this project was awarded on August 12, 1988, to Michael Curran and Associates for about \$11.6 million. The contract completion date is March 10, 1989. The on-site modification work contract for this pipeline was

awarded August 12, 1988, to Plaquemine Contracting Co., Inc., for about \$2.3 million. The contract completion date is March 1, 1989.

- Private terminal facilities near St. James to supplement the shipping capability of the DOE-owned St. James Terminal serving the Bayou Choctaw and Weeks Island sites. DOE solicited bids but received only one offer. In subsequent negotiations, DOE and the bidder did not reach an equitable agreement, and the procurement was canceled. DOE is studying the alternatives and plans a report next year.
- Marine terminal distribution capability in the Lake Charles, Louisiana, area to serve the West Hackberry site. In response to solicitation of bids, DOE received initial proposals as of April 25, 1988, and final revised proposals as of October 7, 1988. DOE is evaluating two proposals but has not set a date for a final decision.
- St. James terminal tie-in to the privately owned Capline system. This tie-in was completed on April 27, 1988, by the Firth Construction Company, Inc., for \$1.85 million and will provide 583,000 barrels of distribution capability per day.

#### COGGINS INSTRUMENTATION AND CONTROL CONTRACT WORK

Problems have occurred with SPR instrumentation and control (I&C) systems at several SPR sites. I&C systems are used to monitor and control the flow of crude oil, water, and brine and to operate and protect critical field equipment from a central location at each site. While other contractors were involved in the initial construction of the systems, for the last several years responsibility for completing the systems has rested primarily on Coggins Systems, Inc. Our last report discussed these problems in detail.

DOE has taken steps to resolve these problems. In June 1988, the SPR Project Manager established a Management Oversight Committee for Distributed Control Systems to maintain a management awareness of I&C activities. In August 1988 DOE requested the Sandia National Laboratories to evaluate SPR I&C systems' hardware and software problems and assess the approaches being taken to resolve the problems. Sandia is a DOE-owned facility and has for several years provided engineering services and analyses as well as special assessments to the SPR. A Sandia engineer stated that Sandia's task is to assess the I&C project, identify the problems, and advise DOE on how to get the I&C System to respond as DOE wants it to in the shortest period of time. Sandia began the project on

October 3, 1988, with a staff of three, and plans to complete a report for DOE early in the first quarter of fiscal year 1989.

With regard to specific sites, DOE recently asked for and obtained a Coggins proposal to resolve the I&C problems at West Hackberry. The work was planned in two phases:

- Phase I began in September 1988 to test basic operating functions of the control system and is complete.
- Phase II, underway as of September 30, 1988, and planned to last 4 weeks, is to resolve the 520 discrepancy items and check out the results. (See further explanation in our prior report.)

The additional cost of this work will be about \$42,230. Boeing plans to prepare an assessment report after each phase, and, later in 1989, will run a 30-day site test, similar to that conducted in January/February 1988, to test the entire system.

There have also been I&C operation problems at Big Hill. The system was tested in two parts, in accordance with contract terms: the raw water and brine disposal systems in September 1987 and the crude oil system in April 1988. These tests yielded 236 discrepancies. Coggins changed some software in March 1988; new software programming was installed in August and September 1988. As of September 30, 1988, there were 63 remaining discrepancies. Coggins is now scheduled to resolve all discrepancies during the first quarter of fiscal year 1989. A full site test, originally scheduled for May 1988, has been postponed, but DOE expects Coggins to complete the contract by December 1988.

At Bryan Mound and Bayou Choctaw, Coggins' schedule is less certain. Coggins has proposed to DOE a schedule to complete Bryan Mound in February 1989 and Bayou Choctaw in August 1989, but DOE's goal is to get all Coggins contract work completed by January 31, 1989, at Bryan Mound and by May 1989 at Bayou Choctaw. Field testing has not yet occurred at these two sites.

