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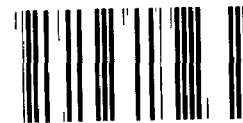
General Accounting Office

Additional Improvements Needed In Logistics Support For The Strategic Petroleum Reserve

Planning maintenance and spare parts acquisition activities (logistics support) for equipment associated with large projects, such as the Strategic Petroleum Reserve, should be integrated with the initial design phase of the project to reduce support costs and increase the reliability of the system.

This report discusses the delays in the Department of Energy's efforts to develop an integrated logistics support system and the resultant difficulties encountered in acquiring, controlling, and protecting spare and repair parts for the Reserve. The Department has made some improvements in its management of logistics support activities, but an integrated logistics support system for the Reserve still had not been completed as of March 1984.

GAO recommends that the Department more closely monitor the development of a new Reserve storage site to ensure that integrated logistics support is fully incorporated prior to the start of operations. It also recommends improvements in the Department's management of its logistics-related contract.



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RESOURCES, COMMUNITY,
AND ECONOMIC DEVELOPMENT
DIVISION

B-208196

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

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

This report presents the results of our review of the Department of Energy's efforts to develop an integrated logistics support system for the Strategic Petroleum Reserve storage locations. The review was made as part of a comprehensive effort to evaluate the Department's performance in developing, filling, and maintaining the Strategic Petroleum Reserve. As you requested on March 8, 1984, we are providing you with the results of our review.

Copies of the report are being sent to the Chairman, Subcommittee on Environment, Energy and Natural Resources, House Committee on Government Operations; the Director, Office of Management and Budget; and the Secretary of Energy.

A handwritten signature in cursive script that reads "J. Dexter Peach".

J. Dexter Peach
Director



D I G E S T

The Energy Policy and Conservation Act (Public Law 94-163, Dec. 22, 1975) authorized a Strategic Petroleum Reserve (SPR) of up to 1 billion barrels of oil for use during energy supply disruptions. The Department of Energy (DOE) has management responsibility for the SPR and currently plans to complete a 750-million-barrel Reserve by fiscal year 1991. Cumulative funding for the Reserve through fiscal year 1983 totaled \$14.3 billion--\$12.4 billion for oil purchases and \$1.9 billion for facilities.

The \$1.9 billion expended for facilities has funded the development, operations, and maintenance of five sites in Louisiana and Texas at which oil is stored and the design of a sixth site at Big Hill, Texas. It has also funded the construction and operation of a government-owned marine terminal and DOE facilities at two commercially-owned terminals used to receive oil deliveries for storage in the SPR. The storage sites and terminals are composed of large underground storage caverns and above-ground tanks interconnected by a complex array of pipelines and fittings, pumps, motors, valves, meters, and instrumentation and control links.

The size and complexities of SPR facilities and operations require extensive logistics support (the means of procuring, maintaining, storing, and controlling materials and equipment) to meet operational demands. The logistics support system DOE adopted for the SPR was based on similar systems used by the Department of Defense for large projects.

Under the Defense logistics support concept, the planning process for how project facilities and equipment are to be maintained and supported with spare and repair parts should be conducted at the same time as, and combined with, the overall project design process. For example, once a need for pumping equipment is

determined during the design stage, planning should be started for purchasing the equipment, identifying spare parts requirements, and establishing maintenance schedules. Integrating these planning and design processes typically produces savings by standardizing equipment and parts; simplifying maintenance procedures; and reducing costs during the procurement, construction, and operations processes.

Because effective logistics support is vital to the successful operation of the SPR-- particularly to DOE's ability to withdraw oil when needed--GAO reviewed DOE's efforts to develop and implement an integrated logistics support system for the SPR. The review is one part of a comprehensive effort to evaluate DOE's performance in developing, filling, and maintaining the SPR. On March 8, 1984, the Chairman and the Ranking Minority Member of the Senate Energy and Natural Resources Committee asked that the findings and any recommendations resulting from GAO reviews of SPR program activities be reported to the Committee.

GAO conducted its review of the logistics support system at the SPR's Project Management Office in New Orleans, Louisiana, and at three of the five existing oil storage sites. The detailed audit work covered SPR activities from 1978 to February 1983 and included examining numerous documents related to SPR site activities associated with logistics support development and interviewing DOE and contractor officials. Because of DOE's on-going development of the logistics support system, GAO continued to test system implementation during periodic site visits until March 1984. This included a limited review of DOE activities at its new Big Hill, Texas, site now under construction.

DOE EFFORTS TO DEVELOP SPR
LOGISTICS SUPPORT HAVE NOT
BEEN COMPLETELY SUCCESSFUL

DOE's primary interest during its initial planning for the construction of the SPR (1976-77) was to store oil underground as quickly as possible. Although DOE recognized

the importance of a logistics support system, it deferred any effort to implement such a system for the SPR. Due to the absence of an initial integrated logistics support planning effort combined with DOE's emphasis on achieving oil storage goals, DOE purchased many non-standardized pumps, valves, and other items of equipment, or used those already in place when it acquired existing storage facilities in the early phase of SPR construction. This situation complicated the process of obtaining spare and repair parts when mechanical components began to break down and equipment manufacturers had either gone out of business or no longer stocked needed replacement parts. By 1978, equipment failures began to adversely affect DOE's ability to meet oil storage site development and oil-fill goals.

After these problems arose, DOE initiated logistics support planning. Although DOE intended to make its operations and maintenance contractor the focal point for this work, the contract scope of work was not clear in this regard. DOE ultimately had to modify the contract at increased cost to add the logistics support responsibilities. (See p. 10.)

DOE provided funds specifically for logistics support development and the purchase of spare parts. Progress was slow, however, because the contractor used most of these funds for other activities, mainly related to oil fill, that it believed DOE was emphasizing. According to DOE, the contractor was expected to exercise its discretion in using funds provided to accomplish its overall mission. However, while the contractor could use funds provided for specific purposes on other contract-related activities without notifying DOE, DOE also told GAO that the lack of progress in completing the logistics support system was caused by poor contractor performance. The contractor, however, attributed its inability to complete system development to the low priority given by DOE. (See pp. 10, 11, 15, and 24.)

Although both factors--DOE's low priority and the contractor's performance--may have contributed to the logistics system not being completed by the contractor, GAO believes that DOE would have been in a better position to

identify and resolve the problems that occurred if it had been more aware of how the contractor actually used the funds that had been specifically provided for logistics support development and spare parts acquisition.

Because of the contractor's unsatisfactory performance in developing the logistics support system, DOE directed the contractor to stop work on it in mid-1981. Work on the logistics support system resumed in 1982 when DOE hired a new operations and maintenance contractor. DOE defined the logistics support responsibilities more clearly in this contract, and the contractor started a new effort to develop a logistics support system. However, the new contractor's progress has been slower than originally expected, and DOE's due dates for various segments of the system have been consistently missed. In addition, although the contractor had completed the basic logistic support system structure and acquired additional spare parts by September 30, 1983, the contractor had not developed the system's data base for equipment operating and maintenance histories and therefore could not accurately determine spare parts requirements. (See pp. 10 thru 13.)

In February 1984, DOE's contractor reported that the system data base was still incomplete. Without a complete data base, the logistics system cannot accurately estimate spare parts requirements. Even though the inventory of spare parts was increased in 1983, GAO believes there is still a question as to whether those spare parts stocks are adequate to meet the needs of the SPR. (See pp. 16 and 17.)

Although GAO estimated that development of the logistics support system has cost at least \$9.8 million, the actual cost is uncertain because DOE could not track the costs incurred by some of its contractors. The former operations and maintenance contractor could not specifically identify such costs and, while the current contractor identifies logistics-related costs, the accuracy of the contractor's records has been questioned by the Defense Contract Audit Agency. (See pp. 22 to 25.)

PLANNING AT NEW STORAGE SITE
IS IMPROVED, BUT IMPLEMENTATION
REQUIRES CLOSE MONITORING

DOE's approach to logistics support development for the Big Hill storage site appears to be more consistent with accepted Defense concepts than its previous efforts at the other sites. DOE included logistics planning in the design of the site, and the engineering contractor has completed an integrated logistics support plan for the site.

To better coordinate site design and future maintenance and operations of the completed facility, DOE is also involving the current operations and maintenance contractor in the storage site design activities. DOE expects that the contractor's operating experience at the existing SPR sites will help identify and resolve design problems before construction begins and assure that operations and maintenance practices are compatible at all sites. (See p. 13.)

GAO believes DOE has the opportunity at the Big Hill site to incorporate many of the lessons learned in developing the first five sites. Although DOE is moving in this direction, GAO also believes that DOE must closely monitor its contractors' logistics support activities to keep them on schedule and within cost estimates.

CONTRACT AWARD FEES PAID FOR
LESS THAN SATISFACTORY PERFORMANCE

DOE paid performance incentive bonuses to contractors for logistics support work as well as other work tasks. In the period 1979 to 1982, the operations and maintenance contractor earned about \$2 million in award fees. The award fee plan used by DOE allowed the contractor to earn up to 40 percent of the total award fee available even when performance was rated as "substandard" or "poor." For the period January through March 1981, for example, DOE rated the contractor's performance in buying and warehousing spare parts as "substandard" and its performance on logistics support development as "poor." Nevertheless, as provided in the contract award fee plan, DOE awarded the contractor \$3,321 of the \$14,235 award fee available during the period for these tasks.

DOE modified the award fee structure in its current operations and maintenance contract. This contract requires significantly better performance rating scores than the previous contract required for payment of award fee. However, the contract allows up to 10 percent of the award fee to be paid for "substandard" performance.

Although the new contractor's progress in completing the logistics support system has been slower than expected, DOE, in 1982 and early 1983, rated the contractor's work in the performance area that included logistics-related activities as "outstanding." Because logistics-related activities were only a component of the performance area rated, it is difficult to determine the relationship between performance on logistics activities and fee awards. (See pp. 26 to 28.)

RECOMMENDATIONS

GAO recommends that the Secretary of Energy instruct the SPR Project Manager to:

- Develop a cost tracking system that clearly identifies costs being incurred in the development and operation of the SPR logistics support system.
- Structure award fee plans in future contracts so that award fees are not paid for less than satisfactory performance and such payments are clearly linked to the contractor's actual achievement in meeting stated objectives.

Given the past problems encountered in developing an integrated logistics support system, GAO also recommends that the Secretary of Energy instruct the SPR Project Manager to closely monitor logistics support development activities at the new oil storage site to ensure timely completion and implementation.

AGENCY AND CONTRACTOR COMMENTS AND GAO'S EVALUATION

GAO obtained written comments from DOE and its current operations and maintenance contractor. Representatives of the former operations and maintenance contractor provided oral comments. DOE supported the thrust of the report regarding the need for integrated logistics support planning and implementation and agreed with

the need for improvement in areas covered by recommendations.

GAO made changes in the report based on the comments of DOE and the contractors as it deemed appropriate. The written comments submitted by DOE and its current contractor are reproduced in appendixes I and II, respectively.



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ABBREVIATIONS

DOE	Department of Energy
DUCI	Dravo Utility Constructors, Inc.
FEA	Federal Energy Administration
GAO	General Accounting Office
ILS	integrated logistics support
POSSI	Petroleum Operations and Support Services, Inc.
SPR	Strategic Petroleum Reserve

CHAPTER 1

INTRODUCTION

The Energy Policy and Conservation Act (Public Law 94-163, Dec. 22, 1975) authorized the creation of a Strategic Petroleum Reserve (SPR) to store up to 1 billion barrels of oil and required that the SPR contain at least 150 million barrels by the end of 1978. The Federal Energy Administration (FEA) was initially responsible for developing the SPR. However, responsibility was transferred to the Department of Energy (DOE) when it was established in October 1977.¹ In its SPR Plan, which was submitted to the Congress in February 1977, DOE proposed to develop and fill a 500-million-barrel SPR by December 1982. This plan was subsequently amended, and DOE currently plans to complete a 750-million-barrel SPR in 1991.

