

REPORT BY THE

Comptroller General**MASTER**

OF THE UNITED STATES

An Evaluation Of Federal Support Of The Barnwell Reprocessing Plant And The Department Of Energy's Spent Fuel Storage Policy

In April 1977 the President deferred indefinitely the commercial reprocessing of nuclear spent fuel to (1) minimize the availability of plutonium and (2) reduce the risks of nuclear weapons proliferation. To carry out the policy, the President proposed that neither Federal funding nor support should be given to complete a large commercial reprocessing facility being constructed at Barnwell, South Carolina. Later in 1977 the Department of Energy announced that the Federal Government would, at some unspecified future date, begin accepting and taking title to spent nuclear fuel that previously was to be reprocessed.

GAO concludes that (1) Federal funding of short-term research activities at the Barnwell reprocessing plant should continue until the completion of a major international study of alternative fuel cycle technologies and (2) the Department of Energy should not build a Government financed spent fuel storage facility until other alternatives are fully explored and the work of an interagency task force on waste management is completed.

**DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED****EMD-78-97
JULY 20, 1978**

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.



COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

B-151475

The Honorable John Glenn
Chairman, Subcommittee on Energy,
Nuclear Proliferation and
Federal Services
Committee on Governmental Affairs
United States Senate

Dear Mr. Chairman:

In response to your requests of November 22, 1977, and January 3, 1978, here are the results of our evaluation of the Barnwell reprocessing plant and the Department of Energy's spent fuel storage policy. As both topics are outgrowths of the President's April 1977 policy decision to defer indefinitely the commercial reprocessing of spent nuclear fuel, we decided to respond to the two requests in one report. This report, as we agreed with your staff, will be available for unrestricted distribution.

We provided selected officials of the Department of Energy and the Nuclear Regulatory Commission an opportunity to review a draft of this report. Their oral comments have been incorporated in the report as we believe appropriate.

The report contains recommendations to the Secretary of the Department of Energy on page 23. As you know, section 236 of the Legislative Reorganization Act requires the head of a Federal agency to submit a written statement on actions taken on our recommendations to the House Committee on Government Operations and the Senate Committee on Governmental Affairs 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.

Sincerely yours,

✓ A handwritten signature in dark ink, appearing to read "Thomas B. Staats", is written over the typed name. A checkmark is visible to the left of the signature.

✓ Comptroller General
of the United States

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

129

COMPTROLLER GENERAL'S REPORT
TO THE SUBCOMMITTEE ON ENERGY,
NUCLEAR PROLIFERATION AND
FEDERAL SERVICES, COMMITTEE
ON GOVERNMENTAL AFFAIRS
United States Senate

AN EVALUATION OF FEDERAL
SUPPORT OF THE BARNWELL
REPROCESSING PLANT AND
THE DEPARTMENT OF ENERGY'S
SPENT FUEL STORAGE POLICY
Department of Energy

D I G E S T

For many years, the Government and utilities assumed that spent nuclear fuel from commercial reactors would be routinely reprocessed to separate the nuclear wastes and recover the residual uranium and plutonium. The radioactive wastes would be concentrated, packaged, and turned over to the Federal Government for disposal while the uranium and plutonium would be used again to fuel either light water or breeder reactors.

In April 1977, however, the President announced a new policy on nuclear power which deferred indefinitely the commercialization of technologies that reprocess or depend on the recycle of plutonium. The reason for the policy was to reduce the availability of plutonium and to minimize the risks of nuclear weapons proliferation.

To carry out the policy, the President has proposed to indefinitely defer the development of the Liquid Metal Fast Breeder Reactor and has said that Allied-General Nuclear Services, Inc. would not receive either Federal funding or support to complete a large commercial reprocessing facility being constructed at Barnwell, South Carolina.

Later in 1977 the Department of Energy announced that the Federal Government would, at some unspecified future date, begin accepting and taking title to spent nuclear fuel from utilities that previously was to be reprocessed. Under this policy, spent fuel from utilities would be accepted upon payment of a one-time fee. The fee would cover the full cost to the Government for interim storage and final disposal of the spent fuel. (See pp. 1 to 3.)

EMD-78-97

FEDERAL SUPPORT OF THE BARNWELL REPROCESSING PLANT

Barnwell is the first large-scale commercial reprocessing venture in the United States. It is designed to reprocess 1,500 metric tons of spent reactor fuel per year. The Nuclear Regulatory Commission approved construction of some of the facilities before 1970 and three of the five major facilities at the complex are essentially complete.

Allied-General has already invested about \$250 million in the Barnwell complex. A recently completed Department study on alternative uses at Barnwell estimates that before the plant could operate continuously at design capacity, an additional capital investment of \$380 million to \$585 million would be needed. It is possible, however, that spent fuel could be reprocessed prior to the completion of the entire complex. (See pp. 4 to 6.)

Barnwell, as well as other reprocessing plants here and abroad, separates spent fuel into almost pure streams of uranium and plutonium. The Administration considers this unacceptable from a nuclear weapons proliferation standpoint and has taken initiatives to study, along with other countries, alternative fuel cycles and methods of reprocessing that might prevent proliferation. Until this international study is complete, Allied-General has said there is very little it can do to complete the Barnwell facility.

The President's decision to indefinitely defer commercial reprocessing reflects a major change in the Federal attitude toward Barnwell. While the Government did not provide any direct financial support to Allied-General, it created--through its previous policies and programs on nuclear power--an atmosphere favorable to reprocessing. The former Atomic Energy Commission, for example, offered verbal encouragement to Allied-General, provided it access to reprocessing technology, and sold it land on which to build the reprocessing complex. Likewise, the Nuclear Regulatory Commission, while imposing strict requirements,

had not previously given Allied-General reason to believe that reprocessing and recycling activities could not eventually meet safety and environmental licensing criteria. (See pp. 6 to 8.)

Faced with the withdrawal of official Government support for conventional reprocessing and the termination of licensing proceedings, Allied-General's position was improved--at least temporarily--when Congress required the Department of Energy to spend \$13 million of its fiscal year 1978 research budget at Barnwell. Congress said, however, that the work at Barnwell should be consistent with the Administration's nonproliferation objectives and that the money not be used to further prepare the plant for reprocessing. In addition, committees in both houses of Congress have tentatively added between \$13 million and \$18 million to the Department's current budget request to continue work at Barnwell through fiscal year 1979. (See p. 8.)

The Department, after receiving the money from Congress, contracted with Allied-General for several studies and research activities relating to (1) spent fuel transportation, receiving, handling, and storage; (2) security and safeguards; and (3) alternative fuel cycles. The Administration believes this work duplicates other research efforts and should not be continued. GAO, during its review, discussed this with Department officials. Generally, high-level management agreed with and even helped develop the Administration's position. Other staff levels, however, do not believe that the work at Barnwell is duplicative but recognize that the Department should do a better job of matching any future work to its program objectives.

