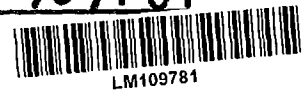


109781

BY THE COMPTROLLER GENERAL



Report To The Congress

OF THE UNITED STATES

~~10,628~~

Federal Facilities For Storing Spent Nuclear Fuel--Are They Needed?

In late 1977, the Department of Energy announced a policy to accept and take title to spent nuclear fuel accumulating at reactor sites. The intent was to remove uncertainty facing utilities caused by storing ever increasing quantities of spent fuel indefinitely.

The Department said it would need both interim and permanent spent-fuel storage facilities. GAO found that the commercial nuclear industry is technically capable of providing needed interim spent-fuel storage capacity. Options are available for both on- and off-site storage which utilities and the nuclear industry have yet to fully explore. The Department's policy to provide interim spent-fuel storage has caused uncertainties, and even delays and cancellations in industry plans to provide its own increased storage capacity.

GAO concludes, therefore, that the Department should not develop an interim spent-fuel storage program. Instead, it should concentrate its efforts on getting resolution to the question of whether commercial spent fuel will be processed and how and where spent fuel will be permanently stored.



005750/109781



COMPTROLLER GENERAL OF THE UNITED STATES

WASHINGTON, D.C. 20548

B-151475

To the President of the Senate and the
Speaker of the House of Representatives

This report discusses the Department of Energy's program of accepting spent nuclear fuel from utilities for storage in Federal facilities.

This review was specifically requested by the Chairman, Subcommittee on Energy and Power, House Committee on Interstate and Foreign Commerce.

We are sending copies of this report to the Secretaries of Energy and Transportation, and the Chairman, Nuclear Regulatory Commission.

R. F. Kistler
ACTING Comptroller General
of the United States

D I G E S T

Once nuclear fuel in a reactor has reached the end of its useful life (or is spent), it is taken from the reactor and placed in a water filled basin. For over two decades it was assumed both by the Government and utilities that this spent fuel would remain at the reactor site for a short period before being transferred routinely to a commercially operated reprocessing plant. There residual uranium and plutonium in the spent fuel could be removed for use again in other nuclear reactors.

On April 7, 1977, President Carter decided to defer indefinitely commercialization of technologies that reprocess or depend on the recycling of plutonium, used to make nuclear weapons. This was done to restrict the spread of these technologies and to minimize proliferation of nuclear weapons.

Utilities that once had planned to send their spent fuel to a commercial reprocessing plant now are faced with two questions: Is the spent fuel reusable and an asset or is it not reusable and, to be treated entirely as nuclear waste? Where are they to store the spent fuel? (See p. 1.)

ANNOUNCEMENT OF A FEDERAL
SPENT-FUEL POLICY

On October 18, 1977, the Department of Energy announced that it would, at some unspecified future date, accept and take title to the spent nuclear fuel accumulating at reactor sites in the United States and abroad. The intent was to remove the uncertainty facing utilities of storing spent fuel indefinitely.

To implement the policy, the Department said it would need both interim and permanent

EMD-79-82

spent-fuel storage facilities. The interim facility would store the spent fuel until the permanent facility became available. It has been assumed that the permanent facility would be a geologic repository capable of storing the spent fuel for thousands of years. (See p. 3.)

On September 15, 1978, Congressman John D. Dingell, Chair of the Subcommittee on Energy and Power, Committee on Interstate and Foreign Commerce, U.S. House of Representatives, asked GAO to review DOE's proposed spent-fuel storage program.

THE NEED AND ALTERNATIVES
FOR A FEDERAL INTERIM
STORAGE FACILITY

Following this announcement, the Department conducted studies on the need and alternatives for Federal interim spent-fuel facilities. Surveys were done of the utilities' storage situations and the Department determined that unless a centralized interim storage facility were provided, many utilities would not be able to store their spent fuel on-site beginning in 1983. (See pp. 6 to 8.)

Currently, the Department is considering several alternatives for a Federal interim storage facility. These include the

- construction of a new 5,000 metric ton facility to be located on a federally owned site,
- purchase of storage pools at three existing but closed reprocessing plants, and
- lease of storage space from the Tennessee Valley Authority.

Depending on which of these is selected, the Department then would calculate a storage fee to recover all Government costs for both interim and permanent storage of spent fuel.) (See pp. 12 to 20.)

GAO conclusions

While GAO determined that the requirements for interim away-from-reactor storage facilities are smaller than estimated by the Department, there still may be some need for such facilities in the near-term and as we progress toward the 1990s.

It is imperative, therefore, that the Federal Government decide soon on where interim spent-fuel storage fits into the overall policy on spent-fuel disposition. The Department believes that spent fuel should be disposed of in geologic repositories and that the Government should provide interim storage facilities until these repositories come on line.

The responsibility for interim spent-fuel storage should be a utility and nuclear industry concern. They have the technical capability to deal with the problem and should have the motivation, considering their large capital investment in nuclear power. The utilities and nuclear industry cannot be expected to act, however, under today's uncertain Federal positions on the future disposition of spent fuel.

GAO believes, therefore, that ^{instead:} (instead of trying to develop an interim spent-fuel storage program, the Department should (1) concentrate its efforts on getting resolution as to whether commercial spent fuel will be reprocessed and (2) commit itself to a timetable for having a method for permanent spent-fuel storage available. These are needed to provide some finality to the issue of spent-fuel storage and to give the nuclear industry a basis for planning storage requirements. For the shorter-term, DOE should work with the nuclear industry to help it determine interim spent-fuel storage needs, meet necessary regulatory requirements, and develop a comprehensive storage program.

GAO does not believe, however, that the utilities or the nuclear industry should have an open-ended responsibility for spent-fuel storage. Therefore, if it

appears that the Federal Government cannot meet its date for having a method of permanent spent-fuel storage available, the Department should then seek congressional approval to provide interim spent-fuel storage facilities.

On the international side, GAO's study shows that the Department's estimates of needed foreign storage capacity are speculative and that its foreign spent-fuel storage program might not contribute significantly to nonproliferation objectives. Those countries in sensitive regions will continue to control some amount of spent fuel, even under the Department's proposed program.

Also, because the United States was instrumental in establishing the International Fuel Cycle Evaluation Study, the Department should not unilaterally decide on a foreign spent-fuel storage policy until the completion of that study--scheduled for early 1980. (See pp. 20 to 22.)

Officials of the Department of Energy, the Nuclear Regulatory Commission, and the Department of Transportation commented on a draft of this report and their comments have been incorporated where appropriate.

Recommendations to the Secretary of Energy

Because our analysis shows that a Federal interim spent-fuel storage facility is not needed, GAO recommends that the Secretary of Energy

- establish a timetable for having a method for permanent spent-fuel storage;
- include in that timetable provisions, for the President's consideration, on whether or not commercial spent-fuel reprocessing should resume;
- work with and explore ways that utilities can solve their spent-fuel storage problems until a method of permanent storage is available; and

--encourage and work with the private industry to provide any needed interim spent-fuel storage facilities.

Federal interim storage facilities should only be considered if DOE cannot meet the date that it commits to having a permanent storage alternative available.

Department of Energy comments

In commenting on this report, the Department said that it was not possible, at this time, to develop specific time frames for the final disposal of spent fuel or for deciding on the future of reprocessing. However, in light of the Federal responsibility in these areas and because of the lack of firm industry interest, the Department believes that a Federal program to provide interim spent-fuel storage is justified.