SPR FACILITIES DEVELOPMENT

DOE has a three-phase program for developing and filling the SPR to the 750-million-barrel level. SPR oil is being stored in underground salt caverns and a salt mine at six sites. (See table 1.)

Table 1

SPR Storage Capacity

<u>Storage facility</u>	<u>Phase I</u>	<u>Phase II</u>	<u>Phase III</u>
	----- (millions of barrels) -----		
Bayou Choctaw, LA	47	10	-
Weeks Island, LA	73	-	-
West Hackberry, LA	49	160	20
Sulphur Mines, LA	26	-	-
Bryan Mound, TX	65	120	40
Big Hill, TX	-	-	<u>140</u>
Total	<u>260</u>	<u>290</u>	<u>200</u>

These storage facilities are connected by pipeline to three marine terminals that receive oil deliveries for storage in the SPR. DOE owns and operates one marine terminal at St. James, Louisiana, and has multiyear contracts to use two commercial terminals at Nederland and Freeport, Texas.

Phase I of the program, which is complete, converted five sites with existing underground storage capacity into SPR storage

¹For simplicity, activities and actions carried out by FEA are hereafter attributed to DOE.

facilities. DOE certified 260 million barrels of storage capacity for long-term oil storage and added wells, oil and water pipelines, pumps, meters, firefighting and security systems, and related buildings. Phase II, which was started in 1979, is adding 290 million barrels of newly created storage capacity. DOE is leaching caverns out of underground salt formations--a repetitive process of pumping in fresh water and pumping out the resultant brine. Phase III began in 1982 and will add 200 million barrels of storage capacity. Construction at the new Big Hill storage site began in the spring of 1983.

Responsibility for facilities development

Initially, responsibility for developing the SPR was based at DOE's SPR Program Office in Washington, D.C. However, to improve the overall management of the SPR, DOE set up a Project Management Office in New Orleans, Louisiana, in early 1979 and divided responsibilities between the program office and the project office. The Deputy Assistant Secretary for SPR heads the program office and is responsible for overall program management and planning. Until June 1983, the Project Manager, who heads the project office, was responsible for the day-to-day design, development, construction, operation, and maintenance of SPR facilities. In June 1983, the Secretary of Energy announced that management of the SPR project office was transferred from New Orleans to the Oak Ridge Operations Office in Oak Ridge, Tennessee.

DOE has mainly relied on contractors to develop, operate, and maintain SPR facilities. As of October 24, 1983, DOE was employing 53 contractors to construct facilities and pipelines, leach additional storage capacity, operate and maintain facilities, provide security, conduct analyses, and provide management assistance.

Integrated logistics support

An integrated logistics support (ILS) system is designed to incorporate a facility's maintenance program into the design and operation of the facility. Among other things, logistics support includes spare and repair parts, support equipment, tools, warehousing, technical documentation, computerized inventory control systems, and associated personnel. Early identification of logistics support needs is important because engineering decisions on system hardware and equipment design and fabrication can include trade-offs between operational and support requirements. Maximizing the use of standard equipment and parts and documenting technical data simplify maintenance and can also result in procurement and construction cost savings.

The importance of ILS planning has been recognized in Department of Defense (Defense) policies, directives, and regulations for many years. According to Defense guidance on ILS implementation, logistics support represents a major portion of the total cost over the life-cycle of a system and is sometimes the

principal cost item. Integrating logistics considerations into the conceptual planning and throughout the entire design and development process can reduce support costs substantially and increase the operational reliability of the system.

DOE has recognized the importance of an ILS system; however, DOE gave priority to oil-fill activities in the first years of the SPR program. SPR storage facilities acquisition, design, and construction activities began in 1976. DOE did not begin to develop an ILS system until late 1978 and did not complete an ILS policy until October 1979. This policy was based to some extent on Defense standards and regulations.

Logistics support, including the acquisition and warehousing of spare and repair parts, is currently the responsibility of the operations and maintenance contractor. DOE hired Dravo Utility Constructors, Inc. (DUCI), in 1978 to serve as the operations and maintenance contractor, but DUCI did not assume responsibility for all ILS activities until 1980. In January 1982, DUCI was replaced by Petroleum Operations and Support Services, Inc. (POSSI). POSSI signed a 3-year contract with an option for 2 additional years. Since the program began, eight different contractors have been involved to varying degrees in designing and/or implementing an ILS system for the SPR sites. (See table 2.)

Table 2

SPR Contractors and Subcontractors Responsible
for the Design and Implementation of an ILS System

<u>Contractor</u>	<u>Subcontractor</u>	<u>Date</u>	<u>Responsibility</u>
Sandia Laboratories		1978	Design of monitoring program to ensure storage site integrity
Parsons-Gilbane		1978-79	Construction manager given responsibility for spare parts acquisition
Dravo Utility Constructors, Inc.	Decision Planning Corp.; Consolidated Technical Services; RMS	1979-82	Operations and maintenance contractor for all SPR facilities; initially responsible for acquisition of maintenance parts; made responsible for entire ILS in 1980
U.S. Army Corps of Engineers	BDM	1979-81	Systems-engineering master plan
PB-KBB, Inc.	Science Applications, Inc.	1979	Conceptual ILS plan
Aerospace Corp.	Science Applications, Inc.	1980-82	Design and implementation of a totally integrated engineering effort, including analyses of logistics support
Petroleum Operations and Support Services, Inc.	PLT Engineers, Inc.; CACI-Federal, Inc.	1982-84	Operations and maintenance manager for all SPR facilities; responsible for the design and implementation of an ILS system
Walk, Haydel and Associates		1983-84	Design engineering for the new phase III site at Big Hill, Texas

OBJECTIVES, SCOPE, AND METHODOLOGY

As part of our effort to evaluate DOE's performance in developing, maintaining, and filling the SPR, we are conducting a series of reviews of SPR program activities. On March 8, 1984, the Chairman and Ranking Minority Member of the Senate Energy and Natural Resources Committee asked that the findings and any recommendations resulting from these reviews be reported to the Committee.

The objectives of this review were to determine whether (1) DOE and its contractors are providing adequate logistics support to the SPR program to ensure that spare parts, warehousing facilities, and property management systems are in place and (2) DOE has effectively managed its ILS-related contractor activities. To assess DOE's development of an ILS capability for the SPR, we compared the actions taken by DOE with those envisioned in established Defense directives, regulations, and standards on logistics planning and systems engineering, including those of the U.S. Army Corps of Engineers.

To assess DOE's management of contractors, we examined numerous contracts, contract modifications, work directives, DOE and contractor reports, administrative files, and correspondence. We interviewed officials from the SPR Program Office, the SPR Project Management Office, and contractors hired to develop the ILS system.

We also visited three storage sites to observe DOE's warehouse facilities and property management systems for spare and repair parts inventories. At these sites we tested the accuracy and completeness of records used to account for and control the inventories.

We assessed DOE's efforts to develop an ILS system for the new Phase III storage site by interviewing representatives of the two SPR architectural and engineering contractors designing Phase III facilities, by examining these firms' contracts to assess their requirements for ILS planning, and by interviewing SPR officials to clarify contract requirements.

Our review was conducted in accordance with generally accepted government auditing standards. Our audit work was conducted from June 1982 through February 1983. Followup work was done between October 1983 and March 1984.

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We sent a draft of this report to DOE and selected portions of it to POSSI and DUCI for review. DOE and POSSI provided written comments (see apps. I and II). Representatives of DUCI (now Dravo Constructors, Inc.) met with us to discuss their comments. We made changes to the report, as appropriate, based on these comments.

CHAPTER 2

DELAYED LOGISTICS SUPPORT PLANNING

CAUSED PROBLEMS AT THE SPR STORAGE SITES

DOE began the initial design and development work for the SPR in 1976. Integrated logistics support planning, however, was not included in this early effort because primary emphasis was placed on responding to legislative and presidential mandates to achieve ambitious oil-fill targets. DOE initiated its ILS planning in 1978 after SPR facilities began to experience system reliability problems caused by failures of nonstandard pumps, motors, and other equipment that were difficult to repair and by extensive corrosion problems. This initial planning effort was performed by several contractors. In addition, DOE attempted to make its SPR operations and maintenance contractor, DUCI, the focal point for ILS development. However, an ill-defined work scope in the contract relating to DUCI's responsibilities in this area and DOE's continued emphasis on oil-fill activities delayed the ILS work so that by early 1982 little progress had been made. A change in contractors in January 1982 has brought about some improvement but progress to date has been slower than expected. As of March 31, 1984, the ILS system was still not fully completed. DOE's current efforts to develop a new Phase III storage site at Big Hill, Texas, include incorporating a number of ILS features intended to avoid the problems encountered in developing the Phase I and II sites. Some of these activities, however, are falling behind schedule.

As a consequence of delays in ILS development, the SPR sites experienced the kinds of problems that early ILS development may have helped avoid, such as acquisition of nonstandard equipment, inadequate spare and repair parts inventory levels, inadequate warehouse facilities for controlling and protecting inventory items, and a poor property records system. DOE has recognized these problems and is taking corrective actions. There is no certainty, however, that these actions will fully resolve all of the problems.

DEVELOPMENT OF THE SPR LOGISTICS SUPPORT SYSTEM

In order to maximize oil fill during the early years of the SPR, DOE obtained a variety of existing storage caverns and equipment and gave low priority to developing a logistics support system and other activities which it believed were not essential to achieve its short-term goal. However, when equipment failures raised concerns that nonstandardized components and spare parts shortages were adversely affecting SPR development, DOE initiated an ILS development program. DOE and contractor efforts have not been totally successful, however, and a fully operable ILS system had not been achieved as of March 31, 1984.

Facility equipment was not standardized

Equipment standardization is the process of establishing uniformity of items to minimize the variety of such items and to maximize interchangeability. Department of Defense guidance on ILS states that standardizing equipment and components in constructing a system minimizes the number of different spare and repair parts, support and test equipment, and training material required to support the system. Standardization, in addition to improving reliability and maintainability, also reduces system support costs.

As the result of DOE's decision to concentrate on oil fill and postpone the development of a logistics support system, equipment and components, such as pumps and valves, at SPR sites were not standardized. Instead a conglomeration of parts and equipment was acquired for the SPR sites. In order to quickly obtain storage capacity, existing caverns and equipment were purchased from a variety of owners, who had used them for a variety of purposes. In addition, DOE's emphasis on starting oil-fill operations left insufficient time for suppliers to manufacture and ship standardized, interchangeable parts and equipment. According to DOE, some standardization problems also resulted because the Federal Procurement Regulations prevented it from obtaining all quantities of a particular type of equipment from one supplier. DOE and its contractors, therefore, used available equipment and acquired other equipment without achieving the greatest degree of standardization or interchangeability possible.