If Congress agrees with the Administration's position and discontinues funding, Allied-General has said that it will decrease operations and consider putting the plant in a mothballed status. While the plant could be brought from mothballed to operational status at some future time, the Department estimates that it would take about 4 years

and cost between \$75 million and \$115 million. It is also an option, according to Allied-General, that it would eventually dismantle the plant and take legal action to recoup its losses from the Federal Government. In any event, the lack of continued Government funding is likely to result in the termination of some or all activities at the plant and the loss or transfer of people key to the reprocessing operation.

If funding is continued by the Congress, money could be used to continue research activities, assist in the development of other facilities at the plant, expand the onsite spent fuel storage facility, or purchase Barnwell for use either as a national or international fuel cycle center. The Administration believes, however, that such funding would hinder its international nonproliferation objectives and cause other countries to doubt the U.S. commitment to the deferral of commercial reprocessing technologies.

GAO believes that the Congress should continue to fund short-term research studies at Barnwell until the completion of the international study on alternative fuel cycle technologies. This will keep the facilities and key people available in the event the United States decides, as a result of the study, that some method of reprocessing is consistent with its nonproliferation objectives.

GAO believes, however, that it is important that the Department not wait on congressional initiatives to plan work at Barnwell and make it compatible with existing programs. Also, GAO emphasizes that this should be a short-term option only. If, at the completion of the international study, the Administration maintains its current policies, GAO would recommend that the Congress terminate its funding initiatives. At that time it would be Allied-General's decision to either maintain or reduce the operating status at Barnwell. (See pp. 8 to 13.)

EVALUATION OF THE SPENT FUEL STORAGE POLICY

In view of the President's new policy on nuclear power, it is unlikely that spent fuel will be reprocessed in the foreseeable future. Similarly, it is unlikely, because of social, regulatory, and geological obstacles, that spent fuel will be safely disposed of until at least the end of the 1980s. For these reasons, the interim storage of spent fuel has, by necessity, become a new part of the nuclear fuel cycle.

Last year the Department announced a spent fuel storage policy whereby the Federal Government would accept and take title to spent reactor fuel upon payment of a one-time fee. Participation in this effort is voluntary. If utilities decide to participate, the spent fuel must be transferred to a Government-approved storage site at user expense. The one-time fee would cover the full cost to the Government of providing for interim storage and disposal of the spent fuel should that be required. (See pp. 14 to 15.)

Since the announcement of the spent fuel storage policy, no implementation plan has been published. However, the Department has undertaken a number of actions in order to develop such a plan. At the time of the GAO review, many of these actions were still underway. These included:

- a survey of utilities to determine the potential transfers of spent fuel to the Government;
- a request for expressions of interest by industry to build any needed spent fuel storage facilities;
- the development of a one-time storage and disposal fee; and
- the preparation of a generic environmental statement.

(See pp. 15 to 22.)

These actions have yet to answer how much spent fuel storage space is needed, who must provide the space, and when the space must be available. Basically, there are two reasons for this. On one hand, the utilities are unwilling to commit themselves to transferring their fuel to the Government until they know the details of the Department's plan. On the other hand, the Department is having trouble developing the details to its plan, in part, because it has not received firm commitments from the utilities. This "chicken or egg" situation has placed both the utilities and the Department in a position of guessing what the other will do. As a recourse, the Department has been working toward building a new storage facility and having it available by 1983.

GAO believes it would be premature for the Department to build a new Government-financed spent fuel storage facility before considering other alternatives. In order of priority, the Department should consider (1) the options available to utilities to solve their own storage problem, (2) the use or expansion of existing away-from-reactor storage facilities, and (3) industry interest to build additional spent fuel storage facilities.

Further, the Department should await the findings of the interagency task force on waste management. Among other things, the task force is evaluating the various issues facing the spent fuel storage policy, including, as an example, the advantages and disadvantages of one large centralized spent fuel storage facility as opposed to a number of smaller decentralized ones. Until the task force completes its work, it may be impossible to predict the implications of the spent fuel policy.

RECOMMENDATIONS TO THE SECRETARY,
DEPARTMENT OF ENERGY

The Department of Energy is considering various options for providing additional spent fuel storage space. These include

building either a Government- or a privately-financed storage facility. The Secretary, Department of Energy, before deciding to build a Government-financed facility should, in order of priority

- work with and explore ways that utilities can solve their own spent fuel storage problem,
- give further consideration to the use and expansion of existing away-from-reactor storage facilities,
- pursue industry interest to provide additional spent fuel storage facilities, and
- consider the findings of the interagency task force.

DEPARTMENT OF ENERGY COMMENTS

In verbally commenting on our draft report, Department of Energy officials said that a framework has recently been developed to implement the thrust of our recommendations. Some actions have already been taken to encourage utilities to solve their own problems, and to give top priority to existing commercial storage facilities. They also said that the findings of the interagency task force on waste management would be considered in reaching a decision on any new storage facility.

C o n t e n t s

	<u>Page</u>
DIGEST	i
CHAPTER	
1 INTRODUCTION	1
New nuclear policy	1
Scope of review	2
2 FEDERAL SUPPORT OF THE BARNWELL REPROCESSING PLANT	4
History and status of Barnwell	5
Barnwell and the Administration's attitude toward reprocessing	6
Barnwell and congressional action	8
Administration view of work at Barnwell	8
The value of work at Barnwell	9
Potential uses of Barnwell	10
Conclusions	11
3 EVALUATION OF THE SPENT FUEL STORAGE POLICY	14
Key elements of the announced spent fuel storage policy	14
Implementation of the spent fuel storage policy	15
Inquiry on potential spent fuel transfers to the Government	16
Request for industry interest in providing spent fuel storage services	17
Development of the one-time storage and disposal charge	18
Preparation of a generic environmental statement	19
DOE efforts toward the construc- tion of a new spent fuel stor- age facility	21
Conclusions	22
Recommendations to the Secretary, Department of Energy	23
Department of Energy Comments	23
APPENDIX	
1 Possible spent fuel storage issues facing the Interagency Task Force on Waste Management	24

II	Principal officials responsible for administering activities discussed in this report
----	---

27

ABBREVIATIONS

DOE	Department of Energy
GAO	General Accounting Office
INFCE	International Nuclear Fuel Cycle Evaluation
NASAP	Nonproliferation Alternative Systems Assessment Program
NRC	Nuclear Regulatory Commission
SURF	Spent Unreprocessed Fuel Program

CHAPTER 1

INTRODUCTION

For many years, the Government and utilities assumed that spent nuclear fuel from commercial reactors would be routinely reprocessed to separate the nuclear wastes and recover the residual uranium and plutonium. The radioactive wastes would be concentrated, packaged, and turned over to the Federal Government for disposal while the uranium and plutonium would be used again to fuel either light water or breeder reactors. This was desirable as a means of conserving fuel and because it was considered more cost effective to recover the uranium and plutonium than to dispose of the spent fuel as nuclear waste.