F. Jones (GAO does not believe, however, that the Department has fully explored the nuclear industry's potential to provide away-from-reactor spent-fuel storage facilities. More importantly, GAO believes that the Department's ~~program~~ ^{DOE} does not recognize that the nuclear industry has the technical capability and should have the motivation to provide interim spent-fuel storage services.) *on the ...*
(See pp. 22 and 23.)

ISSUES AFFECTING THE TRANSPORTATION OF SPENT FUEL

Although little spent fuel is being shipped at this time, shipments may increase as utilities begin to send a portion of their spent fuel to interim storage facilities or other reactors. A number of institutional, social, and political problems exist which could pose formidable obstacles to the transportation of spent fuel.

For instance, many people have expressed concern about the safety of spent-fuel transportation. Likewise, State and local governments have placed restrictions on the shipment of spent fuel through their

jurisdictions because of similar concerns. These problem areas need particular attention so that the transportation of spent fuel can be carried out. (See pp. 24 to 29.)

Recommendation to the
Secretary of Transportation

To resolve any uncertainty about the rights of utilities and other authorized groups to transport spent fuel through interstate commerce, the Secretary of Transportation should include in any routing regulation for transportation of radioactive materials, specific language to make clear the extent and scope of the States' authority to regulate, but not prohibit, the movement of spent fuel.

Officials of the Department posed no objection to this recommendation.

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ABBREVIATIONS

DOE	Department of Energy
GAO	General Accounting Office
NRC	Nuclear Regulatory Commission

CHAPTER 1

INTRODUCTION

Nuclear reactors operating today do not use very much of the energy potential contained in their nuclear fuel. In fact, the nuclear fuel that is taken out of a reactor and replaced by a fresh fuel load usually has used only about 1 to 2 percent of its energy potential. These partially used fuel loads are referred to as spent fuel.

In the past, the Government and those utilities owning nuclear powerplants assumed that this so-called spent fuel would be sent to a plant where the unused part of the nuclear fuel could be retrieved for reuse. The non-reusable part is very toxic and hazardous for thousands of years and must be treated as highly radioactive nuclear waste. This recycling or reprocessing, as it is generally referred to, was seen--from a commercial standpoint--as having economic advantages and as a way of stretching uranium resources. From a military standpoint, the reprocessing of spent fuel is desirable because the process results in plutonium, which is used in making nuclear weapons.

This feature of nuclear fuel reprocessing--the ability to make nuclear weapons from the reprocessed fuel--has placed the future of commercial reprocessing in serious question. In October 1976 President Ford delayed commercial reprocessing in the United States until uncertainties regarding nuclear weapons proliferation were resolved. Later, in April 1977, President Carter announced his decision to defer indefinitely the commercialization of technologies that reprocess or depend on the recycling of plutonium.

Utilities that had once planned to send their spent fuel to a commercial reprocessing plant are now faced with two related questions: (1) Is the spent fuel reusable and, therefore, an asset or is it not reusable and, therefore, to be treated entirely as nuclear waste? and (2) Where are they going to store the spent fuel? Spent fuel is now being temporarily stored at the reactor sites. How and where to dispose of high-level nuclear waste--whether that should include spent fuel or just the unusable part of spent fuel that has been reprocessed--has not been decided.

The administration's tentative solution is to dispose of spent fuel in the same way that high-level nuclear waste is to be disposed--in mined, underground repositories. Its nuclear waste programs are being adjusted to plan for this eventuality and there is very little chance--based on

announced nuclear policies--that commercial spent-fuel reprocessing will ever be approved under this administration.

In pursuit of the administration's policy, the Department of Energy (DOE) announced in October 1977 a program to accept and take title to domestic and a limited amount of foreign nuclear spent fuel. This was done, not only to provide interim spent-fuel storage but to give assurance that the U.S. Government will provide a permanent solution to the spent-fuel problem.

On September 15, 1978, Congressman John D. Dingell, Chairman of the Subcommittee on Energy and Power, Committee on Interstate and Foreign Commerce, U.S. House of Representatives, asked us to review DOE's proposed spent-fuel storage program.

THE BASIS FOR DOE'S SPENT-FUEL STORAGE POLICY

With his April 1977 decision, the President created a special interagency task force to advise him on nonproliferation issues, including the worldwide disposition of nuclear spent fuel. DOE had the lead responsibility for studying the spent-fuel issue. ^{1/} The report of the special interagency task force was submitted to the President in May 1977.

As input to this report, DOE accumulated spent-fuel discharge and storage data and concluded that about 2,000 metric tons of domestic spent fuel would have to be stored away from reactor sites by 1983 and 10,000 metric tons by 1990. DOE recognized, however, that this storage requirement could be postponed through at least 1985 if utilities replaced their spent-fuel storage pool racks at the reactor sites with newer, high-density racks.

Spent-fuel storage pools at reactor sites had been so conservatively designed initially that the original storage capacity could be increased up to four times without any appreciable safety or environmental hazard. This would require, however, the careful redesign of the storage racks, the use of special materials, more efficient use of the storage space in the pool, and specific Nuclear Regulatory Commission (NRC) approval. While this could be a relatively

^{1/}The Energy Research and Development Administration--a predecessor agency to DOE--was actually given this responsibility. However, DOE will be referred to throughout this report.

inexpensive way for a utility to increase its storage capacity, such expansions were not always possible due to specific pool storage situations and designs. In addition, local opposition had been prevalent in several utility actions to increase storage capacity in this manner.

Thus, the special task force recommended to the President a spent-fuel program that would assure domestic utilities that nuclear powerplants would not shut down because of inadequate storage space. The task force, however, went beyond interim spent-fuel storage. Because of the deferral of commercial reprocessing and the uncertainty surrounding the final disposition of spent fuel, the task force recommendation, according to DOE, was geared toward developing a Federal program to provide both interim storage and final disposal of commercial spent fuel.

The task force's work also carried over to foreign spent fuel. While DOE estimated that 3,000 metric tons of foreign spent fuel would have to be stored by 1982 and 15,000 metric tons by 1990, DOE officials said that only a small part of this was ever expected to be sent to the United States. According to one official, the recommendation to the President was that the United States should develop the capability to store limited amounts of foreign spent fuel if that became necessary for nonproliferation reasons.

ELEMENTS OF DOE'S NEW SPENT-FUEL STORAGE POLICY

DOE announced on October 18, 1977, that the Federal Government proposed, at some unspecified future date, to accept and take title to the spent nuclear fuel accumulating at reactor sites. DOE's intent was to store the spent fuel until either a final decision on reprocessing was made or until geologic disposal of nuclear waste became available. Also included in this announcement was the potential that some limited amount of spent fuel would be accepted from foreign countries. Other key elements of the proposed spent fuel policy were:

- The Federal Government will offer, on a voluntary basis, to accept and take title to spent fuel upon delivery to a Government-approved storage site at user expense.
- The fuel owner must pay a one-time fee to cover the cost to the Government of interim storage and permanent disposal of the spent fuel should that be required.

--No credit would be allowed for either the plutonium or uranium in the spent fuel. However, if reprocessing is ever approved, spent fuel may be returned or compensation made to the utilities for its fuel value.

--Decisions to accept spent fuel from foreign countries will be made on a case-by-case basis in support of U.S. nuclear nonproliferation goals.

