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Transportation Planning for the Strategic Petroleum Reserve Should Be Improved. LCD-78-211; B-66927. October 18, 1978. 12 pp.

Report to Secretary, Department of Energy; by J. Dexter Peach, Director, Energy and Minerals Div.

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To minimize the vulnerability of the United States to the effects of a severe energy-supply interruption and to provide limited protection from the short-term consequences of interruptions in supplies of petroleum products, the Congress provided for the creation of a Strategic Petroleum Reserve for the storage of petroleum products. The current goal is to have 1 billion barrels of crude oil in storage by the end of 1985 and 500 million barrels by the end of 1980. At July 31, 1978, there were 35 million barrels of crude oil in storage. The Department of Energy (DOE) has the responsibility for developing a comprehensive plan for transporting the crude oil.

Findings/Conclusions: The DOE has not developed a comprehensive plan for transporting the crude oil, nor has it prepared overall transportation cost estimates. Neither the December 1976 Strategic Petroleum Reserve Plan nor the May 1978 amendment had specific information on transportation plans and costs. Transportation costs were not broken out separately in the \$7.5 to \$8 billion estimate of the total cost of the reserve. The impact of the Cargo Preference Act should be a major consideration. Adherence to the act's requirements will raise transportation costs substantially, but the DOE has not developed the information needed to accurately quantify these costs. The Maritime Administration and at least two oil companies disagree on whether U.S.-flag tankers will be able to transport 50% of the crude oil for the reserve as required by the Cargo Preference Law.

Recommendations: The Secretary of Energy should develop and make available to appropriate congressional committees a comprehensive transportation plan for the Strategic Petroleum Reserve, including detailed transportation cost estimates and firm information on the costs and other effects of the Cargo Preference Act. (RRS)

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REPORT BY THE U.S.

# General Accounting Office

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## Transportation Planning For The Strategic Petroleum Reserve Should Be Improved

The Department of Energy needs to develop a comprehensive plan for transporting crude oil to the Strategic Petroleum Reserve. The large amount of oil (1 billion barrels) in the Reserve and the tight time frame for filling it make such planning essential.

In developing the plan the Department should consider the ramifications of the Cargo Preference Act. This act requires that at least 50 percent of the oil be transported in U.S.-flag vessels if they are available. Firm information on the availability of these vessels and the additional costs of using them has to be generated.





UNITED STATES GENERAL ACCOUNTING OFFICE  
WASHINGTON, D.C. 20548

ENERGY AND MINERALS  
DIVISION

B-66927

The Honorable  
The Secretary of Energy

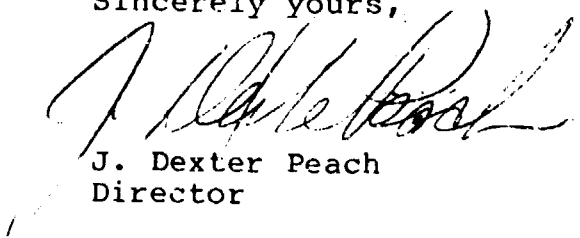
Dear Mr. Secretary:

This report discusses ways your agency can improve transportation planning for the Strategic Petroleum Reserve.

The report contains recommendations to you on page 11. As you know, section 236 of the Legislative Reorganization Act of 1970 requires the head of a Federal agency to submit a written statement on actions taken on our recommendations to the Senate Committee on Governmental Affairs and the House Committee on Government Operations not later than 60 days after the date of the report and to the House and Senate Committees on Appropriations with the agency's first request for appropriations made more than 60 days after the date of the report.

We are sending copies of this report to the Director, Office of Management and Budget; the Secretary of Defense; the Secretary of Commerce; and the chairmen of the appropriate congressional committees.

Sincerely yours,



J. Dexter Peach  
Director

D I G E S T

Because the Strategic Petroleum Reserve is so large and the need to fill it is so urgent, the Department of Energy has to develop a comprehensive plan for transporting the crude oil. Creation of the Reserve was approved in December 1975 to minimize the effects of a severe energy supply interruption.

The current goal is to have 1 billion barrels of crude oil in storage by the end of 1985--500 million barrels by the end of 1980, rather than the end of 1982 as initially planned. At July 31, 1978, there was 35 million barrels of crude oil in storage.