By the mid-1970s, however, the attitude toward commercial reprocessing was beginning to change. Some studies predicted that existing uranium supplies would last until at least the end of the century; the high cost of commercial reprocessing raised questions about the benefits of reprocessing except to fuel advanced breeder reactors; a Federal court prohibited the interim licensing of facilities that use plutonium until a rulemaking proceeding on environmental issues was completed; Nuclear Fuel Services, Inc. closed down its small commercial reprocessing operations in West Valley, New York; and during October 1976 President Ford decided to delay commercial reprocessing in the United States until uncertainties regarding nuclear weapons proliferation were resolved.

NEW NUCLEAR POLICY

On April 7, 1977, President Carter announced a new policy on nuclear power which deferred indefinitely the commercialization of technologies that reprocess or depend on the recycling of plutonium. This was done to limit the spread of these technologies to other countries and to minimize the further proliferation of nuclear weapons. The key points of the policy were to increase support for current light water reactors and the once-through fuel cycle but to defer further development and support for the liquid metal fast breeder reactor and the reprocessing plants needed to fuel it with plutonium.

To carry out the policy, the President has proposed to terminate the construction of the Clinch River Breeder Reactor and has said that Allied-General Nuclear Services, Inc., would not receive Federal funding or support for completing a large commercial reprocessing facility being constructed at Barnwell, South Carolina. Last year, the Department of Energy (DOE) announced that the Federal Government would,

at some unspecified future date, begin accepting and taking title to the spent nuclear fuel that previously was to be reprocessed and which is accumulating at reactor sites. The intent of DOE was to store spent fuel until either a decision on reprocessing is made or geologic disposal is available. Under this policy, spent fuel from utilities would be accepted upon payment of a one-time fee. The fee would cover the full cost to the Government for interim storage and disposal of the spent fuel.

Previously, we have prepared two reports which have application toward the new nuclear policy and the spent fuel storage and disposal policy. The first report examined the problems of safely disposing of hazardous radioactive wastes including spent fuel elements. 1/ The report concluded that it may be optimistic to expect a repository by 1985 because of social, geological, and regulatory obstacles. The second report evaluated the Administration's proposed nuclear non-proliferation strategy. 2/ It recommended that Congress not authorize funds to commercially demonstrate or to commercialize reprocessing technology until technical alternatives are evaluated. On the other hand, the report recognized the continued need for a viable research and development program for nuclear fuel reprocessing. Also, it recommended that Congress be consulted before the United States announces any policy concerning the return of foreign spent fuel or participation in international spent fuel storage centers.

SCOPE OF REVIEW

During our review, we evaluated a DOE contract with Allied-General Nuclear Services, Inc., in Barnwell, South Carolina. The contract provided for studies of spent fuel transportation, receipt, handling, and storage. We reviewed the options available for the Barnwell facility in light of the new nuclear policy.

We also evaluated the domestic storage aspect of DOE's spent fuel storage and disposal policy. We reviewed the present spent fuel situation in the United States to determine if there is a storage problem and we examined the alternative strategies being considered by DOE to resolve the problem.

1/Nuclear Energy's Dilemma: Disposing of Hazardous Radioactive Waste Safely, September 9, 1977 (EMD-77-41).

2/An Evaluation of the Administration's Proposed Nuclear Non-Proliferation Strategy, October 4, 1977 (ID-77-53).

The following chapters highlight our evaluation of each of these areas as well as our observations on related matters. Comments from selected officials of DOE and the Nuclear Regulatory Commission (NRC) have been incorporated in the report as we believe appropriate.

CHAPTER 2

FEDERAL SUPPORT OF THE BARNWELL

REPROCESSING PLANT

Allied-General Nuclear Services, Inc. has partially constructed a large nuclear fuel reprocessing complex in Barnwell, South Carolina. If completed, this plant, known as the Barnwell Nuclear Fuel Plant, would chemically separate the plutonium and unused uranium in spent nuclear fuel so it could be recycled and used again in current or future generation commercial powerplants.

On April 7, 1977, however, the President announced that due to the risks of worldwide nuclear weapons proliferation, the United States would indefinitely defer reprocessing and the recycling of plutonium. In response, NRC terminated licensing proceedings for Barnwell and all work toward completing the complex was stopped. In the interim, the United States has taken initiatives to (1) study alternative fuel cycles and methods of reprocessing that might be more acceptable from a proliferation standpoint and (2) seek an international consensus on the ways to minimize the proliferation risks associated with reprocessing.

Allied-General, faced with the loss of its \$250 million investment, believes that it should receive Federal support at least until national and international studies on alternative fuel cycles are complete and the U.S. position on reprocessing is finalized. Congress, apparently in agreement with Allied-General, required DOE to spend up to \$13 million of its fiscal year 1978 fuel cycle budget at Barnwell. This is enough, according to Allied-General, to maintain the current staffing and operating levels at the plant through September 1978. In addition, Congress provided DOE with \$1 million to study potential uses for Barnwell that would be consistent with this country's nonproliferation objectives. Also committees in both houses of Congress have tentatively added between \$13 million and \$18 million to continue work at Barnwell through fiscal year 1979.

A \$13 million cost type contract was awarded in January 1978 to Allied-General. The Administration and DOE believe that this and any future work at Barnwell will be only marginally beneficial in the near term. Additionally, the Administration believes that continued congressional funding of Barnwell could cause other countries to doubt this country's commitment to its nonproliferation objectives and refuse to follow our leadership in restricting the widescale recycling of plutonium.

The remainder of this chapter provides a history and status of Barnwell and discusses present and future funding arrangements for the complex.

HISTORY AND STATUS OF BARNWELL

Barnwell is the first large-scale commercial reprocessing venture in the United States. ^{1/} It is designed to reprocess 1,500 metric tons of spent reactor fuel per year and, if completed, would consist of five major facilities: (1) a spent fuel storage facility capable of storing between 400 and 750 metric tons of spent fuel; (2) a separations facility which chemically processes spent light water reactor fuel assemblies into liquid uranium, liquid plutonium, and liquid waste; (3) a uranium hexafluoride facility which converts the liquid uranium into uranium hexafluoride for re-enrichment by the Government; (4) a plutonium conversion facility to convert the liquid plutonium to an oxide and store it for eventual use as a light water reactor fuel or in breeder reactors; and (5) a waste solidification facility to solidify the liquid wastes and temporarily store them before shipment to a permanent repository. ^{2/}

NRC approved construction of some of the facilities before 1970 and the spent fuel storage, separations, and uranium hexafluoride facilities are now essentially complete. Conceptual designs have been partially prepared for the plutonium conversion facility and waste solidification plant, but these are unproven parts of a reprocessing complex and have not yet been submitted for NRC review. More importantly, Allied-General does not believe that either of these two facilities can be built and licensed in today's environment without extensive involvement and funding by the Federal Government. It believes that such facilities should first be built and operated by the Government as large-scale demonstration projects.