DOE has given three reasons for this policy. First, DOE recognizes that the indefinite deferral of commercial reprocessing has placed some utilities in a tenuous position. These utilities, counting on reprocessing, had built only small capacity storage pools at reactor sites and, because of a Federal policy shift, are now prevented from shipping their spent fuel offsite to a reprocessing plant. DOE believes it has some commitment or responsibility for spent-fuel storage because of this shift in Federal policies.

Second, DOE believes that if it can demonstrate the viability of a once-through fuel cycle--where the spent fuel is disposed of in permanent storage facilities rather than reprocessed--other countries will be inclined to follow suit.

Third, DOE hopes that its offer to accept a limited amount of foreign spent fuel will encourage some countries to send their fuel to the United States for storage and disposal rather than enter into reprocessing agreements with other countries. In this respect, there are strong concerns within the administration that unless the United States provides this storage service, some spent fuel might be reprocessed and the plutonium diverted to weapons production.

DOE, therefore, submitted legislation to the Congress asking for the authority to accept and take title to both domestic and foreign spent fuel. This legislation, DOE believes, includes all the major elements it needs to carry out a comprehensive spent-fuel management program.

SCOPE OF REVIEW

During this review we evaluated the domestic and foreign aspect of DOE's spent-fuel program. We reviewed the present spent-fuel situation in the United States to determine if there is a storage problem, we examined the alternative strategies being considered by DOE to resolve the storage problem, we examined DOE's proposed amount and method for charging a fee for its proposed interim and permanent spent-fuel storage services, and we evaluated the capability

of the nuclear industry to handle the amount of spent-fuel transportation that will be experienced in the future.

We must point out, however, that DOE and the White House staff refused to provide us copies of the documents creating the special nonproliferation task force or of reports from the task force to the President which led to the development of the spent-fuel policy. The Staff Secretary of the National Security Council verbally told us that releasing such documents could impede the future freedom of executive agencies to be candid when advising the President on national policy issues. Therefore, we have not been able to specifically verify the basis or reasons for the spent-fuel program or fully review its implications. We are in the process of requesting written reasons from the White House for the basis of its denial. Because of the timing, however, we were not able to resolve the matter before issuing this report.

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The following chapters highlight our evaluation of each of the aforementioned areas as well as related matters. Comments from DOE, NRC, and Department of Transportation officials have been incorporated in the report where applicable.

CHAPTER 2

THE FEDERAL SPENT-FUEL STORAGE

PROGRAM: ADVISABLE OR NOT?

In October 1977 DOE announced a comprehensive policy aimed at obtaining the authority to take title to and permanently store spent fuel. It chose to link this policy with a program to provide almost immediate interim storage facilities for both domestic and foreign spent fuel. DOE officials told us, however, that interim spent fuel storage, while important, has never been the primary issue. Instead, interim storage of spent fuel is viewed as a convenient, but necessary, mechanism to resolve the spent fuel issue.

Our review has shown, however, that the need for Federal interim storage facilities has not been established. In the near-term, domestic utilities are exploring other ways to store spent fuel. Further, the nuclear industry, with the proper encouragement and a firm Federal policy relating to spent-fuel storage, is quite capable of handling interim storage requirements. Therefore, we believe that for interim storage of spent fuel DOE should (1) encourage the utilities to store the fuel themselves and (2) work with the nuclear industry to provide any needed away-from-reactor storage capacity.

On the international aspect, we found that DOE's projections of spent-fuel transfers to the United States are very speculative and may not, even if they take place, add significantly to nonproliferation objectives. We believe that DOE should not develop further plans for storing foreign spent fuel in the United States until the completion of a major international evaluation of fuel cycle alternatives-- a study which the administration both supports and helped organize. This evaluation may find it more feasible to store foreign spent fuel in national or multinational storage centers and the administration might want to work within that context rather than unilaterally deciding to bring foreign spent fuel to the United States. Draft reports for this evaluation have been issued and the final reports are expected to be issued by early 1980.

DOE EFFORTS TO DETERMINE IF A FEDERAL STORAGE FACILITY IS NEEDED FOR DOMESTIC SPENT FUEL

Two months after its October 1977 policy announcement, DOE sent letters to 76 utilities with nuclear powerplants

operating or under construction. DOE requested estimates of the spent fuel discharged annually from reactors and the amount the utilities expected to transfer to the Government through 1990. The responding utilities, which represented 98 percent of the expected reactor generating capacity through 1990, generally expressed strong support for the spent-fuel policy, given the indefinite deferral of reprocessing.

Most utilities indicated a desire to transfer some spent fuel by 1990. Some wished to begin transfer as soon as the Government would accept it, while others were interested in delaying transfers until their basins were full or until the spent fuel could be disposed of directly into a repository. A significant number of utilities said it was not possible to determine how much spent fuel they would transfer to the Government until more precise information was available on the timing, costs, and terms of transfer.

DOE evaluated the data from the responses and estimated there would be a need to store 1,700 metric tons of spent fuel by 1983, 5,700 metric tons by 1986, and 14,400 metric tons by 1990. A major flaw of this survey, however, was that DOE did not ask for information on utilities' alternatives or plans for expansion, nor had it estimated the cost of its spent-fuel storage services. Not until several months later, after DOE completed a preliminary estimate of a storage fee, did it become evident that the cost of Federal spent-fuel storage would be much greater than some expansion options at reactor sites.

Uncertainty over the need for Federal spent-fuel storage capacity

During the early part of calendar year 1978, while the authorization and appropriation process was in progress, DOE officials were saying before congressional committees and elsewhere that a Federal storage facility was critically needed. Unless action was started in 1978 to construct a Federal spent-fuel storage facility (with a 5,000 metric ton capacity) these officials were estimating that many power reactors would be forced to shut down by 1983. Federal action was needed, according to these officials, because all options involving private participation would not provide the needed storage space by 1983.

We were reviewing DOE's spent-fuel storage program at that time and were not convinced that DOE had enough information to justify its strong position on the need and timing of a Federal spent-fuel storage facility. We reported on

July 20, 1978, 1/ that immediate action toward the construction of a 5,000 metric ton storage facility might be premature and recommended, among other things, that DOE (1) work with and explore ways that utilities can solve their own problems and (2) pursue industry interest in providing additional spent-fuel storage facilities.

DOE undertakes extensive study
to determine storage needs

In mid-1978 DOE awarded a contract to determine more accurately the need for Government storage. The contractor developed a computer program and contacted all utilities with operating reactors and reactors planned for operation before the year 2000.

At the completion of this study, DOE issued a report, entitled "Spent Fuel Storage Requirements--The Need for Away-From-Reactor Storage" which analyzed the expansion capabilities of utilities and estimated the timing and magnitude of spent-fuel storage requirements. This report states that 560 metric tons of storage will be needed by 1983 (see table 1), with a cumulative total of 6,940 by 1990. In recent congressional hearings, however, DOE testified that these were minimum estimates that should be used for planning purposes and that it is more likely that 1,000 to 3,000 metric tons of storage will be needed by 1983 and that 5,000 metric tons would be needed by 1988. DOE, therefore, maintained its position that away-from-reactor storage should be available by 1983 and that an optimal capacity for such a facility should be 5,000 metric tons.

Our analysis of the need for
Federal spent-fuel storage
capacity

We contacted the owners of the 57 nuclear powerplants that DOE indicated would require away-from-reactor storage by 1988. We learned that because of their critical storage situation, many utilities are not counting on DOE to provide storage space but are developing plans to solve their own storage needs. In fact, several utility representatives told us that they did not feel that DOE would ever have a spent-fuel storage program and they were excluding DOE's

1/"An Evaluation of Federal Support of the Barnwell Reprocessing Plant and the Department of Energy's Spent Fuel Storage Policy," EMD-78-97.

program from their planning base. The following table compares DOE's data with that we developed.