Because the opportunities for greater standardization of equipment and components were not realized, the SPR Phase I and II storage facilities' systems include many nonstandard components, i.e., a variety of components which perform similar functions. This complicates the process of maintaining an appropriate level of spare and repair parts. Also, because existing equipment was acquired at some sites, replacement parts must be specially made for equipment which is no longer being manufactured. For example, parts are no longer available for a 36-inch valve manufactured about 25 years ago because the manufacturer went out of business 15 years ago. Having repair parts custom made is costly; however, it is the only way to maintain the equipment without replacing it.

Early ILS design activities

Beyond the problem of equipment standardization, in 1978 several logistics support problems surfaced. DOE's 1978 annual SPR report indicated deficiencies in several areas, including integrated logistics management, analyses of equipment failures, equipment reliability, and design trade-offs between system effectiveness and economy. The SPR was also experiencing problems caused by weak systems-engineering management; unacceptably high pipe corrosion from brine exposure; and pump and motor failures, resulting in part from improper installation, maintenance, and operating procedures.

DOE recognized that the problems resulted from insufficient attention to planning an equipment maintenance program and obtaining a sufficient supply of spare parts. In the January 1979 Program Stewardship Report No. 2, DOE's Deputy Under Secretary and the Project Manager noted that steps had been taken to acquire systems-engineering support for the SPR. They reported that the "Initial underinvestment in integrated logistics affected program progress," but that this matter was "now receiving catch-up priority attention throughout all phases of the SPR system." The report indicated that questions about the reliability of the SPR system had been raised in part because of an insufficient supply of spare parts and because of pump and motor failure investigations. Reliability, however, was said to be improving with the acquisition of more spare parts. The report also discussed a shortage of warehouse facilities needed to protect spare and repair parts at certain sites and indicated that DOE was planning for interim warehousing and maintenance facilities.

In late 1978 and early 1979, DOE engaged several contractors to study SPR problems as part of an overall ILS planning effort. For example, DOE contracted with Sandia Laboratories to perform a short-term systems integration and engineering study, including assessments of systems-engineering weaknesses, pipe corrosion rates, and pump and motor failures. DOE also hired PB-KBB, Inc., to conduct various technical analyses and to prepare a conceptual ILS plan for the SPR. Additionally, in March 1979, DOE signed an agreement with the Corps of Engineers for long-term systems-engineering support. While these contracts included work tasks that were ILS-related, overall development of an ILS system was not included in the scope of any of these contracts.

In commenting on a draft of this report, DOE said that the work conducted by Sandia and the Corps of Engineers did not have any significant relationship to the ILS system. The scope of work for both contracts, however, indicate that ILS-related activities were included in the overall efforts assigned to these contractors.

In September 1978, DOE hired DUCI as the SPR facilities operations and maintenance manager. DUCI began its phase-in process in late October 1978 and its primary contract work in January 1979. DOE anticipated that DUCI would be the focal point for the preparation and implementation of maintenance and logistics plans. As discussed below, however, the original scope of DUCI's contract did not include responsibility for all ILS activities.

ILS responsibilities were not clearly defined in DUCI's contract

Although DOE officials said that they intended to use DUCI as the focal point for developing the ILS system, DUCI's contract did not clearly define the scope of its ILS work. In April 1979,

DOE directed DUCI to assume overall responsibility for ILS planning by conducting the necessary logistics analyses. However, DUCI maintained that this work was outside the scope of work defined in the contract and requested a modification. Nevertheless, DUCI began work related to ILS system development while DOE determined whether the ILS work was, in fact, within the scope of the contract. A year later DOE's contracting officer agreed with DUCI that the ILS work was not required by the original contract.

In April 1980, DOE modified the DUCI contract to add \$3 million in estimated cost and fees to develop an ILS master plan for the SPR. In December 1980, DOE again modified the contract to add another \$1.1 million in estimated cost and fees to implement the ILS program. However, according to DUCI's Director of Procurement, DUCI spent only about \$1.2 million of the \$4.1 million provided by these modifications on ILS development. According to DUCI, DOE gave ILS development low priority; DUCI therefore used the remaining funds on other activities being emphasized by DOE, such as activities related to oil fill. DUCI did not complete the ILS plan or implementation work funded by the two contract modifications. In August 1981, DOE directed that work on the ILS be stopped because of funding limitations and DUCI's performance. DOE instructed DUCI to work only on oil fill and leaching activities for the remaining 6 months of its contract. Work on the design and implementation of the ILS system was suspended until POSSI took over from DUCI in January 1982.

DOE officials said that poor contractor performance was the most significant factor that caused the problems and delays in completing the ILS system. Both factors--DOE's low priority and DUCI's performance--may have contributed to the ILS not being completed by DUCI. We believe, however, that DOE's responsibility for SPR development warranted closer monitoring of DUCI's progress on ILS development. Furthermore, DOE would have been in a better position to take corrective actions if it had more closely followed DUCI's reprogramming and ultimate use of funds provided for specific purposes.

ILS responsibilities clarified in POSSI contract

DOE's contract with POSSI more clearly delineated the responsibilities for ILS-related planning and implementation because of the problems that had been experienced with the DUCI contract. The POSSI contract scope of work specified such ILS responsibilities as

- furnishing the personnel, materials, and services required to implement a master ILS plan;

- performing preventive and corrective maintenance;
- maintaining government-owned facilities and equipment with the objective of improving and/or maintaining standardization;
- managing and enhancing the supply support system by accepting spare and repair parts provided by other contractors and ensuring that all additional spare and repair parts, and other supplies required, are available at the sites; and
- staffing, operating, and maintaining warehouses and other materials storage facilities provided by DOE.

Details of these and other responsibilities were amplified in contractor data requirement lists and data item descriptions. These types of specific requirements had not been spelled out in the DUCI contract. In our opinion, their use in the POSSI contract, in conjunction with close monitoring of POSSI's activities, provides a mechanism for more effective contract administration. Because DOE began to give higher priority to the ILS system and made ILS-related activities and reporting requirements clearer for POSSI than it had for DUCI, there apparently has been better cooperation and fewer disagreements over work requirements.

POSSI's progress on logistics support system slower than expected

Improved contract terms and provisions, while useful, have not necessarily expedited ILS development. POSSI has worked on the ILS system since January 1982 when it became the operations and maintenance contractor. According to POSSI, it began a new effort to develop an ILS system because it did not have access to any of DUCI's work and was provided only limited information from other contractor efforts to use as a basis. POSSI's contract required that it submit a draft ILS plan to DOE by mid-May 1982, but POSSI requested two extensions which DOE approved. As a result, POSSI did not deliver a complete draft plan until mid-September 1982, about 4 months after it was initially due. DOE notified POSSI of required changes to the draft plan in early December 1982, and POSSI was to make these changes and resubmit the plan to DOE by the end of March 1983. However, POSSI did not deliver the corrected plan until May 1983. At DOE's request, another contractor, Aerospace Corporation, reviewed the plan in July 1983 and recommended changes. Subsequent to that review and additional changes, DOE accepted the plan.

In its comments on our draft report POSSI stated that the basic ILS structure was in place and functioning by the end of fiscal year 1983. However, both POSSI and DOE recognize that the system needs further refinements before it can be considered as fully acceptable. According to POSSI, it has established the

various subsystems that are needed to determine maintenance and spare parts requirements, but further enhancements are still needed in the ILS system. Some of these enhancements are related to the adequacy and accuracy of the data that are needed or are being input into the system. For example, DOE's Oak Ridge Operations Office pointed out in its October 1983 Baseline Assessment of the Strategic Petroleum Reserve Project Management Office² that the ILS system was not fully operational because the system's data base was not adequate to determine spare parts requirements. According to the Baseline Assessment, historical maintenance records have not been maintained and data on equipment failure rates are not available. Such data are critical for determining maintenance and spare parts requirements.

ILS planning underway for Phase III

DOE has started development of a new storage site at Big Hill, Texas, as part of the Phase III expansion of the SPR. DOE is following established ILS concepts during the design of this site more closely than it did at the other SPR sites. DOE incorporated responsibility for ILS planning into its contract with Walk, Haydel, and Associates, Inc. (Walk Haydel), for the detailed design of the site. Walk Haydel is to standardize site equipment as much as possible, using the types and sizes of equipment used by industry in oil storage systems. Walk Haydel also is to make recommendations for initial spare and repair parts inventory levels for the site and incorporate warehouse facilities for spare and repair parts into the site design.

DOE also is involving POSSI in the design of the Big Hill site. DOE has assigned POSSI the responsibility for reviewing the design of Big Hill to assure that the site will be compatible with operation and maintenance practices followed at the other sites. DOE hopes that POSSI's experience in operating the other sites will help identify and resolve design problems before construction is started.

DOE's approach to ILS development at Big Hill appears to be more consistent with accepted ILS concepts. In March 1984, however, we noted that Walk Haydel's recommendation for the appropriate level of spare and repair parts for the site was several months overdue.

²When the Oak Ridge Operations Office was assigned responsibility for SPR management in June 1983, the manager assigned a task force to examine the SPR Project Management Office. The task force reported its findings and recommendations in the Baseline Assessment.

DEVELOPMENT OF SPARE AND REPAIR
PARTS INVENTORIES HAS BEEN SLOW

Adequate supplies of spare and repair parts are essential in efficiently and effectively developing and maintaining the SPR storage facilities. Although DOE was aware of the need to provide spare and repair parts for SPR operations in the early development stages, it did not take the necessary steps to implement a complete purchase program for these items. As a result, DOE and contractor reports show that adequate inventories of spare and repair parts to assure proper operation of pumping equipment, including those needed for oil drawdown, were not available at the storage sites from the SPR program's inception through most of fiscal year 1983. While progress was made during 1983 to increase the spare parts inventory, the adequacy of the spare parts inventory was still questionable in early 1984. For example, DOE's Oak Ridge Operations Office noted in its Baseline Assessment of the SPR that adequate information was not available to determine spare parts requirements. Additionally, information we obtained during visits to the two largest SPR sites in November 1983 and March 1984 showed that the data needed to establish spare parts requirements still contained inconsistencies and inaccuracies.

DOE did not promptly develop
a spare parts inventory

Department of Defense standards for good system-engineering practice and effective ILS planning indicate that spare and repair parts requirements should be determined and necessary inventories purchased and assembled at the needed locations before a system begins operation. However, SPR spare and repair parts were not ordered at the same time system equipment was purchased. Moreover, contractors responsible for purchasing system equipment were not required to maintain equipment documentation, including manufacturers' recommendations for spare and repair parts. Consequently, a major effort was necessary to locate, assimilate, or acquire this equipment documentation once DOE decided to start buying its initial inventory of spare and repair parts.

In July 1978, DOE made Parsons-Gilbane, the construction management contractor, responsible for purchasing a \$500,000 initial inventory of spare parts. DOE increased this amount to \$5.4 million in late December 1978 because the shortage of spares created operational problems when pumps and motors failed. However, DOE did not ensure that Parsons-Gilbane purchased an adequate inventory of initial spare and repair parts. During the 18-month period between July 1978 and December 1979, Parsons-Gilbane purchased only about \$1.4 million worth of spare parts. Due to funding constraints, DOE ordered Parsons-Gilbane to stop further purchases.

When DOE hired DUCI as the SPR operations and maintenance manager, DOE intended that an initial inventory of spare and repair parts, consisting of the acquisitions made by Parsons-Gilbane, would be in place at the sites. Consequently, the contract required DUCI to purchase only spare and repair parts necessary to replenish the initial inventory. However, the initial spare and repair parts were not on hand when DUCI became the operations and maintenance contractor. Because DUCI's contract did not include funding to acquire a stock of such parts, and DOE and DUCI disagreed over the extent of DUCI's ILS responsibilities, DUCI obtained parts as needed for basic maintenance and repair but did not build an initial inventory of spare and repair parts.