In a previous report on the Administration's nuclear non-proliferation strategy (ID-77-53, October 4, 1977), we reported that prior to the President's April 1977 policy statement, the

^{1/}A much smaller commercial reprocessing plant at West Valley, New York, operated between 1966 and 1972. It terminated operations when its owners were unable to economically justify plant modifications necessary to meet new licensing requirements. About 640 metric tons of spent fuel were reprocessed at this plant during its operation.

^{2/}DOE estimates that a permanent Federal repository for high-level nuclear waste will not be available until at least 1988.

Energy Research and Development Administration (now part of DOE) had studied the problems of waste and plutonium solidification and requested authorization of \$30 million to begin the design of commercial-sized waste solidification and plutonium conversion facilities. There was speculation at the time that these plants would have been constructed at Barnwell and that the total complex would have been used to demonstrate, under tightly controlled conditions, the various technical, economic, and safeguards uncertainties of reprocessing. With the President's policy statement, however, these plans were dropped and the request for authorization of \$30 million was withdrawn.

Allied-General has already invested about \$250 million in the Barnwell complex. The recently released \$1 million DOE study on alternative uses of Barnwell estimates that before the plant could operate continuously at design capacity, an additional capital investment of \$380 million to \$585 million would be needed. This includes the cost to design and construct the remaining two facilities. It is possible, however, that spent fuel could be reprocessed (or chemically separated) prior to the completion of the entire complex.

Licensing requirements would have permitted the separations facility to operate for 5 years before a waste solidification plant is available. Because plutonium cannot be shipped in liquid form, this would have to be stored at Barnwell until the necessary facility is completed.

BARNWELL AND THE ADMINISTRATION'S ATTITUDE TOWARD REPROCESSING

Barnwell, as well as other reprocessing plants here and abroad, separates spent fuel into streams of almost pure uranium and plutonium. The Administration considers this unacceptable from a nuclear weapons proliferation standpoint and has taken initiatives to study alternative fuel cycles and methods of reprocessing that might prevent proliferation.

The major study is the International Nuclear Fuel Cycle Evaluation (INFCE)--a multinational study of alternative fuel cycles that is aimed at minimizing the danger of nuclear weapons proliferation without jeopardizing energy supplies or the development of nuclear energy for peaceful purposes. There are 50 participating nations in the INFCE study, but the United States is the main contributor and will have a major technical input to the study results. While this study will not commit any nation to a specific course of action, it is viewed by this country to be very important to the future direction of nuclear energy programs, both here and abroad. It is investigating the full range of nuclear problems and could result in a consensus on the future role of peaceful nuclear energy.

In technical support of the INFCE study, the United States has also initiated the Nonproliferation Alternative Systems Assessment Program (NASAP). This is a major review and analysis of a wide variety of reactors and reactor fuel cycle systems, emphasizing the proliferation risks of each but also considering their safety and their technical, environmental, and commercial feasibility. The specific focus of both of these studies is to identify fuel cycle or reprocessing alternatives which will combine superior proliferation resistance with effective use of uranium resources.

These studies are scheduled to be completed in late 1979, and until then Allied-General has said there is very little it can do to complete the Barnwell facility. The President has indefinitely deferred commercial reprocessing and recycling of plutonium in this country, and he has said that the Barnwell plant would not receive either Federal encouragement or funding for its completion as a fuel reprocessing complex.

In addition, NRC, in consideration of the President's policy, has terminated all licensing proceedings at Barnwell and said it will not consider reopening them until after these major studies are completed. 1/ NRC justifies this decision by noting that

- continued licensing could lead other nations to question the U.S. commitment to defer commercial reprocessing and plutonium recycle,
- congressional actions appear to support the President's nonproliferation objectives and policy on plutonium recycling,
- previous court decisions and existing regulations give the Commission broad authority to terminate licensing proceedings, and
- final environmental and safety considerations cannot be completed until the INFCE and NASAP studies are completed and all viable alternatives to plutonium recycling are known and evaluated.

These policies reflect a major change in the Federal attitude toward Barnwell. While the Government did not provide any direct financial support to Allied-General, it created--through its policies and programs on nuclear power--an atmosphere

1/With the exception of the spent fuel storage facility.

favorable to reprocessing. The former Atomic Energy Commission, for example, offered verbal encouragement to Allied-General, provided it access to reprocessing technology, and sold it land on which to build the reprocessing complex. Likewise, NRC, while imposing strict requirements, had not previously given Allied-General reasons to believe that reprocessing and recycling activities could not eventually meet safety and environmental licensing criteria.

BARNWELL AND CONGRESSIONAL ACTION

Faced with the withdrawal of official Government support for conventional reprocessing and the termination of licensing proceedings, Allied-General's position was improved--at least temporarily--when Congress required DOE to spend \$13 million of its fiscal year 1978 research budget at Barnwell. This is enough, according to Allied-General, to maintain the current staffing and operation levels at the plant through September 1978. Congress required, however, that the work at Barnwell be consistent with the Administration's nonproliferation objectives and instructed that the money not be used to further prepare the plant for reprocessing. In addition, committees in both houses of Congress have added between \$13 million and \$18 million to DOE's current authorizing legislation to continue work at Barnwell through fiscal year 1979. The money provided by Congress in 1978 required DOE to curtail budgeted fuel cycle activities, but the money in 1979 is an addition to DOE's budget request.

ADMINISTRATION VIEW OF WORK AT BARNWELL

On May 16, 1978, DOE sent a letter to the U.S. Senate Committee on Energy and Natural Resources which presented the official Administration position on continued funding of activities at Barnwell. It strongly opposed any additional funding for Barnwell during fiscal year 1979. Among other things, it argued that the

- economic viability of commercial reprocessing in the near-term is highly questionable and, at best, of marginal benefit;
- U.S. policy is to discourage reprocessing in other countries and any activity at Barnwell will be interpreted as inconsistent with U.S. policy;
- timing and size of the Barnwell facility will not benefit the INFCE study;

- \$1 million study commissioned by Congress (1) did not define a single reprocessing related activity that could be done at Barnwell that would aid the present U.S. non-proliferation effort or (2) find any support for changing the decision not to support the completion of Barnwell as a reprocessing facility;
- funding of Barnwell could seriously damage U.S. leadership in general, and the U.S. position in the INFCE study; and
- existing DOE fuel cycle and safeguards activities are extensive and it would be wasteful to duplicate these programs at Barnwell.