TABLE 1

Cumulative Away-From-Reactor Requirements

<u>Year</u>	DOE estimate in metric tons <u>(note a)</u>	Our estimate in metric tons <u>(note a)</u>
1979	70	0
1980	80	0
1981	200	29
1982	340	74
1983	560	152
1984	810	192
1985	1,180	318
1986	1,810	542
1987	2,770	911
1988	3,860	1,433

a/Assumes that the utilities maintain a full core reserve and are not prevented by NRC from completing expansion and intra-utility shipment plans.

This table shows that the near-term storage requirements are not as great as determined by DOE's latest effort. In fact, our estimates may be overstated in some respects, because they reflect only those reactor expansion plans which the utilities told us were definite. There is additional capability to expand, but many utilities have not yet decided to do so, preferring in some cases to wait for the details of DOE's storage program. For instance, of the 27 reactors which DOE determined would not have enough space to store a full nuclear fuel load by 1985, only 1 utility told us that it did not have an option to expand its existing storage capacity. It, however, is considering the possibility of building an independent storage facility in partnership with another group of utilities.

We should point out, however, that both DOE's and our estimates were based on utilities being able to fulfill their storage pool expansion and intra-utility shipment plans. Although NRC has not disapproved any such plans to date, there is growing concern at NRC that increased public intervention will force more restrictive views of such storage options. If this becomes true, the need and timing for away-from-reactor storage could change significantly.

After we developed the information in table 1, we gave it to DOE for its consideration. We have recently been advised that DOE is surveying utilities once again, asking them to update their spent-fuel storage situation and plans. This survey is due to be completed the latter part of June 1979.

DOE EFFORTS TO DETERMINE IF A
FEDERAL STORAGE FACILITY IS
NEEDED FOR FOREIGN SPENT FUEL

As part of its October 1977 policy on spent-fuel storage, DOE announced that it would accept a limited amount of spent fuel from foreign countries when such action would contribute to nonproliferation goals. This policy is supposed to dissuade other countries from prematurely committing to the reprocessing of its spent fuel. Also, the policy would assist those countries with an abundance of spent fuel but a lack of adequate storage space.

DOE has attempted to estimate the foreign spent fuel that might be sent to the United States. To do this it developed three conceptual levels of foreign fuel transfers.

Option 1

The United States would accept spent fuel only from countries located in sensitive regions where the protracted storage of even small amounts of this material might be judged inappropriate or troublesome in terms of proliferation concerns.

Option 2

The United States would accept spent fuel from the countries covered in option 1 and from a limited number of smaller countries that have no ready solutions for spent-fuel disposition.

Option 3

The United States would accept spent fuel from countries in sensitive regions (option 1 countries), from smaller countries with storage problems (option 2 countries), and from some of the larger, industrialized, non-nuclear weapons states.

By 1992, DOE believes that 905 metric tons of spent fuel might be sent to the United States under option 1; 1,795 metric tons under option 2; and 5,270 metric tons under option 3. For estimating purposes, DOE selected option 2. (See app. I.)

We are not convinced, however, that these amounts are realistic estimates of the potential foreign transfer of spent fuel to the United States. First of all, from our review of all three options, it appears that the amounts projected by DOE are very speculative and represent only rough upper-limits of potential spent-fuel transfers. In fact, DOE officials told us that it is impossible to predict the actual quantity of foreign spent fuel that may be sent to the United States. This is because it is difficult to predict, at a given time, the social, economic, and political conditions, as well as the energy needs, prevailing in a country.

Second, DOE told us that even under option 1, it is not planning to accept all the spent fuel from any one country--there will always be some amount remaining in those countries of proliferation concern. Therefore, if a country were so inclined, it would still have the spent fuel from which to extract nuclear weapons materials. Thus, we believe that DOE's program to accept foreign spent fuel will not significantly contribute to nonproliferation objectives.

Third, the United States was instrumental in establishing the International Fuel Cycle Evaluation Study ^{1/} which, among other things, is evaluating the potential for spent-fuel reprocessing and alternatives for storage. It is our view that the United States should not unilaterally decide to accept foreign spent fuel for storage until this study is complete--currently scheduled for early 1980. The study, for instance, may find it acceptable to reprocess under certain conditions or to store spent fuel in national or

^{1/}An international study involving 55 countries and 3 international organizations whose purpose is to evaluate the risks associated with the nuclear fuel cycle.

multinational storage centers. The administration might want to work within this international context to find more permanent or acceptable methods of dealing with foreign spent fuel.

ALTERNATIVES FOR PROVIDING FEDERAL INTERIM SPENT-FUEL STORAGE

In December 1977 DOE surveyed the nuclear industry to determine its interest in providing interim spent-fuel storage services. Of the 15 responding companies, nearly all expressed interest in being a part of the Federal plan. For several reasons, however, DOE did not seriously consider any of these industry offers. First, according to DOE, the industry demanded firm Government commitments to fully protect private investment and profits. Second, DOE did not think that a privately financed facility could be available by 1983 because of difficulty in obtaining legislation that would provide guarantees to the industry. Third, a privately financed facility would require a new design effort, while DOE had already started the conceptual design of a storage facility and was reviewing potential sites for its location.

Thus, it was clear that in the early stages of the spent-fuel storage program, the DOE staff considered a new Government-owned and financed storage facility--with a 5,000 metric ton storage capacity--as its prime option. According to DOE officials, however, the high preliminary cost estimate for such a facility caused DOE to reconsider its position and evaluate other interim storage alternatives.

A new 5,000 metric ton interim storage facility

In November 1977, the operating contractor at DOE's Savannah River Reservation began a conceptual design study for a 5,000 metric ton spent-fuel storage facility. This study, completed in late 1978 at a cost of \$950,000 estimated that such a facility could be built at any Government site for \$270 million and could be ready to receive spent fuel in January 1983--assuming site selection and design work was started in fiscal year 1978.

DOE subsequently updated this information and estimated that the facility would cost approximately \$290 million to construct but could not be ready until September 1985.

Federal purchase of storage pools at existing commercial plants

There are three away-from-reactor storage pools already in existence at West Valley, New York; Morris, Illinois; and Barnwell, South Carolina. DOE has analyzed the potential storage capacity at each of these facilities and the possibility of buying and using them as part of its interim spent-fuel storage program.

West Valley, New York

The first and only reprocessing plant to operate commercially in the United States was the Nuclear Fuel Services, Inc. plant at West Valley, New York. During its operating life--between 1966 and 1972--about 640 metric tons of spent fuel were reprocessed, including 480 metric tons supplied by the Government as an inducement for the company to enter the reprocessing business. After temporarily closing the plant for modifications in 1972, new regulatory requirements and safety concerns forced the plant to close in September 1976. At that time, the company said it would cost \$340 million to meet the changed regulatory and safety requirements.

Part of this reprocessing facility is a licensed spent-fuel storage pool with a capacity of 250 metric tons. About 85 metric tons of storage space is available for use but the company has not been accepting spent fuel for storage for several years. Nuclear Fuel Services, Inc. has estimated, however, that the total storage capacity of the pool can readily be increased to about 900 metric tons and to as much as 1,500 metric tons by using new re-racking designs.