In April 1981, DOE added the responsibility for buying all initial spare parts to DUCI's scope of work. DUCI subsequently recognized that a substantial quantity of parts was needed and proposed to purchase \$28.8 million worth of initial spare parts. DUCI estimated that about \$4 million worth of these parts were urgently needed. The DUCI representatives who commented on our draft report said that this was an assessment of the spare parts that would be needed over the life of the SPR project rather than a proposal for the immediate purchase of these parts. However, DOE treated it as a purchase proposal and questioned DUCI's support for the proposal. DOE also considered it impractical for DUCI to procure and warehouse \$28.8 million worth of spare parts in the remaining 9 months of its contract. Consequently, DOE asked DUCI to procure only up to \$3.9 million worth of the most urgently needed spares. Similar to the situation with Parsons-Gilbane, DUCI actually only spent about \$1.1 million for the initial spares. According to DUCI the remaining funds were used for other mission-related tasks that DOE considered to have higher priority.

DOE recognized the adverse impact of the spare parts shortage in its final evaluation of DUCI's performance for the period ending January 17, 1982. DOE observed that critical equipment had been out of service for maintenance for excessive periods of time and seriously affected the Phase II leaching program. DOE said that the shortage of spare parts was the single most important problem affecting maintenance at the SPR sites and that the shortages of parts had adversely affected SPR readiness to conduct an oil drawdown in an emergency. DOE also noted that after the initial spares at the sites had been used there was minimal effort to replenish the spare parts inventory.

Adequacy of the spare parts inventory
was still questionable in early 1984

Although DOE recognized the importance of maintaining an adequate inventory of spare parts, it initiated little, if any, corrective action to remedy the situation. In October 1982, the Aerospace Corporation evaluated an assessment of spare and repair parts requirements, based on theoretical and industry standards, which had been conducted by its subcontractor, Science Applications, Inc. Aerospace reported to DOE that current SPR stocking levels for repair parts were low and that this could have a negative impact if the SPR were in an extended drawdown situation. Aerospace suggested that DOE take prompt action to reach its recommended stock levels for spare and repair parts.

In December 1982, after the Aerospace/Science Applications analysis, POSSI completed an initial determination of the inventory of spare and repair parts needed to support SPR equipment identified as critical. POSSI subsequently ordered about \$4.3 million worth of critical spare and repair parts. By the end of September 1983, nearly all of these parts had been received. POSSI also identified and acquired about \$4.8 million worth of noncritical spare and repair parts by September 30, 1983. POSSI officials told us that the process of determining the requirements for spare and repair parts necessary to support all the remaining "noncritical" SPR equipment is continuous and that the total cost of these parts cannot be estimated.

POSSI stated in its comments on our draft report that adequate spare parts were on hand to support drawdown and daily operations. Although POSSI has increased the total spare parts inventory levels, the October 1983 Baseline Assessment of the SPR prepared by DOE's Oak Ridge Operations Office questioned whether all of the critical spare and repair part requirements were being met. The assessment stated that the ILS data base was incomplete and, ". . . not sufficient to perform statistical analyses of failure rates, spare parts requirements, and other logistics-related parameters." The assessment recommended that a study be performed to determine the required level of spare parts needed to support drawdown based on failure rates, confidence levels, part criticality, procurement lead times, and total inventory value. The assessment also recommended that after this study is completed, an analysis should be made to determine if the current inventory of spare parts is adequate for the drawdown criteria.

In February 1984, POSSI advised DOE that it had completed the spare parts requirements study recommended in the Baseline Assessment. Although POSSI estimated the total dollar value of spare parts required to support the SPR, it noted that the estimates were based on failure rates used by the U.S. Navy for similar

equipment because it did not have a ". . . sufficient, accurate, or useable history for calculating failure rates of piece parts that reflect the SPR environment." POSSI also stated that the estimates did not include spare parts requirements for major portions of the SPR, such as the instrumentation and control systems, site support equipment, and the fire and physical protection systems.

DOE DID NOT CONTROL AND PROTECT THE GOVERNMENT-OWNED SPARE AND REPAIR PARTS

Storing and preserving equipment and spare parts are key elements of any logistics system. In general, DOE has assigned responsibility for these elements to field office managers and contracting officers. According to DOE's Property Management Regulations, these officials must (1) assure effective management of government property in the custody of DOE contractors, (2) promote improved property management practices and controls, and (3) arrange with contractors to establish effective administrative procedures which will ensure adequate physical protection and control, as well as proper utilization of government property.

Some spare and repair parts and other property have been stored at SPR facilities without proper protection from the elements or from theft or damage. Moreover, contractors have not always recorded receipt of spare and repair parts, identified their location, or shown their disposition. Consequently, physical inventories, including those taken when contractors were changed, have not agreed with property records. DOE does not know whether unlocated spare parts were used properly during operations or if they were lost or stolen.

Warehouses were not available to protect spare and repair parts

DOE made several attempts from 1979 through 1982 to determine whether to use centralized or decentralized warehousing facilities. Science Applications, Inc., studied the problem and concluded in August 1979 that centralized facilities were needed. In 1980, DOE asked DUCI to assess warehousing needs, and DUCI responded that decentralized facilities at each site were more cost effective. In 1981, Science Applications, Inc., was again asked to study this question. This time it concluded that decentralized facilities were the most feasible.

When DOE hired DUCI, DOE agreed to furnish necessary warehouse facilities. DUCI's Director of Procurement told us, however, that DOE provided practically no warehouse facilities during the first year. Although some temporary facilities, such as portable buildings and trailer vans at the sites and rented buildings off site, were used for storage, many parts, materials, and equipment received were issued directly to maintenance activities whether needed or not. Other items were stored at SPR sites unprotected from the weather.

In addition to the temporary facilities, DOE later provided some permanent buildings. However, discussions with contractor personnel at the sites during mid-1983 and a Defense Contract Audit Agency report³ to DOE indicated that the size and condition of permanent warehouse space were still inadequate for proper storage and protection of parts.

As of September 30, 1983, warehouses had been built at Bryan Mound and Weeks Island and were under construction at Bayou Choctaw and the DOE terminal at St. James. A decision had not been made on whether to construct a joint warehouse for the West Hackberry and Sulphur Mines sites or to construct a warehouse at each site. The October 1983 Baseline Assessment discussed the need to determine warehouse requirements at West Hackberry and Sulphur Mines and recommended further study of the needs at both sites and the potential use of an existing structure at West Hackberry. However, until the ILS has been finalized, neither spare parts requirements nor warehousing needs can be accurately determined.

Inventory control system was inaccurate

The absence of accurate property control records for spare parts was evident as early as January 1980. DUCI, in response to a DOE request, attempted to account for the inventory of initial spare parts purchased by Parsons-Gilbane but concluded that the lack of instructions and facilities for handling and storing parts at the individual sites had caused much loss due to corrosion, deterioration, and breakage. DUCI further concluded that the inspection required when items are received may have been ignored, resulting in possible acceptance of items not meeting specifications.

After examining DUCI's response, DOE concluded that there were no complete, accurate records as to what had been ordered, what had been used, and what was in inventory. According to DUCI officials, they were not able to reconcile the records for DOE because the records were in poor condition.

Problems with the property records continued and the situation was apparently unchanged in 1981 when DOE rated DUCI's property management performance as less than satisfactory. In its evaluation of DUCI for the quarter ending June 30, 1981, DOE noted that

"Generally, DUCI's performance was unacceptable at all sites. While progress was made in computerizing the excess property, little or no progress was evident of

³Evaluation of Personal Property Control Systems (1221-3F 1788001-356, June 30, 1983).

an automated system to account by site for spares, repair parts and other expendables. No action is taking place relative to maintaining or disposing of excess property. Property in lay-down areas is not being maintained. Security, accountability (records), and maintenance need upgrading."

The Defense Contract Administration Services Agency tested DUCI's property records in August and September 1982 as part of the contract close-out process. It concluded that the records were inadequate to determine whether property had been consumed or transferred to POSSI. According to POSSI property officials, physical inventories conducted at the SPR sites did not locate numerous spare and repair parts included on DUCI's records, but did locate many more parts not included on DUCI's records.

During our review, we tested between 5 and 7 percent of the spare and repair parts property records maintained by POSSI for three storage sites and found inaccuracies in 23 to 100 percent of the records tested. We tested records at Bayou Choctaw in July 1982 and again in January 1983 and noted little change in the quality and accuracy of the records tested. In January and February 1983, we tested spare parts records at Bryan Mound and West Hackberry. Each test disclosed that (1) the automated records produced at POSSI headquarters in New Orleans did not agree with the manual records maintained at the site and (2) site personnel could neither locate some test items shown on the manual records nor determine from the records what happened to the items.

DOE approved POSSI's property control system in January 1983. However, DOE notified POSSI at that time that, based on an assessment by DOE property evaluation staff, its property control records were inaccurate at five of the six sites and that if corrective actions were not taken within a reasonable time, approval of the system would be withdrawn.

In April 1983, subsequent to DOE's approval of POSSI's property control system, we found that manual property record-keeping had improved at Bryan Mound and West Hackberry. However, contractor personnel told us they still could not locate items which, according to their manual records, were transferred to POSSI from DUCI. Moreover, the automated records of the spare parts inventory prepared by POSSI headquarters for both sites were still inaccurate.

POSSI worked on reconciling these discrepancies throughout 1983, and in its comments on our draft report stated that it had completed inventory adjustments at all but one of the SPR sites. POSSI said it expected to complete the reconciliation at this site--West Hackberry--in December 1983. POSSI also noted that the automated property record system had been implemented at all six SPR sites. According to POSSI, authentication of the automated

system with the manual records was underway at four sites and would be completed at all sites during December 1983. In March 1984, DOE reported that it was in the process of verifying POSSI's inventory records and expected to complete the verification by June 30, 1984.

In its comments on our report draft, DOE stated that it had reevaluated POSSI's property control system and that the system was satisfactory at all of the SPR sites except West Hackberry. DOE also noted that POSSI was devoting additional resources to improve the system and upgrade the property control records at West Hackberry.

CONCLUSIONS

DOE did not include logistics support planning in the initial design of the SPR due to a decision to accelerate oil fill. Subsequently, problems, such as equipment standardization which an ILS is intended to prevent, surfaced. DOE attempted to develop an ILS capability after the problems arose. DOE's efforts to develop an ILS system have stretched over more than a 5 year period--beginning in late 1978 and continuing through early 1984--and have involved a number of contractors. Most of the contractors were responsible for studies or analyses that were to contribute to ILS development by the operations and maintenance contractors--DUCI or POSSI. Although DOE intended to use DUCI as the focal point of ILS development, the contract scope of work was not clear in this regard and DOE ultimately had to modify the contract at increased cost to add the ILS responsibilities. Even then, however, DUCI did not complete the ILS system before it was replaced by POSSI.

DOE defined ILS responsibilities more clearly in POSSI's contract. However, DOE did not provide POSSI any of DUCI's ILS work, and POSSI initiated a new effort to develop the ILS system with only minimal benefit from other contractor efforts. POSSI's progress was slower than originally expected, and although it has completed a basic ILS system, the system still was not fully operational in early 1984.

The slow development of the ILS system resulted in inadequacies in the inventory of spare and repair parts for SPR equipment from program inception through most of 1983. While progress was made in late 1983 to increase the parts inventory, the adequacy of the inventory still was questionable in early 1984.