While this is an extremely strong position and leaves no doubt about where the Administration stands, it fails to recognize two important considerations. First, does the Federal Government have any responsibility to the developers of Barnwell, considering the encouragement given to start a commercial reprocessing industry? Second, will the other nuclear developing countries follow the U.S. lead on proliferation and stop or defer their reprocessing programs? Early indications are that--even with a total U.S. commitment--other countries view the development of breeder technologies and reprocessing as vital to their economic stability, and may not be willing or able to follow the U.S. lead. For instance, Japan, France, West Germany, United Kingdom, and the Soviet Union all have ongoing breeder reactor development programs as well as planned or operating reprocessing facilities. They have not, as of yet, indicated a desire to discontinue these programs.

THE VALUE OF WORK AT BARNWELL

Before the President's announcement on the deferral of reprocessing, Barnwell was a commercial facility in the process of being licensed. Therefore, DOE had not developed any plans to use Barnwell for research and development. When money was provided by Congress in August 1977, a program was developed rather quickly to spend the appropriated money before the close of the 1978 fiscal year. On January 12, 1978, a contract was awarded (without profit or fee) to Allied-General with a cost ceiling of \$13 million. Included in the contract were studies and research activities relating to (1) light water reactor spent fuel transportation, receiving, handling, and storage; (2) security and safeguards; (3) alternative fuel cycles; and (4) maintenance and mothballing of the facility. According to DOE officials, much consideration went into developing a contract effort to insure it was consistent with authorizing legislation and would not further prepare the plant for reprocessing.

There are some differences of opinion, however, on the value of the work at Barnwell. As mentioned previously, the official Administration position is that the work at Barnwell duplicates other DOE research efforts. High-level DOE management agreed with this assessment and even helped develop the Administration position. Other DOE staff levels, however, do not believe the work is duplicative but recognize that if money is again provided by Congress in 1979, DOE should do a better job of matching the work to its program objectives.

POTENTIAL USES OF BARNWELL

At the same time the Congress appropriated the \$13 million for Barnwell, it also provided \$1 million for DOE to study potential uses for Barnwell that would be consistent with U.S. nonproliferation objectives. The results of this study, issued in April 1978, concluded that in addition to reprocessing spent reactor fuel, Barnwell could be used in the short-term to

- train national and international safeguards and security inspectors and fuel cycle operators;
- conduct research, development, and demonstration on more proliferation-resistant fuel cycle technologies; and
- store domestic or foreign spent fuel.

Longer term options include using Barnwell (1) to reprocess spent fuel in ways that do not involve the separation of pure plutonium, such as coprocessing or spiking, 1/ (2) as a model for the establishment of an international fuel cycle center, or (3) to reprocess spent fuel from a Government-owned reactor at Richland, Washington. According to DOE's report, these options depend on the Administration deciding that some form of reprocessing can meet this country's nonproliferation objectives.

Barnwell is the only large-scale reprocessing plant in the United States and has not yet been contaminated by nuclear material. Therefore, it could be useful for conducting research on certain fuel cycling activities. A DOE official said, however, that there were other less costly ways of conducting research and that the large annual operating costs at Barnwell

1/According to the DOE report, Barnwell can be easily adapted in most cases to coprocess or produce combination streams of plutonium and uranium (or nuclear wastes) that are not as susceptible to diversion as conventional reprocessing modes.

prohibit DOE from efficiently using it solely as a research and development facility.

If continued Government funding or support is not provided at Barnwell, it is probable that Allied-General will choose to mothball or eventually dismantle the facility. Annual operating costs at the current level of activity are about \$19 million and Allied-General has said that it cannot continue this expenditure for very long without Federal support.

Mothballing could be a viable option in certain situations and was considered by DOE in its \$1 million study. In effect, the plant would be closed but maintained in some degree of standby condition. This would give time to make decisions on the future of reprocessing without seriously jeopardizing the operability of the plant. DOE has estimated that 18 months and \$15 million would be needed to put the plant into a mothballed status. Annual maintenance costs would then range from \$3 million to \$4.5 million.

Later, if decisions are favorable toward reprocessing, the existing facilities could be brought from mothballed status to operational status in about 4 years at a cost estimated between \$75 million and \$115 million. Allied-General, however, still believes that reprocessing can be a profitable commercial venture if decisions are made quickly on such pivotal problems as coprocessing and waste disposal and if the Government assists in the development and demonstration of plutonium and waste solidification. Therefore, Allied-General is attempting to keep key people at Barnwell and maintain the plant in a ready state in the event the INFCE and NASAP studies produce some favorable change in the Administration's position.

CONCLUSIONS

The United States has embarked on a program to prevent the further proliferation of nuclear weapons. To help accomplish this goal, the President has decided to defer the commercialization of the liquid metal fast breeder reactor and the reprocessing technology that is needed to fuel it with plutonium. This, the President hopes, will convince other countries to do the same and encourage them to look for alternatives to the recycling of plutonium.

The rest of the world, however, does not agree with U.S. positions on breeder reactors and reprocessing. Other countries view these technologies as necessary for economic survival, and they tend to believe that proliferation problems can be solved through such institutional controls as increased inspections and advanced safeguards instrumentation. They have, however, cooperated with the United States in creating INFCE,

controlling the spread of reprocessing technology, and looking at technological alternatives to breeders and conventional reprocessing. At this stage it is difficult to judge where the INFCE and other studies will lead. Some DOE officials doubt whether other countries will easily give up or defer technologies they have been developing for many years.

Until the INFCE study is complete, therefore, it is hard to predict what the future of reprocessing will be in this country. In the meantime, Congress is faced with the decision of whether to continue the funding of Barnwell or to cooperate with the Administration and end all financial support.

If funding is not provided, Allied-General has said that it will decrease operations at the plant and consider putting it in a mothballed status. It is also possible, according to Allied-General, that it would eventually dismantle the plant and take legal action to recoup its losses from the Federal Government. In any event, the lack of continued Government funding is likely to result in the termination of activities at the plant and the loss or transfer of people key to the operation. While the existing facilities could be brought from mothballed to operational status at some future time, DOE estimates that it would take about 4 years and cost between \$75 million and \$115 million.

If funding is continued by Congress, it could be provided in several ways. First, the current operating costs at Barnwell are about \$19 million per year. Congress could decide to continue to fund certain types of research activities and studies as was done in 1978. This will help keep the Allied-General staff together and the options open for future long-term uses of Barnwell. The \$1 million study performed by DOE identified several possibilities for using Barnwell in this way, but DOE considers them to be relatively inefficient uses of its research funds.

Secondly, money could be provided to assist in the development of waste solidification and plutonium conversion facilities at the plant. These are unproven parts of the reprocessing technology and too risky--according to Allied-General--to design and build without Federal support. This was being considered by DOE at one time, but dropped when the President developed his policy.