While DOE has included the West Valley storage pool in its analysis, it does not have any immediate plan of using the pool in its storage program. The State of New York, which owns the site, is opposed to any further waste storage operations. There is a possibility, however, that the State might accept additional spent-fuel storage at West Valley in return for Federal assistance on the eventual decontamination and decommissioning of the site and associated structures.

Morris, Illinois

In the late 1960s and early 1970s, the General Electric Company spent between \$70 and \$80 million on the construction of a medium size reprocessing plant in Morris, Illinois. Problems were experienced with the plant, however, and General Electric abandoned any hopes of commercial operation.

Since 1972, General Electric has been licensed by NRC to receive and store commercial spent fuel. The plant currently has a spent-fuel inventory of 350 metric tons and room for another 400 metric tons (50 metric tons of which is already committed). General Electric has not operated its storage pool as a commercial enterprise, although a company official told us that it would be a profitable business under a stable Federal nuclear policy. Instead, the company has restricted its storage space to those utilities with which it has an association and which are experiencing serious storage problems at their reactor sites.

In addition, General Electric (with several utilities) applied to NRC in August 1977 for permission to construct an adjacent pool at Morris to store an additional 1,100 metric tons of spent fuel. When DOE announced its spent-fuel storage program in October 1977, however, this application was withdrawn. A General Electric Company official said that his company was not interested in competing with the Government for interim spent-fuel storage business.

DOE considers the Morris plant one of its prime options for providing immediate storage space. It has held informal meetings with General Electric Company officials at which the company has expressed an interest in selling the plant for approximately \$30 million. The advantages of this storage option are that it is relatively cheap; it has 350 metric tons of immediate uncommitted storage space, its owner, which could operate the facility under contract to DOE, is already licensed to receive and store spent fuel; and its capacity can be expanded by 1,100 metric tons for approximately \$24 million. Thus, for about \$54 million, DOE can acquire 1,450 metric tons of interim spent-fuel storage space which may be enough, according to our data, to handle away-from-reactor storage needs through at least 1988.

The disadvantage of the Morris site is that the State Attorney General has expressed opposition to any increase in spent-fuel storage in Illinois, even at reactor sites. He has intervened on behalf of the State in licensing proceedings to expand existing pools at nuclear powerplants and had intervened in General Electric's application to expand the Morris pool before the application was withdrawn. Staff members in the State Attorney General's office told us that they believe that spent-fuel storage is more hazardous than estimated by NRC and should not be a permanent or long-term storage option in Illinois. Because of the uncertain timing of a final solution for spent fuel, they were concerned that interim storage at Morris would, in fact, turn into long-term storage.

Likewise, a representative of the Illinois Governor's office expressed concern about using Morris as a storage facility. While not as negative as the State Attorney General's office, this representative said that it would be difficult to convince the people of Illinois to accept the Morris facility for spent-fuel storage unless DOE can demonstrate that the

--storage is truly interim in nature and is part of a comprehensive waste management program and

--storage facility is part of a concept in which each region of the country assumes its fair share of the spent-fuel storage burden.

In these respects, the Governor's representative said that for Morris to be acceptable as a storage facility, DOE must have definite plans and timetables for removing the spent fuel to either a geologic repository or to a reprocessing plant. Also, he did not think it would be acceptable if Morris were the only spent-fuel storage facility in the country--or even if it were one of only two such facilities. This did not fit his definition of a regional storage network. He did say, however, that it would be more acceptable to the State if DOE owned and operated the facility. He felt that this would add some certainty to the eventual disposition and removal of the spent fuel.

Barnwell, South Carolina

Barnwell, which is designed to reprocess 1,500 metric tons of spent fuel per year, was to be the first large-scale commercial reprocessing plant in the United States. Allied-General Nuclear Services, Inc., the owner of the plant, began construction in 1970 and--at a cost of \$362 million --has essentially completed three of the five major facilities at the site, including a 400 metric ton capacity spent-fuel storage pool.

After the President's indefinite deferral of commercial reprocessing in April 1977, NRC stopped reviewing Allied-General's operating license applications and hopes for commercial operation of the plant were essentially eliminated. Since then Allied-General has stated many times that it will invest no additional capital in the site. It has also said that it has no interest in commercially operating the facility for only spent-fuel storage.

As with the Morris, Illinois facility, DOE considers Barnwell a prime option for providing immediate interim spent-fuel storage capacity. It has determined that the

400 metric ton storage pool at Barnwell can be re-racked to provide a total storage capacity of 1,750 metric tons. This would take about 30 months and cost \$25 million. In addition, Allied-General has estimated that the facility's capacity can be expanded to a total of 5,000 metric tons in about 51 months and for a cost of \$110 million. This latter option would include the construction of three new storage pools which would be attached to the current pool and which would use some common systems and equipment.

The biggest unknown about Barnwell, however, is its potential purchase price. DOE has met with Allied-General officials to discuss purchase options. Our understanding of Allied-General's position is that it wants to sell the entire complex and not only the storage pool. Also, Allied-General wants a return of as much of its investment as possible--which is about \$362 million--but has expressed some flexibility in this area. DOE, in turn, has estimated that there is a limit that it can pay and still consider Barnwell as an acceptable option. This limit assumes, however, that Barnwell's storage capacity can be expanded to 5,000 metric tons and will be fully utilized.

The South Carolina State Government has established circumstances in which spent-fuel storage might not be acceptable at Barnwell. A State representative told us that the Governor is opposed to spent-fuel storage at Barnwell unless

- it can be shown that utilities have expanded their onsite storage capabilities to the maximum and have exhausted that capacity,
- DOE can demonstrate a firm commitment and timetable for a permanent waste repository so that spent fuel can be removed from Barnwell within a reasonable time, and
- there is a regional network of storage facilities so that South Carolina will not be the sole "dumping ground" for spent fuel.

Offer by the Tennessee Valley
Authority to provide national
spent-fuel storage services

On June 14, 1978, the Chairman of the Tennessee Valley Authority (TVA) wrote President Carter offering TVA's assistance in solving the interim spent-fuel storage problem. TVA, which has 17 nuclear powerplants in operation or under construction, was considering the construction of a

centralized storage facility to meet its future needs. While such a facility was not needed by TVA until at least 1988, the Chairman offered to accelerate its construction schedule by 3 to 5 years and to expand its storage capacity to meet national requirements.

In return, the Chairman asked that the Government reimburse TVA, "through Federal appropriations or otherwise for costs incurred over and above those incurred to meet TVA's own needs." According to a TVA official, however, TVA was not asking for advanced Federal appropriations for these costs--TVA was prepared to pursue separate funding arrangements to pay the full cost of the expanded storage facilities. Instead, TVA wanted guarantees from the Federal Government that the facility would be fully utilized or else the Government would pay the cost of the excess storage capacity. TVA believed that its offer to build extra storage space should not, in any way, penalize its ratepayers.

Under this proposal, TVA anticipated that it would own and operate the storage facility; it would choose the storage design in accordance with DOE criteria and build the facility; and it would lease the excess space to DOE on a full cost recovery basis. DOE, in turn, would deal directly with the utilities in taking title to the spent fuel and recovering its costs.

DOE generally expressed interest in the TVA proposal and met several times with its representatives to discuss the proposal. Over the past few months, however, DOE has not given this proposal active consideration and TVA has put its proposal to DOE aside for the time being. Instead, TVA is now studying the potential for building smaller, decentralized storage facilities at each powerplant site rather than one large centralized facility. If decentralized facilities prove to be better storage alternatives, TVA may withdraw its storage proposal to DOE. In any event, TVA has determined that its present storage capacity will last until the late 1980s but is taking measures now to plan for an increase in that capacity. It is not, however, presently considering Federal interim storage as a principal option for its own interim storage needs.