The Department of Energy has not developed a comprehensive plan for transporting the crude oil, nor has it prepared overall transportation cost estimates. Such a plan is particularly important in view of the accelerated storage fill date. (See ch. 2.)

The plan should discuss transportation alternatives and their implementation and cost implications. It should then recommend a course of action and estimate the cost of the total transportation package. Alternatives would include:

- Percentage of oil to be purchased from each major foreign acquisition area and the effect on transportation.
- Sources and mixes of different size vessels.
- Percentage combination of U.S.- and foreign-flag vessels. (See ch. 2.)

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Energy must consider in its plans the ramifications of the Cargo Preference Act. This act requires that at least 50 percent of all Government cargo purchased overseas be shipped on U.S.-flag vessels if they are available.

Adhering to the act could raise transportation costs substantially. Estimates of the additional cost of cargo preference for 50 percent of the first 500 million barrels of crude oil ranged from \$122.5 million to \$620 million. (See ch. 3.)

Opinions differ on the availability of U.S.-flag vessels to transport the crude oil. The Maritime Administration, which administers the act, is optimistic that U.S.-flag vessels will be able to transport 50 percent of the oil. Some oil companies are pessimistic. Because of the significant impact of cargo preference on costs and plans, these differences need to be resolved. (See ch. 3.)

The Secretary of Energy should develop, and make available to appropriate congressional committees, a comprehensive transportation plan for the Strategic Petroleum Reserve. The plan should include detailed cost estimates. Firm information on the costs and other effects of the Cargo Preference Act also should be generated and included. Energy and the Congress then will be better able to assess program costs and budget impacts and determine whether any changes are appropriate in the act's application to the Reserve. (See ch. 4.)

GAO discussed this report with Energy officials. They generally agreed with the findings and recommendations.

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### ABBREVIATIONS

DOE	Department of Energy
GAO	General Accounting Office

CHAPTER 1  
INTRODUCTION

To minimize the vulnerability of the United States to the effects of a severe energy supply interruption and provide limited protection from the short-term consequences of interruptions in supplies of petroleum products, the Congress provided for the creation of a Strategic Petroleum Reserve for the storage of petroleum products (Energy Policy and Conservation Act of 1975, 42 U.S.C. 6201 (Supp. VII 1977)).

The act required the Administrator of the Federal Energy Administration (this agency's functions were later transferred to the Department of Energy (DOE)) to submit to the Congress by December 15, 1976, a Strategic Petroleum Reserve Plan, detailing his proposals for designing, constructing, and filling the storage and related facilities of the Reserve.

The submitted plan provided for a Reserve of 500 million barrels of crude oil by December 1982. Effective June 20, 1977, the plan was amended to move the fill date up to December 1980. In May 1978, DOE amended the plan again, increasing the size of the Reserve from 500 million to 1 billion barrels. The full 1 billion barrels is to be completely stored by the end of 1985. The first 500 million barrels is still targeted to be stored by the end of 1980. At July 31, 1978, there was 35 million barrels in storage.

DOE plans to purchase the crude oil primarily from foreign sources. Saudi Arabia, Iran, Great Britain (North Sea), Mexico, and Venezuela are being considered or used as principal sources. Oil may also be purchased from Nigeria and Algeria.

Transportation of the crude oil from the foreign sources to U.S. storage sites is the subject of this report.

Once shipped, the oil will be stored underground in salt dome caverns, mines, or rock caverns. According to DOE, storage facilities will be located with easy access to tanker docks or major pipelines to assure timely fill and withdrawal.

DOE has overall responsibility for managing and operating the Reserve; however, the Department of Defense is helping to carry out this responsibility. The Defense Fuel Supply Center is purchasing the crude oil, and the Military

Sealift Command is arranging tanker transportation. The Department of Commerce's Maritime Administration is also involved in transportation in that it administers legislation on use of U.S.-flag commercial vessels.

The December 1976 plan estimated a cost of between \$7.5 billion and \$8 billion for the purchase, transportation, and storage of the 500 million barrels of crude oil. The May 1978 amendment increased the estimate to \$14.4 billion--\$9.0 billion for the first 500 million barrels and \$5.4 billion for the next 250 million barrels. Estimates for the final 250 million barrels have not been made.