Thirdly, money could be provided to expand Barnwell's spent fuel storage pool. As discussed in the next chapter, utilities are running out of spent fuel storage space at nuclear powerplants and DOE is looking at options for providing some type of away-from-reactor storage. At present, Barnwell--depending on the type of storage racks used--could store

between 400 and 750 metric tons of spent fuel. Allied-General has estimated that this could be expanded to 5,000 metric tons at a cost of \$109 million, but is not interested in commercially operating Barnwell as a spent fuel storage facility. Therefore, any such use would probably involve Federal financing or purchase.

Finally, the Government could decide to purchase Barnwell for use either as a national or an international fuel cycle center. This would, of course, involve substantial costs and be in direct opposition with existing Administration policies.

Whatever decision Congress makes with respect to Barnwell involves a number of advantages and disadvantages. If funding is terminated, the Federal Government would naturally save whatever money that would have been spent. It is probable, however, that such termination would result in either the temporary or permanent loss of the experienced people and the facilities at Barnwell. This would limit potential uses of Barnwell should the United States subsequently decide that reprocessing is needed or can be consistent with its nonproliferation objectives.

On the other hand, continued funding would keep the key people and the facilities available but might hurt U.S. nonproliferation initiatives abroad. It is also questionable if any short-term use of Barnwell would be worth the \$15 million to \$20 million needed to keep the Barnwell staff and facilities in a ready state. Continued funding, however, would provide the United States with the greatest degree of latitude if the INFCE study results in any policy change on reprocessing. It also recognizes that Allied-General might have some rights that deserve consideration, at least until major questions on reprocessing have a chance to be resolved.

Therefore, while we did not attempt to evaluate all the available alternatives and determine which would be the most cost effective, we believe that Congress should continue to fund short-term research efforts and studies at Barnwell until the completion of the INFCE study. We believe, however, that it is important that DOE not wait on congressional initiatives to plan work at Barnwell and make it compatible with existing programs. Also, we emphasize that this should be a short-term option only. If the Administration maintains its current policies when the INFCE study is completed, we would recommend that Congress terminate its funding initiatives. At that time it would be Allied-General's decision to either maintain or reduce its operating status at Barnwell.

CHAPTER 3
EVALUATION OF THE
SPENT FUEL STORAGE POLICY

In view of the President's new policy on nuclear power, it is unlikely that spent fuel will be reprocessed in the foreseeable future. Similarly, it is unlikely, because of social, regulatory, and geological obstacles, that spent fuel will be disposed of safely until at least the end of the 1980s. For these reasons, the interim storage of spent fuel has, by necessity, become a new part of the nuclear fuel cycle.

Last year DOE announced a new Federal policy for spent fuel storage. Its purpose was to remove the uncertainty from utilities of having to store spent fuel for an indefinite period of time. Although no implementation plan has been published since the announcement of this policy, DOE has been undertaking a number of actions to develop such a plan.

In large part, these actions have still not answered the questions of how much interim storage space must be built, who must provide the space, and when the space must be available. Basically, there are two reasons for this. On one hand, the utilities are unwilling to commit themselves to transferring their spent fuel to the Government or to finding their own solution to the storage problem until they know the details of the Federal plan. On the other hand, DOE is having trouble developing the details of the Federal plan because it does not know (1) to what extent utilities will transfer their spent fuel to the Government; (2) whether the requirements of the National Environmental Policy Act can be satisfied; and (3) what will be the results of the interagency task force on waste management.

This situation has placed both the utilities and DOE in a position of guessing what the other will do. As a recourse, DOE is currently working toward building a new 5,000 metric ton storage facility and having it available by 1983.

KEY ELEMENTS OF THE ANNOUNCED
SPENT FUEL STORAGE POLICY

In October 1977 DOE announced a new spent fuel policy which was described as "a logical extension, given the indefinite deferral of reprocessing, of the long-established Federal

responsibility for permanent disposal of high-level waste." 1/
The policy would also remove the uncertainty facing utilities
of having to store spent fuel for an indefinite period of time.
Some key elements of the policy were that:

- The Federal Government would 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 that will cover
the full cost to the Government of providing for 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 the recovery of
the fuel value is ever approved, spent fuel may be re-
turned or compensation made for the net fuel value. 2/

DOE said preliminary estimates of storage and disposal
costs indicate that the total fee should add less than 1 mill
(one-tenth of a cent) per kilowatt hour to nuclear power elec-
tricity costs, which are now about 40 mills per kilowatt hour
to the consumer. Also DOE said it will develop detailed stor-
age and disposal cost estimates which would be published for
comment prior to official adoption.

IMPLEMENTATION OF THE SPENT FUEL STORAGE POLICY

DOE officials told us they have been working on an imple-
mentation plan for the spent fuel storage policy which should
be published shortly. In order to develop such a plan, DOE
has undertaken a number of actions, many of which were still
ongoing at the time we completed our review. These include:

- a survey of utilities to determine how much spent fuel
would be transferred to the Government;
- a request for expressions of interest by industry in
providing a spent fuel storage facility;

1/DOE news release dated October 18, 1977.

2/The difference between the value of the uranium and the plu-
tonium less the cost of fuel recycle.

- the development of a one-time storage and disposal fee;
- the preparation of a generic environmental statement on the spent fuel policy; and
- DOE efforts toward the construction of a spent fuel storage facility.

The following sections discuss each of these actions, including their status. Generally, we found that these actions are still in a tentative stage of development. Thus, our evaluation is limited to what was underway at the time of our review.

Inquiry on potential spent fuel transfers to the Government

In December 1977 DOE sent letters to 76 utilities asking about their spent fuel situation. Specifically, DOE requested estimates of spent fuel annually discharged from reactors, and of the amount utilities would wish to transfer to the Federal Government. The 68 utilities that responded generally expressed support for the spent fuel policy but with some reservations.

Many utilities called for separate fees for interim storage and for ultimate disposal. A significant number, however, preferred to minimize costs by skipping interim storage and sending fuel directly to a final repository. Some utilities said it is not possible to determine how much spent fuel they would transfer to the Government, under its voluntary plan, until more precise information is available on the timing, cost, and terms of the transfer. Many utilities said it is urgent for the Government to quickly define a domestic spent fuel policy and establish firm, reliable schedules for its implementation.

According to DOE, the survey shows that six reactors are currently operating without a full core reserve and reactor shutdowns, because of lack of storage space for normal discharges, could occur at one reactor during 1978, and up to 12 plants by 1983. ^{1/} In the aggregate, DOE estimates there

^{1/}Basically, reactor pools were designed to store one-third of the core (normal yearly discharge) prior to shipment to a reprocessor and one full core (full core reserve) if it becomes necessary to offload the entire reactor core for any reason.

will be a need to store 1,700 metric tons of fuel by 1983, 5,600 metric tons by 1986, and 14,000 metric tons by 1990. 1/

DOE estimates, however, could be overstated if utilities do not choose to transfer their fuel to the Government. For instance, utilities could (1) leave their fuel at existing away-from-reactor storage facilities in Morris, Illinois, and in West Valley, New York, (2) transfer spent fuel between their own reactor basins, (3) increase the size of storage pools at existing plants or plants still being designed, or (4) build utility-owned facilities for spent fuel storage. We found, however, that DOE has not specifically requested information on what utilities might do to meet their own storage needs.