The State of Tennessee varied from Illinois and South Carolina in its views of a Federal storage facility. An official of the State government told us that Tennessee, long familiar with nuclear activities, was not opposed to a spent-fuel storage facility per se. In fact, if a need were clearly established based first on TVA's spent-fuel storage needs, Tennessee might agree to such a facility if suitable arrangements could be made to insure that it adds

to the State and local tax base and assurances can be given that health and safety concerns have been adequately addressed. He said that the Oak Ridge area, the site considered by TVA for the storage facility, has its share of non-taxable Federal facilities. Any additional facility that would require further governmental services without paying its way in taxes might not be acceptable.

DOE, even though it does not have TVA's proposal under active consideration, has recently awarded a contract to the State of Tennessee for \$248,000 to look at (1) storage ownership options, (2) the benefits and problems of both public and private ownership, and (3) the environmental and technological problems associated with building and operating a storage facility. A State official told us that this contract would help Tennessee participate with TVA and DOE in determining the cost and benefits associated with locating such a facility and in resolving any potential jurisdictional problems. This study will help the decisionmakers of the State and the citizens better understand the issues associated with spent-fuel storage. Tennessee, according to this official, wants to be in a position to work with, not against, the Federal storage program.

Potential spent-fuel storage
by Exxon Nuclear Company, Inc.

Before President Carter's announcement on reprocessing, the Exxon Nuclear Company, Inc., had submitted an application to NRC for construction of a large reprocessing plant close to Oak Ridge, Tennessee. Included in that application was a proposed 3,000 metric ton spent-fuel storage pool which was expandable to about 14,000 metric tons. An Exxon official told us that it planned to have this storage facility available first so that it could provide some interim spent-fuel storage to its potential reprocessing customers. The President's decision on reprocessing, however, plus the DOE announced spent-fuel storage program effectively precluded any possibility of Exxon entering the commercial spent-fuel storage business.

On January 6, 1978--in response to DOE's request for expressions of interest for providing storage--Exxon wrote DOE offering its assistance. According to an Exxon official, a financial investment by Exxon would have required a consistent Federal policy but not Federal financial guarantees. To date, however, DOE has not actively pursued Exxon's expression of interest.

REASONABLENESS OF DOE'S PROPOSED
SPENT-FUEL STORAGE FEE

Shortly after the announcement of its spent-fuel storage policy, DOE started efforts to estimate the potential charge for its storage services. Several studies were conducted and DOE issued a report in July 1978 entitled "Preliminary Estimates of the Charge for Spent-Fuel Storage and Disposal Services." The purpose of this report, according to DOE, was not to establish policy or set a specific charge, but to provide basic elements of and ways that a charge might be calculated.

Nevertheless, DOE performed various rough calculations and selected a reference case that estimated the storage fee to be

--\$232 per kilogram for both interim storage and final disposal and

--\$117 per kilogram for disposal only.

Since a large commercial reactor normally off-loads 30 metric tons of spent fuel per year, the annual cost to a utility for storage and disposal would be about \$7 million. This is independent of the costs that a utility would pay to transport spent fuel to the Federal facility.

According to the preliminary fee report, this reference case was presented purely for discussion purposes. It includes six basic categories or cost centers:

1. Away-From-Reactor Storage Facility--A water basin spent-fuel storage facility with a capacity for 5,000 metric tons.
2. Transportation--Movement of spent fuel from the storage facility to the repository by dedicated trains over an estimated 1,600 miles.
3. Encapsulation Facility--A facility on the site of the repository that will prepare the spent fuel for placement in the repository.
4. Geologic Repository--A 2,000-acre facility in a bedded salt formation capable of accepting spent-fuel elements in 1988.
5. Research and Development--Government R&D funds expended in support of commercial spent-fuel management.

6. Government Overhead--All non-R&D expenses of the Government directly associated with commercial spent-fuel management.

From information presented in this report and based upon information presented in other DOE reports, we believe that accurate data exists only on the cost for an away-from-reactor storage facility. Should DOE seek to build a new facility somewhere in the United States, this cost can probably be accurately estimated because, in part, storage of spent fuel in a water basin facility has been a proven practice. Years of information exist to indicate what the cost of a spent-fuel storage facility would be, independent of the size.

The same statement, however, cannot be made about other parts of the estimated fee. DOE assumed that the storage facility would be 1,600 miles from the geologic repository. This distance was arbitrarily chosen. Also, DOE assumed that the geologic repository will be located in bedded salt and be available between 1988 and 1993. But DOE has encountered difficulties with bedded salt as a geologic disposal medium and there is no certainty that a suitable geologic repository can be found before the year 2000. Further an encapsulation facility must be built on the site of the geologic repository. Like the geologic repository, DOE is years away from actually constructing such a facility and determining what the true costs will be.

DOE officials recognize that there are uncertainties associated with the fee charge. For that reason, DOE plans to recalculate the fee charge later this year and update it annually as more precise information becomes available. In this way DOE believes that it can offset the uncertainties of its estimates and insure that it fully recovers all storage costs. In fact, DOE believes that even if the storage facility is greatly underutilized, it can charge all unrecovered costs to its high-level waste disposal program and recoup its costs from the utilities seeking final disposal services.

CONCLUSIONS AND OBSERVATIONS

Our analysis shows that the domestic nuclear industry is technically capable of providing any needed interim spent-fuel storage capacity. Options are available for both on- and off-site storage which utilities and the nuclear industry have yet to fully explore. Further, DOE's announced policy to provide interim spent-fuel storage has caused uncertainties, and even delays and cancellations in industry plans to provide its own increased storage capacity.

Equally important, however, the longer that the Federal Government takes to develop a firm position on interim spent-fuel storage--whether it is to be part of a Federal program or left to industry to resolve--the less likely it is that the industry will be able to deal with, in a timely manner, any needs for away-from-reactor storage.

While our analysis of away-from-reactor storage needs shows that utilities are planning future spent-fuel storage without firm dependence on the Federal Government, there still exists some small need for away-from-reactor storage. In addition, there is a potential that utility on-site expansion and intra-utility shipment plans may not all be approved. According to NRC officials, the public intervention in these plans has been increasing and it is impossible to predict how NRC and the courts may deal with them in the future. Thus, there may be some need for interim away-from-reactor spent-fuel storage both in the near-term and as we progress toward the 1990s.

It is imperative, therefore, that the Federal Government decide soon on where interim spent-fuel storage fits into the overall policy on spent-fuel disposition. DOE believes that spent fuel should be disposed of in geologic repositories and that the Government should provide interim storage facilities until these repositories come on line. It believes, that it can provide the interim storage facilities sooner than the industry and with less public concern and intervention.

We believe that the responsibility for interim spent-fuel storage should be a utility and nuclear industry concern. They have the technical capability to deal with the problem and should have the motivation, considering their large capital investment in nuclear power. They cannot be expected to act, however, under today's uncertain Federal positions on the future disposition of spent fuel.