The slow ILS development also contributed to the delays in providing adequate warehouse space at the SPR sites to protect the spare and repairs parts which had been purchased. Adequate warehouse space could have helped to control the inventory of parts and improve the accuracy of the property records. DOE has recognized the problems in these areas and has taken actions to improve them.

DOE's approach to ILS development for its new Phase III site is more consistent with established logistical support practices than was its previous approach. However, since some of the Phase III ILS activities are starting to fall behind schedule, we believe that DOE needs to assure that the ILS activities are properly completed and implemented and that the maximum degree of standardization in equipment and spare parts is achieved. DOE also needs to assure that sufficient levels of spare and repair parts are acquired for the SPR sites and that warehouse facilities are available to protect these parts.

RECOMMENDATIONS TO THE SECRETARY
OF ENERGY

In view of the importance of logistical support to the efficient and economical operation of the SPR, the past problems encountered in developing a logistics support system, and the schedule slippages occurring at the Big Hill site, we recommend that the Secretary of Energy instruct the SPR Project Manager to more closely monitor contractor activities to ensure that

- logistics support activities at Big Hill are properly completed and implemented in a timely manner and
- equipment and parts acquired for the Big Hill site are standardized to the maximum extent possible.

We further recommend that the SPR Project Manager be instructed to take appropriate steps to determine the optimum level of SPR spare and repair parts inventories and warehousing facilities based on operational experience and design specifications.

CHAPTER 3

PROBLEMS IN IDENTIFYING ILS COSTS

AND PAYING CONTRACT AWARD FEES

As discussed previously, the development of an ILS for the SPR has been in process for 5 years and has yet to be completed. Costs associated with the development process are difficult to determine and DOE could not track these costs because some contractor accounting records did not specifically identify all ILS development costs or costs associated with the purchase of spare and repair parts. Although the current contractor identifies costs in these areas, the accuracy of the costs reported by the contractor was questioned by the Defense Contract Audit Agency. Finally, DOE has provided payment of award fees for contract performance rated by DOE as less than satisfactory.

We believe DOE would enhance its ability to assess progress in completing the ILS system if steps were taken to more closely monitor ILS development and associated costs. We also believe DOE should closely examine the basis for paying award fees under future SPR contracts so that the fees are not paid for less than satisfactory performance.

ACTUAL COST OF DEVELOPING ILS UNCERTAIN

The actual costs associated with developing an ILS system for the SPR are difficult to determine. Two of the major contractors DOE hired to perform ILS development work, Parsons-Gilbane and DUCI, did not record ILS system development costs or costs of purchasing spare and repair parts in sufficient detail to identify amounts actually spent for these purposes. Consequently, DOE cannot identify total ILS system development costs.

Based on DOE and contractor estimates of the costs which have been associated with the ILS system development, we estimate that as of December 31, 1983, DOE had spent about \$9.8 million to design and develop an ILS system, including a property control system, for the SPR. In addition, about \$15.3 million has been spent to purchase spare parts. A breakdown of these costs, by DOE contractor, is shown in table 3.

Table 3

Estimated Expenditures for Spare Parts and
for Developing an ILS System

<u>Contractor</u>	<u>Spare parts purchases</u>	<u>ILS activities</u>	<u>Total cost</u>
Parsons- Gilbane	\$ 1,403,122	-	\$ 1,403,122
PB-KBB	-	\$ 220,000	220,000
Corps of Engineers	-	735,000	735,000
DUCI	3,980,000 ^a	1,434,968	5,414,968
Aerospace	-	1,163,000	1,163,000
POSSI ^b	9,896,000	6,137,000 ^c	16,033,000
DOE	<u>-</u>	<u>100,000^d</u>	<u>100,000</u>
Total	<u>\$15,279,122</u>	<u>\$9,789,968</u>	<u>\$25,069,000</u>

^aSPR Project Management Office officials told us that extensive costs had been incurred for off-site repairs of equipment because of the need for specialized repair equipment and the shortage of spare and repair parts. These officials estimated, for DUCI alone, that approximately \$1 million worth of spare parts was purchased in connection with subcontracted repairs. We have included this amount in our total for DUCI spare parts purchases.

^bDOE and POSSI provided updated figures in their comments on our draft report. We further updated POSSI's expenditures to December 31, 1983.

^cIncludes \$2,518,000 related to development of a property control system.

^dSPR Project Management Office officials told us that DOE's in-house cost for monitoring contractor and subcontractor ILS activities was equal to the salary of one employee for several years, or about \$100,000.

DOE COULD NOT TRACK COSTS FOR SPARE PARTS

DOE could not track funds provided to DUCI for spare parts because the contractor was not required to report the costs incurred for specific work tasks. As a result, DOE had to modify its contract with DUCI to provide additional funds for urgently needed spare parts. Although the current contractor--POSSI--reports expenditures in more detail than DUCI could, the accuracy of the costs reported was questioned as a result of an audit of its accounting system.

The ILS development for the SPR was included in reimbursable "mission-type" contracts that DOE awarded for SPR operations and maintenance. SPR Project Management Office officials stated that, under such contracts, funds lose their identity once obligated to the contract, even if obligated for a specific purpose such as acquisition of initial spare parts. According to these officials, contractors are responsible for determining how to spend available funds to best accomplish the contract "mission." The contractor establishes task priorities and may decide not to work on a specific task if it believes that other tasks are more important. However, because the contractor is not required to report costs incurred for specific work tasks, DOE does not have information available which could alert it to problems that may be developing or to develop appropriate solutions to problems. For example, DOE was not aware that funds provided to DUCI for spare parts had not been used for the intended purpose until after the funds had been used.

In at least two instances, DUCI used funds that were provided specifically for spare parts on other mission tasks. In April 1981, DOE decided to modify DUCI's contract to add a requirement that DUCI purchase as much as \$3.9 million worth of urgently needed initial spare parts. DOE added about \$4.2 million to the contract for the estimated cost of these parts and fee associated with this modification. However, instead of buying the spare parts, DUCI used these funds for other mission-related work under the contract.

Subsequently, DOE provided an additional \$1.3 million to DUCI to obtain the needed initial spare parts. Because total funds available to complete the overall contract requirements were limited, DOE wanted to ensure that the needed spare parts were bought. Therefore DOE stipulated in the second contract modification that "Up to \$1,300,000 shall be expended solely for most urgently needed initial spare parts . . ." According to SPR Project Management Office officials, DUCI may have used a portion of these funds for other contract work.

In commenting on a draft of this report, DUCI representatives said that it is generally correct that a mission-type contractor has discretion to use funds as it sees fit within the scope of the contract. However, DUCI said that it did not have much discretion in how it used funds because DOE emphasized activities associated with storing oil as rapidly as possible. With respect to the purchase of spare parts, DUCI representatives said that while funds were specifically provided for spare parts acquisition, DUCI used the funds provided for spare parts on other tasks based on its understanding of DOE's priorities.

In its comments on our draft report, DOE stated that while it did control funds under the DUCI contract, its control was not as effective as it might have been. DOE also stated that it does track the use of funds by contractor functions and that significant progress had been made in cost reporting under the POSSI contract. Further, DOE stated that it did not believe that monitoring expenditures made by mission-type contractors for specific work orders or contract modifications was necessary. DOE said that it uses reports, meetings, and audits to track contractor expenditures in accordance with the approved total contract amount and work breakdown structure.

We recognize that DOE does monitor contractor expenditures to ensure that the contractor does not spend more money than it is allocated and that contractors report expenditures in the format called for by the work breakdown structure. The work breakdown structure is part of the system that DOE contractors are to use to track costs against budgeted amounts. However, DUCI had problems in developing a cost accounting system and in mid-1981, DOE directed DUCI to stop working on the system. Since DUCI did not complete this system, it could not provide data which would have enabled DOE to monitor expenditures for activities such as ILS. Although POSSI reports expenditures in more detail and includes activities such as ILS, the accuracy of the data provided by POSSI's accounting system has been questioned by the Defense Contract Audit Agency.⁴ According to the Audit Agency, POSSI's accounting system could not accumulate reliable cost data related to detailed activities, but it could accumulate adequate data for overall labor, material, and overhead categories.

We believe that DOE could have exercised more management control over the use of funds provided for spare parts if it had been able to track how the funds actually were applied.

⁴Audit Report on Accounting System Survey, contract number DE-AC96-82-P010365, Petroleum Operations and Support Services, Inc. (1221-3F160041-331, June 22, 1983).

SPR CONTRACTS PROVIDED FOR PAYMENT OF
AWARD FEE FOR PERFORMANCE RATED LESS
THAN SATISFACTORY

DOE's cost reimbursable contracts with DUCI and POSSI provided for the payment of an award fee for performance rated as being less than satisfactory. Based on a DOE evaluation of DUCI's performance, which was rated less than satisfactory, DUCI received an award fee. While DOE has modified the award fee structure under the current POSSI contract, POSSI can still earn a portion of its award fee even if its performance is rated as substandard. Since the award fees are intended to motivate contractors to achieve excellence, we believe DOE should modify the award fee structure to achieve these ends.

In the cost-reimbursable contracts DOE has used with DUCI and POSSI, the contractor is paid a "base" fee and is eligible to receive all, or a part of, an "award" fee. The award fee is intended to motivate the contractor to achieve excellence in such areas as quality, timeliness, ingenuity, and cost effectiveness. The amount of the award fee is based on the number of performance points a contractor earns and can range from 0 to 100 points.