DOE officials recognize that their estimates include spent fuel already being stored in existing away-from-reactor facilities and which could be transferred between reactor basins. However, they consider these options as stop-gap measures and believe that a definite program is needed immediately to offer a true solution to the storage problem. Therefore, these officials say a new spent fuel storage facility should be constructed and available by 1983.

Request for industry interest in providing spent fuel storage services

In December 1977 DOE surveyed the nuclear industry to determine its interest in providing spent fuel storage services. Of the 15 responding companies, nearly all expressed interest in being a part of the Federal plan.

One respondent, General Electric Company, is currently operating a 700 metric ton spent fuel storage facility at Morris, Illinois. While this facility is about 40 percent filled, 350 metric tons of the remaining storage capacity is uncommitted and available for use. Also, the company said that it is seeking approval from NRC to construct a 1,100 metric ton addition to its existing storage facility. General Electric expects this to be available by 1981. Beyond that, it has investigated the potential for dry storage of approximately 1,000 to 1,500 metric tons of spent fuel and for adding another storage

1/A typical core for a 1,000 megawatt pressurized water reactor contains about 190 fuel assemblies, and the uranium in the core will weigh about 86 metric tons. A typical 1,000 megawatt boiling water reactor contains about 750 fuel assemblies containing about 140 metric tons of uranium.

facility at the site with approximately a 3,000 to 4,500 metric ton capacity.

A second respondent, Stone and Webster Engineering Company, has been designing an interim storage facility which would accommodate approximately 1,300 metric tons of spent fuel and be located on an existing nuclear powerplant site. In November 1976 it submitted a general design of the facility to NRC for review, and NRC has subsequently found the proposed approach and conceptual design acceptable. The company estimates that, if built at an existing nuclear powerplant site, its facility could be constructed in 12 to 18 months less time than other storage options.

A third respondent, Nuclear Engineering Company, Inc., is presently engaged in the operation of radioactive and hazardous waste disposal sites in the United States. This company owns a 100-acre plot of land on the Hanford Reservation at Richland, Washington. According to Nuclear Engineering, this site would be an ideal location for an interim spent fuel storage facility because of its remote location, its Federal ownership, its environmentally acceptable posture, its tight security, and its proximity to one of the locations currently under DOE consideration as a high-level waste repository.

At the time of our review, none of these three respondents had been asked for additional information. According to a DOE official, the industry responses were not deemed acceptable for a number of reasons. First, the industry has demanded firm Government commitments to fully protect private investment and provide profit. Second, a privately-financed facility could not be available by 1983 because of difficulty in obtaining legislation that would provide guarantees to industry. Third, a privately-financed facility would require a new design effort while DOE has already started conceptual design of a storage facility and is reviewing potential sites for its location.

Thus, it is clear that after evaluating industry responses, the DOE staff was initially planning a Government-owned and -financed storage facility. According to a DOE official, high preliminary cost estimates for this facility, however, have caused DOE to reconsider its position and to think once again about soliciting proposals from private interests.

Development of the one-time storage and disposal charge

While utilities expressed interest in DOE's spent fuel offer, they stressed that any commitment to send fuel to the Government would depend on the actual fee charge, the method by which it is calculated, and the payment arrangements. DOE is

examining several alternative methods of calculating the fee, but it will select one only after all methods have been reviewed and commented on by the public.

Regardless of the method selected, however, the fee would include a charge for (1) away-from-reactor interim storage, (2) final geologic disposal including encapsulation, (3) transportation from interim storage to the final repository, (4) research and development, (5) overhead, and (6) contingency. In addition, a number of specific assumptions have tentatively been set.

- The away-from-reactor storage facility is assumed to be a licensed water-basin facility with an initial capacity of 5,000 metric tons of spent fuel.
- Domestic utilities would take advantage of the storage offer and ship all fuel after it has cooled 5 years, with the first shipment being made in 1983.
- The storage facility is assumed to be Government-financed.

Because DOE is still in a planning stage, however, any of these specific assumptions could change. While several alternatives have already been considered, DOE has not yet fully explored the options available to utilities to meet their own storage needs, or whether the facility could be financed by private interests or by the Government. For these reasons, the fee charge will be subject to revision and change for some time.

According to DOE officials, a report on the cost of facilities and the fee charge will be published for comment by September 1978.

Preparation of a generic environmental statement

To assess the environmental effect of the spent fuel storage policy, DOE is preparing a generic environmental impact statement. The statement is not expected to be issued for public review and comment until some time in August 1978. A draft statement, however, indicates that the environmental impacts of the policy are within the appropriate existing national standards and guidelines.

It basically examines two options to implement the storage policy: (1) centralized storage in a large spent fuel facility owned and operated by the Government and (2) decentralized storage in reactor basins and/or privately-owned storage facilities.

The spent fuel storage facility--whether Government or privately owned--is assumed to consist of a set of modular, water-filled basins. This concept was selected because it is proven and is acceptable to NRC. While other alternatives for spent fuel storage are identified, the statement does not analyze them or assess their advantages and disadvantages in comparison to water-basin storage.

One of these is the Spent Unreprocessed Fuel (SURF) Program. This was a DOE research and development program that would provide dry storage of commercial unreprocessed spent fuel in surface storage facilities. However, the SURF program has now been reoriented to develop a facility to package and handle spent fuel prior to geologic disposal. According to a DOE official, this change was made because the Office of Management and Budget directed that a SURF-type facility not be constructed until there is an identified need. The Battelle Pacific Northwest Laboratory is currently conducting a cost-benefit study on the SURF facility which will then be used for further decisionmaking.

The draft statement also discusses the possibility of shipping spent fuel to existing privately-owned facilities at the General Electric Company plant in Morris, Illinois, to the Nuclear Fuel Services, Inc. plant in West Valley, New York, and to the Allied-General Nuclear Services plant in Barnwell, South Carolina. According to the statement, there is unfilled basin space available for about 900 metric tons of spent fuel at these three plants, but concludes that this is not sufficient to meet the expected storage demands of the 1980s.

During our review, we noted that, under certain conditions, storage space at these three plants could be increased by 6,000 metric tons. Specifically:

- General Electric submitted an application to NRC in 1977 to increase its storage capacity by an additional 1,100 metric tons, but requested an indefinite suspension of the licensing review when DOE announced its spent fuel storage plan. The Illinois state attorney general has indicated his opposition to the expansion because, in his view, the facility would be used for long-term waste storage.
- The Nuclear Fuel Services plant uses a system with a very low spent fuel storage density. A more space-efficient design would enable the existing pool to accommodate an additional 500 to 650 metric tons of fuel. However, such a modification would have to be submitted to NRC for review and approval, and Nuclear Fuel Services has no plans in this regard. DOE is presently

studying the future resolution of the West Valley site and will submit a report to Congress by the end of 1978.