## CHAPTER 2

### TRANSPORTATION PLANNING

#### NEEDS IMPROVEMENT

DOE has not developed a comprehensive plan for transporting the crude oil. It lacks overall transportation cost estimates and has not covered the ramifications of the accelerated completion date.

Neither the December 1976 Strategic Petroleum Reserve Plan nor the May 1978 amendment had specific information on transportation plans and costs. The plan merely made general statements that delivery to the storage sites may involve several modes of transportation. Similarly, transportation costs were not broken out separately in the \$7.5 to \$8 billion estimate of the total cost of the Reserve. Transportation costs were included in the crude oil acquisition costs, except for a \$500 million add-on for the possible effect of the Cargo Preference Act. This act requires that at least 50 percent of all cargo purchased overseas by the Federal Government be shipped on U.S.-flag vessels if such vessels are available at fair and reasonable rates.

In February 1977, we met with DOE transportation and procurement officials to obtain specific information on Reserve transportation planning and estimated costs. The officials were unable to provide us with specific transportation plans or costs. However, they promised and later developed a transportation plan.

This document was issued as a preliminary transportation plan on July 6, 1977. It contained a general discussion of transportation modes and discussed transportation of combinations of crude oil types from different overseas origins to U.S. ports on the Gulf of Mexico. Costs per barrel for many combinations of various size vessels were shown.

Although the plan was pertinent and useful, it could have been more complete. No estimate of the total transportation costs was made. Also, the plan only discussed fill requirements through December 1978. There was no discussion of requirements beyond that date or the effects of moving up the fill date for the first 500 million barrels from December 1982 to December 1980.

The preliminary plan was the last transportation document DOE issued. An updated or expanded plan has not been published since. A comprehensive transportation plan would be helpful to DOE in making transportation arrangements.

Such a plan should discuss possible alternatives and their implementation and cost implications. It should then recommend a course of action and estimate the cost of the total transportation package. Some matters to be discussed in the plan are:

- Percentage of oil to be received from the major acquisition areas (Persian Gulf, West and North Africa, Venezuela, and North Sea) and the effect on transportation.
- Percentage combinations of U.S.- and foreign-flag vessels.
- Sources and mixes of different size vessels.
- Use of very large and ultra large crude carriers and the resultant transshipment facilities.
- Requirements of barges to transport oil from terminals to storage sites.
- Matching of vessel capabilities and discharge capabilities to avoid demurrage charges.

Some of these factors are directly affected by the requirements of the Cargo Preference Act. The impact of this act is discussed in the following chapter.

## CHAPTER 3

### CARGO PREFERENCE REQUIREMENTS AFFECT

#### TRANSPORTATION PLANNING

In transportation planning, the impact of the Cargo Preference Act should be a major consideration. Adherence to the act's requirements will raise transportation costs substantially, but the Department of Energy has not developed the information needed to accurately quantify these costs. The impreciseness of data primarily concerns the sources of crude oil and the availability of U.S.-flag vessels.

The Cargo Preference Act of 1954 (46 U.S.C. 1241) requires that at least 50 percent of the gross tonnage of Government commodities be transported on U.S.-flag commercial vessels to the extent that such vessels are available at fair and reasonable rates. If these conditions cannot be met, the Maritime Administration has the authority to issue temporary waivers allowing the use of foreign-flag vessels on a shipment-by-shipment basis.

#### ESTIMATES VARY ON CARGO PREFERENCE COST

Estimates of the cost of cargo preference varied, but in all cases the cost was significant. This cost represents the difference between the going rates for foreign-flag and U.S.-flag vessels.

The Strategic Petroleum Reserve Plan, dated December 15, 1976, included an estimate of \$500 million for cargo preference. The plan noted, however, that the extent of applicability of the act to specific crude oil purchases and fill schedules over the life of the program was unknown. The July 1977 preliminary transportation plan stated that Cargo Preference Act compliance procedures needed to be established, but it did not estimate the cost of cargo preference.