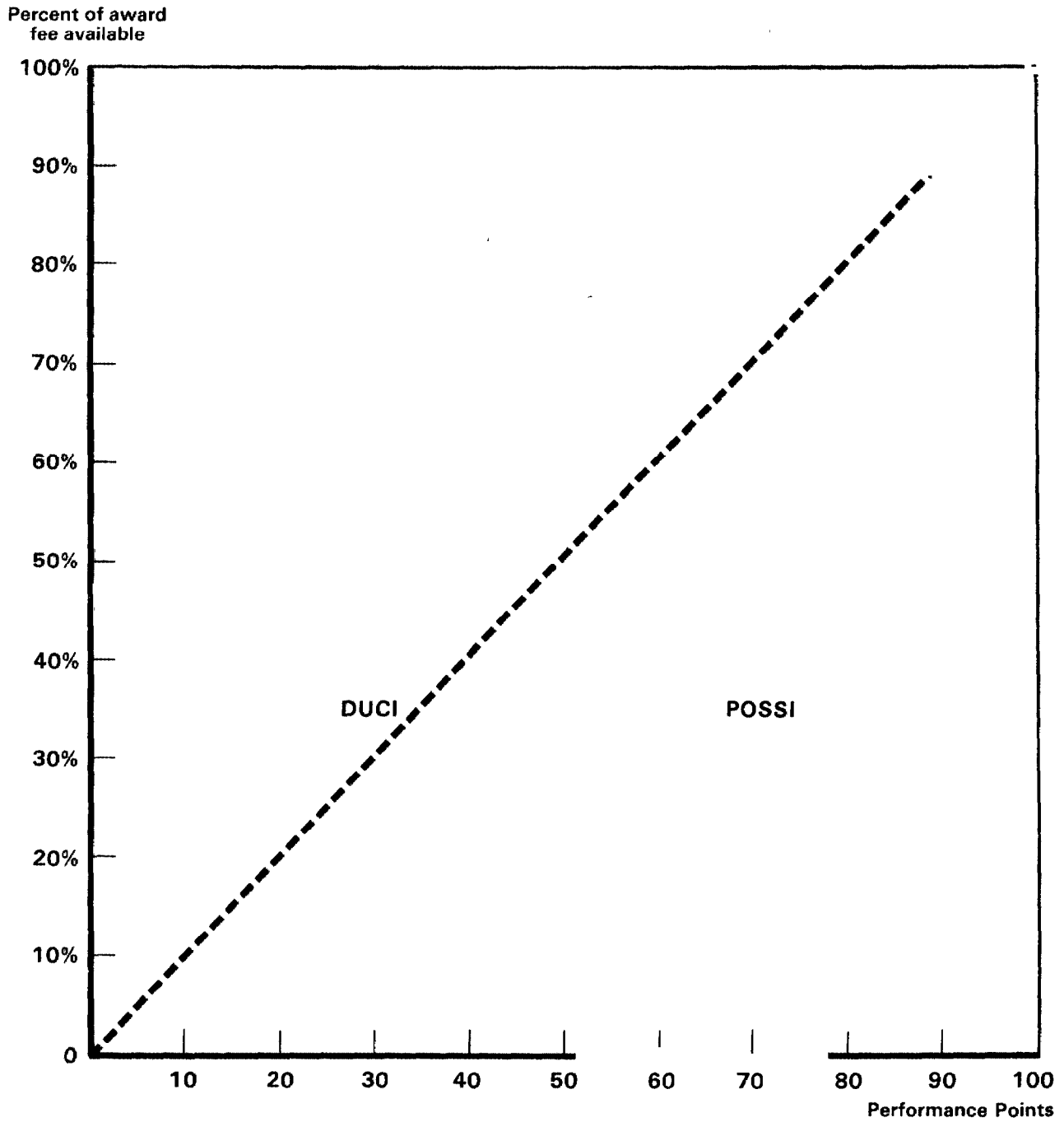
During the period from 1979 to 1982, DUCI earned about \$2 million in total award fees. The award fee plan used for DUCI allowed the contractor to earn up to 40 percent of the total award fee available even when performance was rated as "substandard" or "poor." During the period from January through March 1981, DOE rated DUCI's performance in buying and warehousing spare parts as "substandard" and its performance on ILS as "poor." DOE assigned performance points of 40 and 15, respectively, to these tasks. Even though performance was less than satisfactory, DOE awarded DUCI \$3,321 of the \$14,235 award fee available during the period for these tasks.

The award fee plan DOE uses to evaluate POSSI's performance provides more incentive for achieving high performance than did the award fee plan DOE used for DUCI. Under the POSSI contract, an award fee is paid only when the number of performance points earned is 60 or greater. However, performance scores of between 60 and 70 points can be earned based on a DOE performance rating of "substandard" and up to 10 percent of the available award fee can be paid for "substandard" performance.

The following chart graphically shows the differences in the award fee structure under the DUCI and POSSI contracts.

FIGURE 1:

Difference in Award Fee Provisions in the DUCI and POSSI Contracts



Adjective Performance Ratings

DUCI	Poor	Substandard	Satisfactory	Good	Outstanding
	0	20	40	60	80
					100
POSSI	Unsatisfactory		Sub-standard	Satisfactory	Good
			60	70	80
					90

DOE considers POSSI's performance on its ILS planning activities as part of a broader performance category called "operations and maintenance plans and readiness."⁵ DOE rated POSSI's performance in this category as outstanding in calendar year 1982 and awarded 96 percent of the total possible fee available for the category. DOE also rated POSSI's performance as outstanding in this category during the early part of 1983. However, as discussed in chapter 2, POSSI's development of an ILS plan took longer than originally anticipated and still was not considered to be fully operational in early 1984. The extent to which POSSI's performance in developing the ILS system was considered by DOE in its performance evaluation could not be readily discerned from the award fee evaluations since ILS development was included in the broader category. While judgment is involved in the evaluation process, we believe there should be a clear link between the actual performance of assigned tasks and amount of fee paid.

Overall, we believe that the award fee structure under the SPR contracts related to ILS design and implementation should be designed to encourage high quality performance. As such, award fees should not be paid for contractor performance that DOE rates as less than satisfactory.

The DUCI representatives who commented on our draft report said that the award fee is intended to be a motivating factor and not a means of punishing the contractor. They said that DOE established priorities for various work efforts and that DUCI followed these priorities. According to the DUCI representatives, the ILS work was not completed because DOE gave it low priority. As we indicated earlier, both DUCI's performance and the priority given by DOE were probably factors contributing to lack of ILS completion.

DOE, in commenting on our draft report, stated that it believes that POSSI's award fee structure provides appropriate performance incentives. However, DOE agreed that better contractor performance can be achieved by emphasizing appropriate elements in the award fee objectives and by providing better administration of the award fee evaluation.

CONCLUSIONS

DOE has spent 5 years and at least an estimated \$9.8 million to develop and implement an ILS system for the SPR. The actual cost of developing the ILS system is uncertain because of the way that some of DOE's contractors maintain their accounting records. In addition, DOE could not track funds provided for the purchase of spare parts because funds provided for specific work tasks lose their identity once obligated to cost-reimbursable mission contracts. Although POSSI accumulates costs in more detail than DUCI did, the accuracy of these costs

⁵This category subsequently was changed to "logistics."

has been questioned by the Defense Contract Audit Agency. We believe that DOE needs to improve its ability to monitor overall contractor costs related to the completion and operation of the SPR's ILS system.

DOE's cost-reimbursable contracts have provided, and continue to provide, award fees even if contractor performance is rated substandard by DOE. In addition, the award fee structure does not present a clear link between ILS performance and fee awards.

Since the award fee is one of the few tools available to DOE to motivate good performance from contractors with cost-reimbursable contracts, it is extremely important that DOE use this tool well. Thus, we believe DOE should structure future award fee plans so that the fee is paid only for satisfactory or better performance and that performance of specific activities is clearly linked to fee awards.

RECOMMENDATIONS TO THE
SECRETARY OF ENERGY

We recommend that the Secretary of Energy instruct the SPR Project Manager to:

- Develop a cost tracking system that clearly identifies costs being expended in the development and operation of the SPR ILS system.
- Structure the contract award fee plans in future contracts so that (1) award fees are not paid for less than satisfactory performance and (2) award fee payments are clearly linked to the contractor's actual achievement in meeting stated objectives.



Department of Energy
Washington, D.C. 20585

NOV 02 1983

Mr. J. Dexter Peach
Director, Resources, Community and
Economic Development Division
U.S. General Accounting Office
Washington, DC 20548

Dear Mr. Peach:

The Department of Energy (DOE) appreciates the opportunity to review and comment on the General Accounting Office (GAO) draft report entitled "Integrated Logistics Support for the Strategic Petroleum Reserve Has Been Poorly Managed," GAO/RCED-83-138.

The DOE strongly supports the thrust of the draft report regarding the need for integrated logistic support planning and implementation to ensure trouble-free, cost-effective operation of the Strategic Petroleum Reserve (SPR). The draft report recognizes that significant improvements have been made in this area during the last 18 months. We intend to place a high level of management emphasis on integrated logistic support to continue improvements until a fully acceptable and effective system is finalized.

As a general comment, we feel that the draft report, particularly in the DIGEST, places disproportionate emphasis on shortcomings in logistics support in the early years of the SPR program. We agree that the ambitious storage schedules mandated by Congress did not afford sufficient time to undertake the level of support planning in the design phase that ideally would be accomplished. Undoubtedly, some benefits would have been realized in the logistics support program by delaying the development schedule of the SPR. This, of course, must be balanced against the benefits which were gained by early storage of oil in the SPR. In retrospect, the management decisions to proceed with accelerated fill of the SPR appear to have some validity considering that substantial dollar savings were realized by placing over 90 million barrels of oil in storage at less than one-half post-1979 prices.

In recent years, the SPR has taken action to implement an extensive logistics support program. The benefits of conducting logistics support planning in conjunction with the design phase are fully recognized by the Department. As the report notes, support planning and efforts to maximize standardization in Phase III are being accomplished in coordination with the design. However, since the report's primary focus is on the early years of the program, it is unclear to the reader what problems previously existed, and what is the current state of operations. For example, on page 15, the report states "Spare parts shortages continue to hamper SPR operations." We suggest the report be revised to reflect that problems existing as a result of parts shortages occurred prior to FY 1982, since both storage development and fill objectives have been exceeded over the past two years. In general, we believe the report would be clarified by focusing on recent years and improvements which may be achieved in current activities.

[GAO NOTE: Some page numbers referring to the draft have been changed to refer to the final report.]

In attempting to address the past and present contractor involvement in the SPR's integrated logistic support effort and the associated costs, the report combines systems engineering, logistic support analysis, spare parts procurements and special studies. We believe that the Sandia and Corps of Engineers efforts should both be deleted from the report. Sandia was commissioned by the Under Secretary of Energy to perform a short-term technical assessment of the SPR. The Corps of Engineers undertook the Systems Engineering master plan effort when it was envisioned that they would be involved in management of turnkey projects. Neither of these efforts had any significant relationship to the SPR's integrated logistics support program. Also, the \$4,222,000 identified in Table 3 (page 21) as Petroleum Operations and Support Services, Inc.'s (POSSI's) integrated logistic support expenditures cannot be verified. The record shows that as of August 31, 1983, POSSI had spent \$2,871,000 on integrated logistic support development. In addition, the figure of \$1,463,000 for spare parts purchased by POSSI is very low. POSSI has received \$8,460,000 of direct materiel (spare/repair parts) through September 1983.

[GAO NOTE: Table updated to December 31, 1983.]

The statement on page 22 that "DOE did not track or control funds in the DUCI contract" is misleading. Funds control on the Dravo Utilities Constructors, Inc. (DUCI) contract was in existence, although it was not as effective as it might have been. Feedback was obtained from the contractor and the SPR Project Management Office held weekly senior management meetings with DUCI which included approval or disapproval of funds expenditures. DOE does track use of contract funds by contractor function. We track expenditures of man-hours, spare parts, salaries, etc. in accordance with the approved contract baseline and work breakdown structure. We believe that significant progress has been made in gaining visibility of key elements in POSSI's cost reporting, and we continue to seek improvements in this area.

The section on property control systems, pages 16-18, needs to be updated and clarified. POSSI's property control system at all sites has been reevaluated by DOE and rated satisfactory, except for West Hackberry. POSSI's property management personnel have taken steps and provided additional personnel to improve the system at West Hackberry and upgrade the property control records at this site. It also appears that the GAO auditors assumed the automated records were the official property records. The manual record cards were and still are the official records until the automated system is validated. The implementation of the automated system was and is in the validation and data verification stage. This means verifying and ensuring accuracy and completeness of the site documentation prior to data input and generation of master records. Thus, the property control system has been computerized, is currently in the validation phase, and full dependency on the automated system is expected by December 1983. Until such time, the manual records will be considered the official records.

The Department concurs with the apparent intent of the report recommendations, but would suggest some revision to achieve the desired objective as follows:

- o Recommendations 1 and 3 (page 33)

The recommendations as written could lead the reader to believe that contractors are not required to report expenditures and/or are allowed to use funds for tasks that are outside the scope of the contract. Some of the SPR contracts are mission-oriented. This means that there is a broad and general scope of work which contains many subelements, each subelement to be emphasized or de-emphasized depending on a variety of conditions actually experienced during the course of the contract. The contractor is free to use the contract funding as required to pursue the mission of operating and maintaining the SPR. Use of such funds is monitored in a variety of ways, including financial reporting, audit, surveillance by various contract, property, project control and technical groups, and formal reports during our project reviews. We do not believe it is necessary to monitor contractor costs for specific directions of work or contract modifications except in rare instances.