We believe, therefore, that instead of trying to develop an interim spent-fuel storage program, DOE should (1) concentrate its efforts on getting resolution as to whether commercial spent fuel will be reprocessed and (2) commit itself to a timetable for having a method for spent-fuel disposal available. These are needed to provide some finality to the issue of spent-fuel storage and to give the nuclear industry a basis for planning storage requirements. For the shorter-term, DOE should work with the nuclear industry to help it determine interim spent-fuel storage needs, meet necessary regulatory requirements, and develop a comprehensive storage program.

We do not believe, however, that the utilities or the nuclear industry should have an open-ended responsibility for spent-fuel storage. Therefore, if it appears that the Federal Government cannot meet its date for having a method of permanent spent-fuel storage available, DOE should then seek congressional approval to provide Federal spent-fuel storage facilities.

On the international side, our study shows that DOE's estimates of needed foreign storage capacity are speculative, and that its foreign spent-fuel storage program might not contribute significantly to nonproliferation objectives. Those countries in sensitive regions will continue to control some amount of spent fuel, even under DOE's proposed program. Also, because the United States was instrumental in establishing the International Fuel Cycle Evaluation Study, we do not believe that DOE should unilaterally decide on a foreign spent-fuel storage policy until the completion of that study--currently scheduled for early 1980.

RECOMMENDATIONS TO THE SECRETARY OF ENERGY

Because our analysis shows that a Federal interim spent-fuel storage facility is not needed, we recommend that the Secretary of Energy

- establish a timetable for having a method for permanent spent-fuel storage;
- include in that timetable provisions, for the President's consideration, on whether or not commercial spent fuel reprocessing should resume;
- work with and explore ways that utilities can solve their spent-fuel storage problems until a method of permanent storage is available; and
- encourage and work with the private industry to provide any needed interim spent-fuel storage facilities.

Federal interim storage facilities should only be considered if DOE cannot meet the date that it commits to having a permanent storage alternative available.

DOE COMMENTS AND OUR EVALUATION

In commenting on our draft report, DOE officials recognized that a firm time schedule for the availability of a disposal facility or a decision on reprocessing

would significantly reduce the uncertainties and risks faced by utilities and the private industry in planning and providing for spent-fuel storage requirements. They believe, however, that such time schedules cannot be established at this time because the (1) disposal program is dependent upon the selection and implementation of waste management strategies, as identified in the Interagency Review Group on Nuclear Waste Management report, which do not allow firm time schedules to be set and (2) decision on reprocessing is tied to the need for and timing of commercial breeder reactors in the United States.

DOE officials also indicated that utility and private storage of spent fuel is preferred where possible and DOE is encouraging that course of action. Nevertheless, DOE feels that institutional, regulatory, and intervenor activities are and will continue to present obstacles to private efforts to provide storage either at reactors or in facilities away-from-reactors. DOE believes that written correspondence from private industry already provides a basis for concluding that private industry cannot and will not provide centralized storage facilities under contract to DOE unless these ventures are guaranteed by the Government. This correspondence also indicates that the industry believes that storage facilities should be provided by the Government in light of the risks and uncertainties from changing political, regulatory, and intervenor actions.

Therefore, in light of the Federal responsibility in resolving disposal and reprocessing uncertainties, and the need for Government guarantees for private investment in facilities, DOE believes that a Federal program to provide interim spent-fuel storage is justified.

We agree that DOE's spent-fuel storage program has, in its latter stages, emphasized increased at-reactor storage of spent fuel. In fact, DOE has testified that it expects, as a maximum, to store (on an interim basis) only about 10 percent of the spent fuel generated in this country. We do not agree, however, that DOE has fully explored the nuclear industry's potential to provide away-from-reactor spent-fuel storage. More importantly, we believe that DOE's program does not recognize that the nuclear industry, which is supposed to be commercially viable, has the technical capability and should have the motivation to provide interim spent-fuel storage services.

CHAPTER 3

ISSUES AFFECTING THE TRANSPORTATION

OF SPENT FUEL MUST BE RESOLVED

Only small amounts of spent fuel are now being transported in the United States. In the near-term, however, shipments may increase as utilities send a portion of their spent fuel to interim storage facilities or other reactors. In the long-term, transportation will become more important as spent fuel is either shipped to an ultimate disposal site or a reprocessing facility. This is expected to raise many concerns about the (1) safety of spent-fuel shipments, (2) interaction among Federal, State, and local jurisdictions as they attempt to regulate spent-fuel shipments, (3) possible restrictions on the use of rail transportation of spent fuel, and (4) availability of shipping casks.

MORE DATA NEEDED ON THE SAFETY OF SPENT-FUEL TRANSPORTATION

Many segments of the public have expressed concern about the safety of spent-fuel transportation. Rail carriers have questioned the safety of spent-fuel containers in accident situations and have, in some cases, refused to transport these materials. Likewise, State and local governments have placed restrictions on the shipments of spent fuel through their jurisdictions because of concerns about potential transportation accidents. If transportation of nuclear materials is to continue, therefore, the safety and security of such shipments must be clearly demonstrated.

The two Federal agencies responsible for regulating the transportation of nuclear fuel and waste are the Department of Transportation and NRC. These agencies have adopted comprehensive standards and regulations to (1) protect employees and the general public from radiation exposure during the transport of spent fuel and (2) assure that spent-fuel casks are properly designed and constructed. In a recent reexamination of its regulations on packaging and transportation of radioactive materials, the NRC staff concluded that the environmental impacts of normal transportation and the risks of accidents involving radioactive material shipments were sufficiently small to allow continued shipments by all modes.

In addition, DOE, as part of its effort to test the safety and integrity of shipping containers, subjected spent-fuel casks to severe highway and rail accident

conditions. These full-scale tests supported the results of scale-model testing and computer analysis programs of DOE and provided evidence that the casks can withstand serious accident impacts.

Despite such information, there remains a negative public perception of the safety of spent-fuel transportation. In this context, a transportation subgroup of the President's Interagency Review Group on Nuclear Waste Management 1/ recently reported that the

"Lack of high quality, credible, and candid information about defense and commercial nuclear transportation methods, equipment, and performance has left State and local officials and questioning citizens with little confidence that health, life, and property are adequately protected. Consequently, a significant segment of the public is convinced neither of the safety of, nor the need for, such shipments."

The subgroup, therefore, recommended that a process be developed to systematically collect transportation data and build a data bank on ton-miles, accidents, waste shipment volumes and numbers, and other information to assist in risk assessment, container and vehicle design, public information, and other functions related to nuclear waste transportation safety. According to the subgroup report, this type of information was collected by NRC in 1975 but has never been updated.

NRC is currently preparing to update its 1975 data and DOE officials told us that DOE has recently developed a program to systematically collect and analyze data on spent-fuel shipments. We believe it important, however, that both agencies develop ways to insure that the analysis of such data becomes available to the public.

NEED TO ELIMINATE STATE AND
LOCAL PROHIBITION OF SPENT-
FUEL TRANSPORTATION

Growing concern about the safety of transporting radioactive material has caused over 50 percent of the States, as

1/The transportation subgroup is comprised of representatives of the Department of Transportation, DOE, the Environmental Protection Agency, NRC, the Arms Control and Disarmament Agency, and the Department of Commerce.

well as some municipalities, to pass laws and regulations to control or eliminate the movement of radioactive materials through their jurisdictions. These regulations coupled with those at the Federal level, impose a maze of restrictions on shippers and carriers of radioactive materials. If this trend should continue, the movement of radioactive material between different State and local jurisdictions could be seriously impeded, and in some cases, virtually stopped.