#### OTHER SPR CONTRACT NEGOTIATIONS

During the past 6 months, PEMEX settled claims under the prior contract (PEMEX III) totaling \$216,835. Under the PEMEX IV contract, PEMEX settled in full one crude oil quality claim (one cargo) for \$11,433 in June 1988. DOE has filed five additional quantity claims (five cargoes) for \$157,217, none of which had been settled. The PEMEX IV contract calls for deliveries to average between about 58,500 barrels per day (minimum) and 71,500 barrels per day (maximum). As of September 30, 1988, actual deliveries were less than the minimum, as were projected fiscal year 1989 deliveries. DOE considers a contract modification unnecessary because all purchases under contract are subject to a funds-

availability clause, and a monthly modification reflects actual daily delivery rates.

As of September 30, 1988, DOE and Fruin-Colnon Corporation had not reached a final settlement on DOE's liquidated damages claim for late completion of the Big Hill I-A construction contract and Fruin-Colnon's claims of about \$9 million due from DOE. Attorneys for DOE, the Department of Justice, and Fruin-Colnon held discussions in Washington, D.C., on September 21, 1988. No agreements were reached.

During the reporting period, DOE extended two Walk, Haydel and Associates, Inc., (WHA) contracts. On May 31, 1988, DOE exercised the third and final 1-year option to extend WHA's Capital Improvement Program contract to May 31, 1989, for a total estimated cost and fixed fee increase of about \$7.81 million. This increase brought total contract value as of September 30, 1988, to about \$42.3 million. On June 30, 1988, DOE also modified WHA's contract for architectural and engineering reviews at Big Hill to extend the period of performance from July 1, 1988, through January 31, 1990, for a total estimated cost and fixed fee increase of about \$1.2 million. This increase brought total contract value as of September 30, 1988, to about \$79.4 million.

DOE also received proposals for the Capital Improvement Program to follow-on after WHA's contract expires May 31, 1989, and selected, from a short list of four, Fluor Daniel, Inc., for negotiation as the new Architecture and Engineering contractor for the program. Within the next quarter, Fluor will submit a proposal that will provide a basis on which DOE and Fluor will discuss and negotiate price. The base contract will be for 2 years, with three 1-year unpriced options.

#### DRAWDOWN EVALUATION AND EXERCISE PLANS

As we mentioned in our previous reports, the SPR drawdown readiness exercise (SPREX-87) which took place in June and July 1987 produced a list of items requiring followup and corrective action. As of September 30, 1988, three items remained open: insufficient staff resources, a need for formal early notification of several non-SPR participant organizations, and a need to revise the Sales Evaluation Model. DOE is taking steps to resolve these items. DOE identified staff "augmentees." A draft drawdown management plan incorporates revised early notification provisions; revisions to the Sales Evaluation Model are in progress.

DOE is developing a 5-Year System Test Exercise Plan, and since January 1, 1988, most drawdowns were postponed. DOE's concerns about potential problems involving drawdown exercises include

- effects on cavern integrity,
- effects on cavern shape, and
- interruptions in collection of long-term data on cavern behavior.

DOE has developed criteria for future tests and exercises which reflect these concerns, and the new SPR Project Management Office Drawdown Readiness Program Order, issued September 22, 1988, stresses that drawdown tests be based on valid engineering data requirements.

DOE plans an administrative exercise, called SPRITE IV, to be completed November 1988. A Cavern Drawdown Priority Model will be used to simulate a full-scale drawdown. The paperwork processes for bids, sales, and deliveries of crude oil will be executed simulating actual conditions.

Several drawdowns are proposed for fiscal years 1989 and 1990.

- Sulphur Mines, January 1989--to test and calibrate the site's sonic meters in conjunction with roof oil movement to Big Hill.
- Bayou Choctaw, July 1989--to demonstrate the maximum, as well as the design, flow rate with three caverns on-line. This would meet the requirement for a maximum rate test every 5 years.
- West Hackberry, March 1989--to test the final drawdown configuration which will be in place by January 1989.
- Weeks Island, fiscal year 1990--to test the drawdown reliability of crude oil pumps and inert gas generators and further allay GAO's criticism in its report of September 27, 1985,<sup>3</sup> that ". . . the site should be tested for drawdown to the maximum extent possible."
- Bryan Mound, late fiscal year 1990--to test the drawdown capability after the site's drawdown rate is upgraded to 1.25 million barrels per day after June 30, 1990.