[GAO COMMENT: DOE's concerns about the proposed recommendations have been recognized in the final report. We continue to believe, however, that cost monitoring is necessary, but to avoid misleading a reader, we have consolidated the two proposed recommendations and clarified what we believe needs to be done by DOE. The revised recommendation is on p. 27.]

- o Recommendations 1 (page 44) and 3 (page 45)

The thrust of the GAO comments in the body of the report appears to support strict application of award fee ratings to achieve the desired contractor results in specific areas. However, the recommendation focuses on a rather narrow range of the award fee structure and fails to recognize the relationship of base and award fee in negotiating a total fee package. We believe the POSSI award fee as structured provides appropriate incentive for performance. We do agree that better contractor performance can be achieved by emphasizing appropriate elements in the award fee objectives and better administration of the award fee evaluation process.

[GAO COMMENT: The final report recognizes the base and award fee relationship and improvements in POSSI's award fee requirements. In addition, the two proposed recommendations have been consolidated to clarify what we believe needs to be done to better administer the award fee process. The revised recommendation is on p. 27.]

- o Recommendations 1 and 2 (page 19)

We concur with these recommendations as written and believe that appropriate actions are under way to achieve these objectives.

The Department of Energy appreciates the opportunity to comment on this draft report and trusts that the General Accounting Office will consider the comments in preparing the final report.

Sincerely,



Martha O. Hesse
Assistant Secretary
Management and Administration



Document #CAO-83-533

November 7, 1983 (Federal Expressed)

Mr. F. Kevin Boland
Senior Associate Director
United States General Accounting Office
Washington, D.C. 20548

Dear Mr. Boland:

I have carefully reviewed the selected portion of your draft audit entitled "Integrated Logistics Support for the Strategic Petroleum Reserve Has Been Poorly Managed", and am providing detailed information in the enclosure that I hope will be of assistance to you in fulfilling your responsibilities.

In brief, we at Petroleum Operations and Support Services, Inc. (POSSI) have developed post construction ILS and property systems that are operational and continue to be steadily enhanced to benefit site operations.

If I may be of assistance to you in this matter in any way please do not hesitate to call.

Sincerely,

A handwritten signature in cursive script, appearing to read "W. M. Oller".

W. M. Oller
Project Manager

WMO/WSM/RJM/sks

cc: C. C. Johnson, EP-55
Dave Spence
Chet Strunk
Bob Girman
Paul Wilson
Richard Moore
Joe Falcone
Falvie Anderson
Walt Malinowski

INTEGRATED LOGISTICS SUPPORT

No ILS program to build on. POSSI assumed ILS responsibility in early 1982 after having had no contractual transition time. In spite of the six previous contractors' ILS efforts identified in table two, there was no ILS system at the time POSSI assumed the contract. Limited useful information was provided upon which to build an ILS system. POSSI had to start almost "from scratch."

What ILS entails. ILS entails more than is described on page three of the GAO draft. POSSI ILS also includes a preventive maintenance program, a maintenance history program for both corrective and preventive maintenance, a systematic way to provide data for measuring the status of equipment reliability, availability and maintainability, a program for obtaining and maintaining an equipment configuration baseline, the capability for logistics support analysis, a maintenance management information system, and a failure modes and effects analysis capability.

OBJECTIVE, SCOPE AND METHODOLOGY

Warehousing and standardization. ILS planning, early in the program would have been beneficial. POSSI and DOE have made the best of a sub-optimum situation. POSSI has encouraged the construction of adequate warehouses to store and protect the project spare parts. POSSI's Reliability Program Plan advances the concept of standardization by replacing worn-out equipment with standard equipment after the attrition of obsolete, unsupportable, worn-out equipment. This is an economical, practical approach; however, there is concern with the potential limitation of competition in parts procurement. A program is underway to accelerate standardization through development of more definitive engineering standards which will result in uniformity of newly purchased equipment and which will make the standardization program compatible with the Federal Procurement Regulations (FPR) requirements.

Spare parts requirements determination. POSSI has developed a site-specific Initial Spares Requirements List (ISRL) to provide adequate sparing. Although the ISRL was desirable at the commencement of the contract, the ISRL development required a systematic effort, tied to equipment availability theory. This required the investment of time to accomplish properly. In the interim period, spares were ordered based on the usage rates for repair requirements and on the judgement of experienced POSSI maintenance personnel. This interim approach provided adequate spares to ensure that attainment of our leach/fill goals were never impaired. Currently an effort is underway to reconcile ISRL with spares on hand and on order, so that desirable spares not now planned for can be procured. At present, adequate spares are on hand to support drawdown and daily operations.

Costs for ILS activities and spare parts. If the costs shown in table three are meant to imply that \$4,222,000 has been spent to identify and purchase \$1,463,000 worth of spares, this is erroneous. ILS entails more than spare part identification, and the tasks described on page three of the GAO draft. As of the end of fiscal year 1983, POSSI's records show that \$3,588,000 was spent on ILS activities and \$8,460,000 was spent on spare and repair parts. This later figure includes not only piece parts meant for stock but also other parts such as for the conversion of certain pumps to stainless steel, parts for direct turn over for corrective maintenance, and some end item spares. Examples of the parts that this figure represents are shown in appendix A.

Since pages of this section were omitted from our copy of the draft letter, we are not able to comment further.

CONTRACT PROVISIONS ON ILS

ILS versus Property responsibilities. The GAO draft sets forth scope-of-work responsibilities and calls them ILS responsibilities. As a clarification, the Property sections of the SPR Project Management Office and the O&M contractor are responsible for the management of supply support systems as well as warehouses and other storage facilities. The only area of supply support for which ILS is responsible is the identification of spare part requirements. In POSSI, ILS, Property, Configuration Management and the Technical Library are grouped together in the Integrated Systems Department because the functions are interrelated and the potential for cost avoidance is significant.

Criticality analysis for equipment failures not in contract. POSSI performed failure modes and effects analysis (FMEA), but did not do so for failure modes, effects and criticality analysis (FMECA) because the contract item that specified FMECA was deleted from the POSSI effort before the contract was signed.

AWARD FEE CONSIDERATIONS

Award fee slopes in error. The award fee slopes shown on page 37 are in error. We have corrected the slope on the marked up page 37 enclosed as appendix B. We refer you to the Award Fee Conversion Chart Attachment C-5 to the Award Fee Plan to verify this.

No award fee for unsatisfactory performance. Petroleum Operations and Support Services, Inc. (POSSI) receives no award fee for performance that is of an unsatisfactory nature. We refer you to Attachment C-4 the Grading Table of the Award Fee Plan and invite your attention to Unsatisfactory Performance.

Award fee added to base fee. The award fee portion of the fee POSSI earns is added to the base fee. The base fee is valued at 3% of the estimated cost of contract performance that POSSI and

Department of Energy (DOE) developed in 1981. This three percent (3%) base fee provides POSSI with fee consideration adequate for minimally acceptable performance in all aspects of contract performance.

Award fee clarified. The Award Fee is valued at four percent (4%) of the estimated cost of contract performance developed by POSSI and DOE in 1981. This four percent (4%) available award fee provides POSSI with fee consideration to recognize the quality of performance ranging from just slightly better than minimally acceptable to outstanding. The available award fee pool consists of equal contributions from DOE and POSSI. That is, had this contract been a cost plus fixed fee contract, the negotiating parties would have agreed that POSSI should receive a five percent (5%) (total fee) fixed fee assuming average performance. On the Cost Plus Award Fee basis, POSSI has a reduced fixed (base) fee (5% - 2% = 3%), as its contribution to the award fee pool and the DOE has provided the two percentage points that make the total award fee equal 4% of the initial estimated cost. POSSI is entitled to earn 5% fee (combined base and award) for average performance. For less than average performance, POSSI is at risk for 2%. For better than average performance, POSSI has a potential to add the DOE 2% contribution. POSSI is entitled to one half (50%) of the available award fee at an 80% performance score. To date, POSSI has received scores in excess of 91% or in excess of 90% of the award fee dollar pool.

Incentive comparison. Whether or not the current award fee plan provides more or less of an incentive for POSSI than for DUCI can only be ascertained through comparison of the clarity and specificity of DOE senior management's direction to POSSI and DUCI on the areas of performance they want (or wanted) the O&M contractor to emphasize as compared to the relative success of the two organizations in achieving the client's goals. Only with clear direction can contractor management know its client's goals and focus its abilities and resources to attain those goals. Consequently, by simple review of the page 37 graph we cannot comment on lesser or greater incentives for POSSI or DUCI as we have not reviewed DUCI's award fee plan or subsequent performance.

Availability of award fee funds. Further, the graph does not indicate the basic difference between available funds to DUCI and POSSI resulting from the roll over of DUCI's unearned award fee from one period to the next period. POSSI's unearned available fee is not carried forward as incentive funds once a specific award period has past. The approach used with DUCI permits a contractor to earn scores equating to as low as 50% of the earned award fee (the fixed fee equivalent) and recover 91% of the award fee available. Needless to say, this places a great incentive upon improving performance to recover otherwise lost cost, an incentive DOE has yet to make available to POSSI.

ILLUSTRATIVE POTENTIAL CONTRACTOR AWARD FEE

RECOVERY WITH ROLLOVER

Award Period	Earned	Carry	Award in Period
1	\$41,500	41,500	83,000
2	62,250	62,250	124,500
3	72,625	72,625	145,250
4	77,813	77,812	155,625
5	80,406	80,407	160,813
6	81,703	81,703	163,406
7	82,352	82,351	164,703
8	82,676	82,675	165,351
9	82,838	82,838	165,676
10	82,919	82,919	165,838
11	82,960	82,959	165,919
12	<u>82,980</u>	<u>82,980</u>	<u>165,960</u>
TOTAL AWARD			
FEE EARNED	<u>\$913,022</u>	(or 91% of the available money)	

Assumptions:

- \$1,000,000 Available Award Fee Pool
- 12 Award Periods (\$83,000 Award Fee Available per Period)
- Each Award Fee Period the Contractor earns a score for adequate performance (50% of available fee is earned).

Added work does not bring added fee. As of November 7, 1983 POSSI has received 106 Technical Directions which require (for the most part) the performance of work not planned by POSSI. The estimated cost to perform this work is approximately \$10 million. A similar number of written directions of a technical nature that were not formal Technical Directions have also been received. The estimated cost, base fee and available award fee have not been adjusted to recognize the added work. POSSI has been assured that the contract cost will be increased to cover the added work through overrun funding. The lack of individually negotiated estimates, however, results in non-specificity in the level of resources the client wants focused on a particular Technical Direction, and frequently the dilution of other POSSI efforts to provide resources to perform a particular TD. This has the easily recognized result of (1) not providing more fee (positive incentive) to recognize POSSI's performance of the Technical Directions and (2) providing negative incentive as POSSI can be hurt financially through evaluation of TD performance and can not be helped by it. There is also the more subtle effect of reducing the fee (and performance) incentive in the disciplines which were slighted in resources to provide for TD performance.