In a February 1978 document on the cost of cargo preference, DOE stated that the exact cost was not known because tanker availability, requirements, and routes would not be known until a contract was awarded for each oil procurement.

Nevertheless, DOE compared past transportation costs for U.S.- and foreign-flag vessels for the following four routes.

<u>Route</u>	<u>Foreign-flag price a barrel</u>	<u>U.S.-flag price a barrel</u>	<u>Difference</u>
Ras Tanura, Persian Gulf/Houston	\$1.62	\$4.06	\$2.44
Puerto LaCruze, Venezuela/Houston	.38	.87	.49
Bougie or Bejaia, Algeria/Houston	.84	2.31	1.47
Kharg Island, Iran/Houston	1.69	4.17	2.48

DOE stated that, although the unweighted average of the above differences was \$1.72 a barrel, a cost of \$2.00 a barrel for compliance with the act was considered reasonable because much of the Reserve crude oil would be procured from Arabian Gulf sources. The price differences on these routes exceed \$2.00 a barrel.

During discussions with the Office of Management and Budget, DOE lowered this estimate to \$1.00 a barrel because of the many uncertainties that might make a more realistic number substantially higher or lower than the \$2.00 a barrel estimate. These uncertainties concerned the domestic and foreign oil mix, foreign sources, routes, tanker availability and price, and application of Maritime Administration regulations.

For budget and estimating purposes, a \$0.50 a barrel allowance was included for all oil purchased for the Reserve. Including \$0.50 for all oil is the equivalent of including \$1.00 for shipping 50 percent of the oil on U.S.-flag vessels. The \$0.50 allowance was included in the DOE fiscal year 1979 budget request and was also cited in the May 1978 amendment to the Reserve Plan.

The following table shows that the cost of using U.S.-flag vessels to ship half of the initial 500-million-barrel Reserve is sizable whether the lowest cost difference per barrel discussed above or the highest difference is used.

<u>Difference per barrel</u>	<u>Additional cost for 250 million barrels</u>
\$2.48	\$620,000,000
2.00	500,000,000
1.72	430,000,000
1.00	250,000,000
.49	122,500,000

This wide range raises the possibility that transportation costs will be greatly understated. For example, if DOE continues to budget the equivalent of \$250 million for cargo preference costs and the oil actually is acquired from the Arabian Gulf sources at a cargo preference cost of \$620 million, an understatement of \$370 million would result.

AVAILABILITY OF U.S.-FLAG VESSELS  
NEEDS TO BE DETERMINED

Opinions differ on the availability of U.S.-flag ships to transport 50 percent of the crude oil for the Reserve. These differences should be resolved and informed estimates of availability developed. Availability affects not only transportation planning but also, and perhaps more importantly, transportation costs. As noted previously, using U.S.-flag vessels is much more costly than using foreign-flag vessels.

The Maritime Administration is optimistic that U.S.-flag tankers can transport 50 percent of the oil. Some oil companies are not so optimistic.

Maritime Administration officials voiced their opinion in several meetings with us. They supported their position with an October 21, 1976, Maritime Administration study entitled "The U.S.-Flag Tanker Fleet and Domestic Carriage Requirements--An Assessment of Fleet Adequacy."

This study analyzed tanker needs for crude oil shipments for the Strategic Petroleum Reserve, Alaskan crude oil shipments to the west coast, and west coast surplus oil shipments to other U.S. markets. The latter two types of shipments have an important bearing on the availability of U.S.-flag vessels because the Merchant Marine Act of 1920, commonly known as the Jones Act (46 U.S.C. 883), in effect requires that 100 percent of such crude oil must move on U.S.-flag vessels if destined for a U.S. port.

The Maritime Administration study concluded that the U.S.-flag tanker fleet will be adequate to meet anticipated requirements associated with all three types of shipments. The study further concluded that, after all domestic requirements have been met, the remaining fleet will be about three to four times larger than needed to carry the 50-percent share of imports expected to be carried in U.S. vessels during the Reserve fill cycle.

The study, although based on the assumption that 500 million barrels of crude oil would be in storage by 1982, noted that meeting the accelerated fill date of 1980 would still be within the capacity of the U.S. fleet.