#### PROGRESS TOWARD SETTLEMENT OF DEMURRAGE OVERCHARGE ISSUES

Demurrage is the penalty or fee added to the cost of chartering a vessel if it is delayed more than a specified period

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<sup>3</sup>More Assurance Is Needed That Strategic Petroleum Reserve Oil Can Be Withdrawn as Designed (GAO/RCED-85-104, Sept. 27, 1985).

of time, usually 72 hours, while loading and/or unloading. The Military Sealift Command (MSC) is responsible for chartering tankers for the delivery of SPR oil and is, therefore, responsible for evaluating claims for demurrage, which are ultimately paid from the SPR oil acquisition and transportation account.

In our last two reports,<sup>4</sup> we discussed possible demurrage overcharges going back as far as June 1980. As of April 1988 MSC had agreed that overpayment occurred in six cases totaling \$92,904 and took steps to recover this amount. Another six cases, with questionable payments amounting to \$96,997, remained unresolved and required additional research.

As of September 1988, MSC had determined that the unresolved claims represent improper payments and is, therefore, taking steps to obtain refunds in all 12 cases. MSC calculates these claims now total \$189,893 and has requested repayment of all claims. In one case, the MSC Contracting Officer has directed the Comptroller's office to deduct \$40,728 from future invoices of the American Trading Transportation Company, Inc. In another, the Cove Co., having received MSC's request for a refund of \$42,419, has stated objections to MSC's claim. MSC is reviewing these objections. MSC is actively pursuing the remaining outstanding claims.

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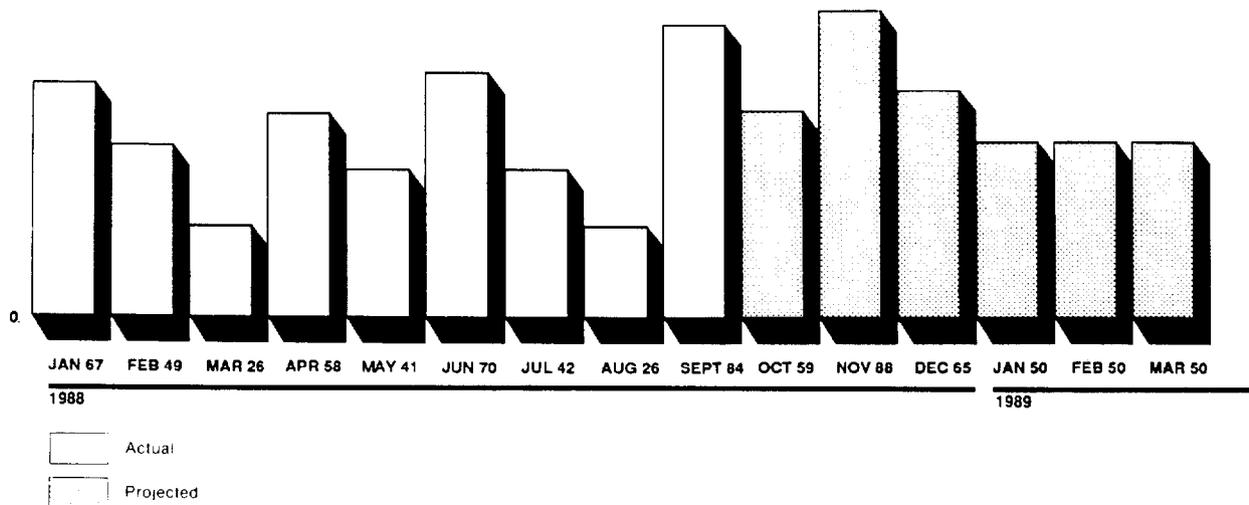
<sup>4</sup>Oil Reserve: Status of Strategic Petroleum Reserve Activities as of September 30, 1987 (GAO/RCED-88-59FS, Nov. 30, 1987) and Oil Reserves: Status of Strategic Petroleum Reserves as of March 31, 1988 (GAO/RCED-88-175FS, June 24, 1988).