Award fee negotiations. The DOE/POSSI contract costs were negotiated at the same level they would have been negotiated on a cost plus fixed fee basis. They were estimated as sufficient for adequate performance in all areas of contractually required scope. They were not negotiated at a sufficiently high level to permit outstanding performance in all areas. The government generally does not need, and should not buy, excessive performance. Accordingly, when DOE evaluates performance in all areas of the contract scope on an unsatisfactory to outstanding scale, their assessment is, by necessity, based upon what can be performed by POSSI within the available resource limitations agreed to by the management of POSSI and the DOE/SPR. The award fee is administered in a manner that permits a reasonable expectation that it is possible for the contractor to perform at the highest level of the expressed performance range. With this perspective, DOE has evaluated POSSI repeatedly as outstanding performers.

PLANS TO IMPROVE WAREHOUSING FACILITIES

Adequate warehousing. ECPs are in motion to improve (provide adequate) warehousing at three sites.

POSSI ILS DEVELOPMENT PROGRESSING, BUT NOT AS RAPIDLY AS EXPECTED

Notable progress in ILS development. POSSI has made much progress in developing an ILS system. It has, in addition to what the draft letter states; i.e., submitted a draft ILS Master Plan for DOE approval, determined spare part requirements for mission-essential equipment and developed a property control system which DOE approved: (1) put on line at all sites a refined computerized preventive maintenance system with an automated scheduling system, (2) established an automated work order system and associated maintenance history file, (3) set up an operating computerized method for calculating equipment mean-down-times (MDT's) and mean-run-times-between-failures (MTBF's) for reliability, availability and maintainability purposes, (4) written and published fifteen maintenance-related manuals, and (5) set up a logistic support analysis system which included failure modes and effects analysis. Although still requiring enhancements, a complete, basic ILS system is in place and functioning.

Time needed for an ILS system built after design phase. It is difficult and time consuming to establish an operating ILS system "from scratch" on an operating project. ILS is meant to be established gradually and systematically during the design and construction phases of a project, not as a "catch-up" proposition. Also, building an ILS system must be a time-phased project, on which the completion of some items are necessary before others can be addressed, regardless of how many people may be working to develop the system. Success must be measured differently in an ILS system that is built after the project design phase.

ILS Master Plan schedule adequate. With regard to the ILS Master Plan, the implication in the GAO draft is that POSSI is remiss in its ILS program because a second draft of the plan was not submitted until May of 1983. A first draft was submitted, by POSSI, and, reviewed and commented on by the DOE. A revised draft was then submitted by the contractor. This process on such a complex document is time consuming, but worthwhile. The submission dates were discussed and agreed on by both parties (DOE and POSSI) considering the evolving document's complexity and the other ILS documents being produced simultaneously. That a final ILS Master Plan was not quickly approved does not mean POSSI's was without ILS goals. The overriding intent during the preparation of the ILS Master Plan was to produce a quality document that was considered and concise. Undue haste may have had a deliterious effect on the Master Plan, other ILS activities and eventually operations.

PROPERTY CONTROL SYSTEM

Quality of property control records. Property control records have steadily improved to the current point that they are in accordance with DOE regulations. Shortcomings in the records that were apparent at various points in time while the property control system was being developed were foreseeable and resulted from the lack, (1) of identification of the government owned property and (2) of the basic system of control, rather than from the lack of automation. Automation of property controls provides efficiency of operation and a tie-in with ILS, purchasing and accounting.

Manual system necessary before mechanization. It is imperative that an accurate, manual system be operational prior to mechanization. POSSI concentrated its prior efforts on establishing the currnt valid manual system and is now emphasizing development of an accurate mechanized property system.

No accurate property record baseline to build on. POSSI had little benefit from the transfer of the previous contractor's records system, but had to create and develop an inventory record system baseline utilizing incomplete and sometimes inaccurate transfer documentation. This manual system baseline was established early in the contract. DOE and POSSI consciously planned to construct a manual record system while development and implementation of a parallel automated system was underway. Early audits performed on site records did identify problems in record-keeping; however, it was understood that annual physical inventories would result in increasingly more accurate manual records.

Inventory adjustments necessary. Subsequent property record audits were conducted during which reconciliation activities substantiated that some materials listed as transferred to POSSI were not in inventory. Additional material was found in inventory

with no evidence of transfer to POSSI. Completed inventory adjustment vouchers for five sites document \$157,711.05 worth of materials listed in turnover documents as transferred to POSSI yet not in inventory, and \$3,768,716.74 worth of materials found in inventory without evidence of transfer to POSSI. Adjustment vouchers for the sixth site will be completed in December of this year. Appendix C documents the inventory adjustments. The overall results provide a more accurate property record-keeping system as substantiated by later GAO site visits, conducted in April, 1983. POSSI now has a viable property baseline.

Development of Automated Property Record System. POSSI's contractual requirements call for development and implementation of an automated Property record system. This effort was not complete at the time of the early audits. GAO audit personnel were advised, prior to their site visit, that the automated records lagged behind the manual records in transaction postings and the official record at the time of audit would be the manual record system. Today POSSI's automated Property Record System has been implemented at all six sites and authentication with manual record systems is underway at four sites: Weeks Island, Bryan Mound, West Hackberry and Bayou Choctaw. POSSI has scheduled completion of the authentication and implementation process for all sites during December 1983. Subsequent to this period, a thirty-day validation period will ensure timely posting and updating of automated records prior to discontinuance of the manual system.

Overall

POSSI has made significant progress in the ILS and Property disciplines, and we intend to continue to improve both systems. Limited records at the time of POSSI's commencement on the SPR Project required the development of both systems from the ground up on a non-interference basis with leach/fill activities.

POSSI and DOE have succeeded in providing the project with all necessary programs and expanded capabilities within the Integrated Logistics Support and Inventory Control Systems for the real time management and monitoring of O&M activities. The SPR program now has an automated, site-specific preventive maintenance system, has an automated maintenance history system which addresses reliability, availability and maintainability (RAM) and a quantitative, systematic method of measuring progress within RAM. The SPR now has a logistic support analysis system capable of many functions, (one of which is the systematic identification of spare parts requirements).

POSSI has made similar progress in the development of accurate manual and automated systems of inventory control in the Personal and Real Property areas. POSSI now knows what it has, where it is and how much it cost. POSSI has provided ILS and Property Management systems that give DOE comprehensive support to its readiness for drawdown.

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United States Senate

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

8 March 1984

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 Committee on Energy and Natural Resources considers the Strategic Petroleum Reserve (SPR) a high-priority national energy security program. An adequate and usable SPR is a key element of this Nation's efforts to provide protection against the consequences of an international oil supply interruption.

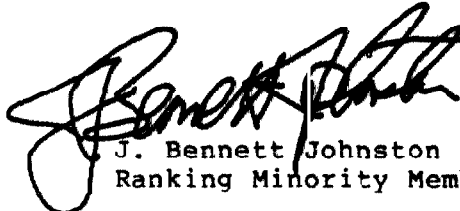
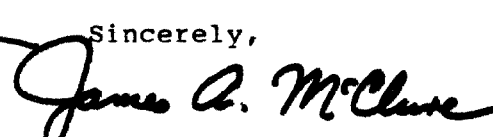
On March 25, 1982, the Committee requested that the General Accounting Office monitor the SPR program activities, and report quarterly by letter to the Committee as to the Administration's progress in filling the SPR and in complying with the requirements of applicable law.

We have been advised that during the course of your monitoring and reporting activities pursuant to this request, certain SPR issues have been found which may warrant additional GAO review. Accordingly, we request that the GAO, in consultation with the Committee, identify those matters which warrant review, and that the GAO report to the Committee the findings of such review, along with any recommendations.

Given the importance that Congress and this Committee attaches to the Strategic Petroleum Reserve, it is essential that we be informed as rapidly as possible of any programmatic matters or other problems which may adversely affect the program.

Please let us know if we can be of any assistance in carrying out this request.

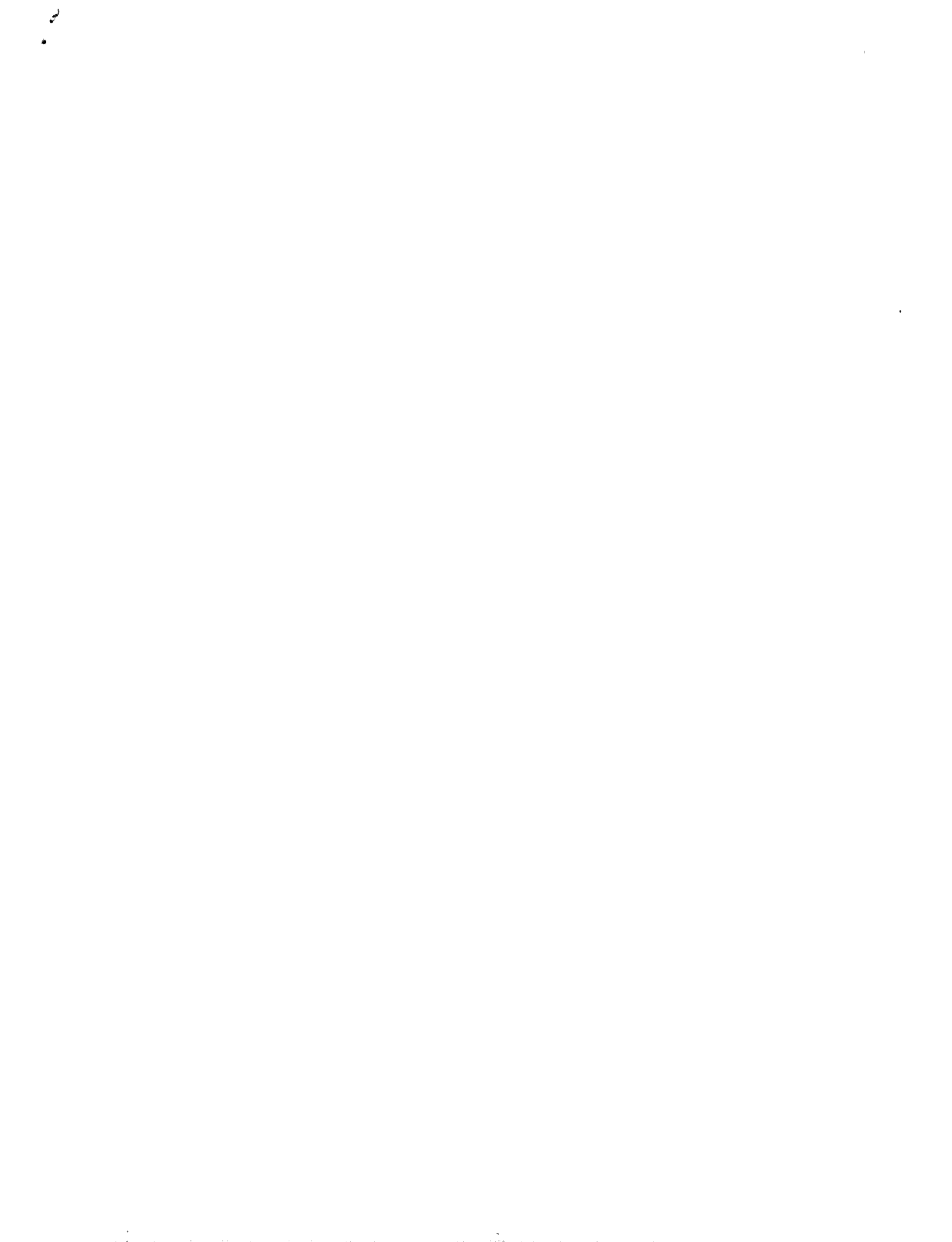
Sincerely,

J. Bennett Johnston
 Ranking Minority Member

James A. McClure
 Chairman

(306304)



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