In our report entitled "Federal Actions Are Needed to Improve Safety and Security of Nuclear Materials Transportation" (EMD-79-18, May 7, 1979), we reported that the proliferation of State and local regulations was caused, in part, because the Department of Transportation had not developed routing regulations to implement its authority under the Hazardous Materials Transportation Act.

The Department of Transportation is currently developing the routing regulations but the specifics have not yet been finalized. Department officials said, however, that they are considering giving the States some authority to designate routes or otherwise regulate the movement of hazardous materials through their jurisdictions. Such a policy, according to these officials, is favored because the number of routes involved in the highway transportation of hazardous materials would be too much for one agency to monitor.

We agree that the Department of Transportation probably does not have the capability to completely monitor and regulate the transportation of all radioactive materials and we endorse the Department's argument that States have some rights to designate specific routes within a federally established framework. We believe, however, that Federal routing regulations should make it clear that States do not have the authority to prohibit the movement of spent fuel or other radioactive materials through their jurisdictions.

POTENTIAL EFFECTS OF RAILROAD DEREGULATION

The nuclear industry expects that rail transportation will play a key role in the future movement of spent fuel and high-level radioactive wastes. One spent-fuel rail cask, for instance, can carry 6 to 10 times more spent fuel than a truck cask. Rail carriers, however, have asked the Interstate Commerce Commission to withdraw spent fuel from common carriage status and to require that it be transported by special trains at reduced speeds and increased rates.

In one instance the Eastern railroads claimed that because of the hazards involved, they should not be common carriers for nuclear materials. The Interstate Commerce Commission ruled, however, that the question of safety could not be used as a defense by the railroads for negating their common carrier status. Questions regarding the safety of transporting spent fuel would have to be raised with NRC and the Department of Transportation, the agencies having jurisdiction on such matters.

The Interstate Commerce Commission also denied the railroad's request to require the use of special train service for transporting spent fuel. The United States Government and the electric utility companies denied this need and pointed out that such services would cost the utilities millions of dollars per year in added transportation costs, costs that will ultimately be borne by the consumer. The Interstate Commerce Commission agreed with the United States Government, and ruled the railroads were not convincing in their argument for the needed safety of special train services.

In summary, the Interstate Commerce Commission has deemed the railroads a common carrier of spent fuel and ordered them to publish reasonable and otherwise lawful tariff provisions covering the transportation of spent fuel in a regular train service. An aspect that could change this ruling, however, is the potential deregulation of the rail industry. The President has announced plans to seek such deregulation but the degree to which it might occur is not yet clear. An attorney for the Interstate Commerce Commission said, however, that in a completely deregulated environment, railroad companies might require special trains and increased rates or otherwise refuse to transport spent fuel and other radioactive materials. At this time, the justification for use of special trains has not been established. Appropriate Federal agencies have ruled that spent-fuel shipments meet safety standards and that such special service will unnecessarily cost the consumers of nuclear energy millions of dollars more each year. However, rail carriers still do not agree with this ruling and plan to appeal it in the Federal courts.

AVAILABILITY OF SPENT-FUEL SHIPPING CASKS

Concern has been expressed by several Federal agencies and congressional members that sufficient spent-fuel shipping casks will not be available when needed to transport the accumulating spent fuel. Many of these fears resulted from a recent report by the transportation subgroup of the Interagency Review Group on Nuclear Waste Management. The

report stated that there could be a shortage of spent-fuel shipping casks when needed, primarily because of long procurement lead times, limited production capability, and uncertain industry incentives.

Based on our analysis of information provided by utilities and vendors of spent-fuel casks, we found that the current inventory of spent-fuel casks ^{1/} is ample to handle the expected shipments of spent fuel through 1985. In addition, the nuclear industry has the capability to produce enough casks to accommodate the increasing need for spent-fuel casks envisioned after 1985. We also found, however, that failure of the administration to provide a final spent-fuel policy as soon as possible could eliminate the time cushion the nuclear industry has to plan and meet its transportation needs.

A recent study performed by the Electric Utility Companies' Ad Hoc Nuclear Transportation Group presented similar findings. Based on meetings with vendors, the group concluded that even with the maximum estimated number of casks required by 1990--31 rail casks and 30 truck casks--the demand could easily be within the manufacturing capability of the United States. The study cautioned, however, that to fully utilize the existing manufacturing capability, new casks must be ordered with sufficient lead time to allow for a levelized manufacturing effort. In other words, the cask manufacturing capacity might not be sufficient if utility orders are not received in an orderly and progressive manner. At this time, however, utilities do not want to commit to the purchase of additional casks until a firm Federal policy on spent fuel is announced and vendors are not willing to risk their own capital in equipment and labor without firm utility orders. These groups believe, therefore, that a firm Federal policy on both interim storage and ultimate disposal of spent fuel is needed soon so the demand for spent-fuel casks develops in the orderly fashion necessary to support a competitive market.

CONCLUSIONS

Although very little spent fuel is being shipped at this time, its transportation may soon increase if utilities begin to ship their spent fuel to interim storage facilities or other reactors. In the longer-term, transportation will

^{1/}Currently there are 18 spent-fuel shipping casks--12 truck and 6 rail--and an additional 5 truck casks under construction.

become more important as spent fuel is shipped to either an ultimate disposal site or a reprocessing facility. A number of logistical, institutional, social, and political problems exist, however, which could pose formidable obstacles to the transportation of spent fuel. Problem areas we found that need particular attention include:

- Negative public perceptions of the safety of nuclear materials transportation.
- A maze of State and local restrictions on transportation that have resulted, in part, from the lack of comprehensive Federal routing regulations.
- Possible deregulation of the rail industry that could allow railroads to restrict transportation services and charge unreasonable rates.
- Lack of a definitive Federal policy on the disposition of spent fuel that could eliminate the lead time necessary to plan for and acquire spent-fuel shipping casks.

RECOMMENDATION TO THE
SECRETARY OF TRANSPORTATION

To resolve any uncertainty about the rights of utilities and other authorized groups to transport spent fuel through interstate commerce, we recommend that the Secretary of Transportation include in any routing regulation for transportation of radioactive materials, specific language to make clear the extent or scope of the States' authority to regulate, but not prohibit, the movement of spent fuel.

Officials of the Department posed no objection to this recommendation.

Upper Limits of Foreign Spent Fuel
That DOE Expects To Be Delivered
To The United States

FY	Countries in Sensitive Regions (Option 1)		Nonproliferation Benefits - Low Option (Option 2)		Nonproliferation Benefits - High Option (Option 3)	
	Total		Total		Total	
	Annual	Cumulative	Annual	Cumulative	Annual	Cumulative
1983	110	110	220	220	541	540
1984	50	160	125	340	417	960
1985	65	225	95	435	443	1400
1986	70	295	140	575	620	2020
1987	80	375	115	690	540	2560
1988	90	465	195	885	440	3000
1989	95	560	210	1095	480	3480
1990	110	670	220	1320	530	4010
1991	115	785	230	1550	600	4610
1992	120	905	240	1795	660	5270
1993	130	1035	250	2045	750	6020
1994	135	1170	265	2310	830	6850
1995	145	1315	285	2595	900	7750
1996	150	1465	305	2900	970	8720
1997	160	1625	330	3230	1080	9800
1998	170	1795	350	3580	1170	10,970
1999	180	1970	375	3955	1260	12,230
2000	190	2160	400	4355	1350	13,580

These figures were taken from DOE's report entitled, "Spent Fuel Storage Requirements --The Need for Away From Reactor Storage."

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