SECTION 2

DATA ON THE STATUS OF THE  
STRATEGIC PETROLEUM RESERVE

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

120 Volume (barrels per day) in Thousands



<sup>a</sup>Daily receiving rate for October 1988 through March 1989 based on DOE projection of future deliveries. All of these rates are subject to change.

Source: DOE

Table 2.1: Status of SPR Petroleum Account (Oil Acquisition and Transportation Funds) as of September 30, 1988<sup>a</sup>

<u>Funds made available</u>	<u>Amount</u> (millions)
Fiscal year 1977 to 1981 appropriations <sup>b</sup>	\$ 6,665
Fiscal year 1982 appropriations	3,684
Fiscal year 1983 appropriations	2,074
Fiscal year 1984 appropriations	650
Fiscal year 1985 appropriations	2,050
Fiscal year 1988 appropriations	<u>439</u>
Total	<u>\$15,562</u>
 <u>Funds used or committed</u>	
Fiscal year 1977 to 1981 payments	\$ 4,859
Fiscal year 1982 payments	3,687
Fiscal year 1983 payments	1,641
Fiscal year 1984 payments	2,329
Fiscal year 1985 payments	1,621
Fiscal year 1986 payments	397
Fiscal year 1987 payments	490
Estimated fiscal year 1988 payments <sup>c</sup>	338
Estimated DOE unpaid obligations as of September 30, 1988 <sup>d</sup>	<u>197</u>
Total	<u>\$15,559</u>
Estimated unobligated funds at DOE	\$ 0

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

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

<sup>c</sup>Amount consists of DOE's actual reported payments through August 1988 and DOE's estimated payments for September 1988.

<sup>d</sup>Unpaid obligations primarily represent funds that have been obligated for oil deliveries or are obligated to Defense Fuel Supply Center for PEMEX oil transportation costs. DOE estimated that about \$162 million had been obligated as of September 30, 1988, for future costs.

Source: DOE.

Table 2.2: Status of SPR Underground Capacity for Crude Oil Storage as of September 30, 1988

<u>Storage facilities</u>	<u>Gross volume planned</u>	<u>Gross volume completed</u>	<u>Permanent capacity planned<sup>a</sup></u>	<u>Capacity available</u>	<u>Capacity filled<sup>b</sup></u>
- - - - - (millions of barrels) - - - - -					
Phase I sites:					
Bayou Choctaw	54.6	48.6	52.0	46.0	45.7
Bryan Mound	74.0	74.0	69.7	69.7	53.7
Sulphur Mines	-	27.3	-	26.0	25.1
Weeks Island	73.0	73.0	73.0	73.0	71.8
West Hackberry	<u>50.4</u>	<u>50.4</u>	<u>47.6</u>	<u>47.6</u>	<u>47.7</u>
Total	<u>252.0</u>	<u>273.3</u>	<u>242.3</u>	<u>262.3</u>	<u>244.0</u>
Phase II sites:					
Bayou Choctaw	11.3	11.3	10.0	10.0	7.2
Bryan Mound	139.4	139.4	124.5	124.5	129.5
West Hackberry	<u>181.2</u>	<u>181.2</u>	<u>160.8</u>	<u>160.8</u>	<u>140.1</u>
Total	<u>331.9</u>	<u>331.9</u>	<u>295.3</u>	<u>295.3</u>	<u>276.8</u>
Phase III sites:					
Bayou Choctaw	11.2	4.3	10.0	-	-
Bryan Mound	36.6	36.6	31.8	31.8	30.4
West Hackberry	12.3	12.3	10.6	10.6	.2
Big Hill	<u>180.6</u>	<u>30.1</u>	<u>160.0</u>	<u>-</u>	<u>.1</u>
Total	<u>240.7</u>	<u>83.3</u>	<u>212.4</u>	<u>42.4</u>	<u>30.7</u>
Tank and pipelines	-	-	-	-	<u>3.2</u>
Total	<u>824.6</u>	<u>688.5</u>	<u>750.0</u>	<u>600.0</u>	<u>554.7</u>

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

<sup>b</sup>Differences with previous reports reflect the affect of remedial leaching and the movement of oil.

Source: DOE.

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