Some sectors of private industry do not agree that enough U.S.-flag tankers will be available to handle 50 percent of the transportation requirements for the Reserve and the requirements of the other programs.

In November 1977, the Amoco International Oil Company gave us an analysis of U.S.-flag tanker supply and demand which it had developed to provide background for some long-term planning assumptions. Included in the demand figures were the requirements for the Strategic Petroleum Reserve, Alaskan oil production, west coast surplus oil disposition, U.S. domestic trades, and Military Sealift Command needs.

The Amoco analysis concluded that, except for an 11.1-percent surplus in 1979, there would be an insufficient supply of U.S.-flag tankers to satisfy projected needs for the 5-year period from 1978 through 1982. In terms of tonnage, the shortage worked out to 12.9 percent in 1978, 3.3 percent in 1980, 2.0 percent in 1981, and 3.9 percent in 1982. Regarding the Reserve, the analysis assumed that 250 million barrels would be in storage by the end of 1978, 500 million barrels by the end of 1980, and 700 million barrels by the end of 1982.

Early in 1977, the Standard Oil Company (Ohio) studied the availability of U.S.-flag tankers to transport Alaska crude oil to the west coast and to transport west coast surplus oil to other U.S. markets. The company concluded that tankers would be incapable of handling the anticipated demand by January 1978. The company further concluded that this shortage would continue through all of 1978 and, although improved, would persist through 1979 and 1980. As indicated previously, the ability to satisfy Alaska oil demands has a direct bearing on the ability to satisfy Strategic Petroleum Reserve demands.

During the first 7 months of 1978, the U.S. tanker fleet was able to handle all of the above demands. One reason was that actual requirements for shipping Reserve and Alaska oil were considerably less than projected.

## CHAPTER 4

### CONCLUSIONS, RECOMMENDATIONS, AND AGENCY COMMENTS

#### CONCLUSIONS

The magnitude of the Strategic Petroleum Reserve program, the acceleration of the storage completion date for the first 500 million barrels from December 1982 to December 1980, and the requirements and costs of the Cargo Preference Act all have a significant bearing on the transportation of crude oil for the Reserve.

Yet the Department of Energy has done only limited transportation planning. A comprehensive transportation plan was not developed early in the program and has still not been developed.

DOE should develop a detailed overall transportation plan that can be used as a framework when making actual transportation arrangements. The slow start DOE has made in filling the storage facilities, combined with the accelerated completion date, makes it essential that a comprehensive plan be developed for transporting the oil.

The plan should include more than basic information on types and sizes of tankers and costs of transporting oil on particular size ships. It also should discuss possible transportation alternatives and their implications. The alternatives should cover such areas as various mixes of tanker sizes, costs of the tanker mixes, and arrangements for terminal facilities. The advantages and disadvantages of each alternative should be discussed. Finally, the plan should recommend a course of action and estimate the cost of the total transportation package.

DOE also needs to study the ramifications of the Cargo Preference Act on the transportation costs and plans for the Reserve. Estimates of the additional costs of using U.S.-flag tankers vary. Also, the Maritime Administration and at least two oil companies disagree on whether U.S.-flag tankers will be able to transport 50 percent of the crude oil for the Reserve.



## RECOMMENDATIONS

We recommend that the Secretary of Energy develop, and make available to appropriate congressional committees, a comprehensive transportation plan for the Strategic Petroleum Reserve. The plan should include detailed transportation cost estimates. Firm information on the costs and other effects of the Cargo Preference Act also should be generated and included. DOE and the Congress then will be better able to assess program costs and budget impacts and determine whether any changes are appropriate in the act's application to the Reserve.

## AGENCY COMMENTS

The matters covered in this report were discussed with DOE officials. They generally agreed with our findings and recommendations.

## CHAPTER 5

### SCOPE OF REVIEW

We reviewed DOE's plans and implementing actions relating to the transportation of crude oil for the Strategic Petroleum Reserve. We reviewed policies and procedures, examined records, and interviewed officials at the following involved Federal agencies:

--DOE's Strategic Petroleum Reserve Office.

--Defense Fuel Supply Center.

--Military Sealift Command.

--Maritime Administration.

We also contacted officials of two oil companies.