--Allied-General currently has a 400 metric ton storage facility at its Barnwell reprocessing complex. However, additional licensing and about \$1.5 million would be required to complete it for commercial use. For another \$3 million, the storage capacity at Barnwell could be increased by 300 metric tons. A recently completed Allied-General study estimates that the storage capacity could be increased to 5,000 metric tons in 51 months for \$109 million. Use of the facility, however, would entail making adequate business arrangements with Allied-General as well as reinstating the licensing process or amending the application.

DOE is aware of the above information but, at present, has not included it in the statement. Also, we observed that the statement does not identify the technical, legal, regulatory, or institutional problems applicable to implementing the spent fuel policy. We understand that a recently constituted interagency task force on nuclear waste management will do this and submit a report with recommendations to the President.

According to DOE officials, however, DOE will not await the task force's report to continue planning for a spent fuel storage facility. If their generic environmental statement is acceptable under the National Environmental Policy Act and there is a demonstrated need for a new facility, according to these officials, DOE will act on its own.

The task force's report is expected by October 1, 1978. In Appendix I, we list some of the issues being considered by this task force.

DOE efforts toward the construction of a new spent fuel storage facility

DOE officials told us that a 5,000 metric ton spent fuel storage facility is needed by 1983. This will be large enough to store the estimated spent fuel transfers from utilities through the year 1986.

There are currently two options under consideration--either seek private storage services or provide Government financing for the facility. DOE officials estimate that a 5,000 metric ton storage facility would cost about \$210 million, no matter how it is financed. Further, DOE officials believe a Government-financed facility could meet the 1983 date but a privately-financed facility could not be available until at least 1984. The latter date reflects the additional time necessary to seek

appropriate legislation, negotiate contracts, and obtain licensing approval. To meet the 1983 date, DOE officials project that the site must be selected by September or October 1978, the environmental report and the safety analysis report must be submitted by March of 1979, and construction must begin by the middle of 1980. DOE has activities ongoing to meet these dates.

At DOE's request, the Savannah River Laboratory is developing a conceptual design and a budget estimate for the storage facility. This is expected to be completed by September 1978. For study purposes, DOE assumes that the facility will be located at Savannah River.

Also, the Savannah River Laboratory has been preparing a site drilling program and is studying geological and meteorological data to identify a suitable location at Savannah River. Other possible locations being studied are at Oak Ridge, Tennessee, and at Richland, Washington.

CONCLUSIONS

With the President's decision to defer commercial reprocessing indefinitely, the utilities are faced with the uncertainty of having to store spent fuel for an indefinite period of time. As a solution, DOE announced a policy to accept and take title to the spent fuel upon payment of a one-time fee by the utilities. While DOE has been undertaking a number of actions, it has yet to develop an implementation plan for this policy.

Specifically, DOE has been (1) surveying the utilities to determine whether they would be interested in transferring their spent fuel to the Government, (2) asking the industry whether it would be interested in providing the spent fuel storage facilities, (3) developing a one-time storage and disposal fee, and (4) preparing a generic environmental statement.

While these actions still have not fully answered many questions about the spent fuel storage situation, DOE has been working toward building a new 5,000 metric ton storage facility and having it available by 1983. We believe that before DOE decides to build a Government-financed facility, it should consider other alternatives.

In order of priority, DOE should consider (1) the options available to utilities to solve their own storage problem, (2) the use or expansion of existing away-from-reactor storage facilities at Morris, Illinois, at West Valley, New York, and at Barnwell, South Carolina, and (3) industry interest to build additional spent fuel storage facilities.

Further, DOE should consider the findings of the interagency task force on waste management. Among other things, this task force is evaluating the various issues facing the spent fuel storage policy, including the advantages and disadvantages of one large centralized spent fuel storage facility as opposed to a number of smaller decentralized ones. Until the task force completes its work, any decision on a new facility may be premature.

RECOMMENDATIONS TO THE SECRETARY,
DEPARTMENT OF ENERGY

The Department of Energy is considering various options for providing additional spent fuel storage space. These include building either a Government- or a privately-financed storage facility. The Secretary, Department of Energy, before deciding to build a Government-financed facility should in order of priority

- work with and explore ways that utilities can solve their own spent fuel storage problem,
- give further consideration to use and expansion of existing away-from-reactor storage facilities,
- pursue industry interest to provide additional spent fuel storage facilities, and
- consider the findings of the interagency task force.

DEPARTMENT OF ENERGY COMMENTS

In verbally commenting on our draft report, DOE officials said that a framework has recently been developed to implement the thrust of our recommendations. Some actions have already been taken to encourage utilities to solve their own problems, and to give top priority to the use of existing commercial storage facilities. They also said that the findings of the interagency task force on waste management would be considered in reaching a decision on any new storage facility.

SPENT FUEL STORAGE ISSUES BEING CONSIDERED BY THE
INTERAGENCY TASK FORCE ON WASTE MANAGEMENT

TECHNICAL

1. What is the operational life of a water-basin storage facility?
2. What measures must be taken to assure that a spent fuel storage facility will be adequately protected against theft or sabotage?
3. What equipment is needed for accepting shipping casks at the spent fuel storage facility?
4. What spent fuel leak-detection equipment must be developed?
5. What are the problems of multitype assembly storage?
6. What effect does corrosion have on spent fuel cladding?
7. What problems will develop from handling and shipping failed fuel?
8. What effect does handling and shipping have on the long-term integrity of spent fuel?
9. What consideration must be made for decontamination and decommissioning of the spent fuel storage facility?
10. What consideration will be given to collocation of the spent fuel storage facility and the final repository?
11. What are the advantages and disadvantages of one large decentralized spent fuel storage facility as opposed to a number of smaller decentralized spent fuel storage facilities?

ENVIRONMENTAL

12. What are the expected consequences from routine and accidental releases of radioactive material from a spent fuel storage facility?
13. What radiological standards must be met by a spent fuel storage facility?

14. What nonradiological standards must be met by a spent fuel storage facility?

INSTITUTIONAL/POLITICAL

15. What action is needed to assure that a financial structure is in place for decommissioning the spent fuel storage facility?
16. What must be done to coordinate the research and development programs of the various Federal agencies concerned with spent fuel storage?
17. How will public acceptance be gained in implementing the spent fuel storage program?
18. Must spent fuel be defined to simplify its regulation by Federal agencies?
19. What legislation is needed to clarify NRC's licensing authority over DOE spent fuel storage and disposal facilities?
20. What site selection procedures for the spent fuel storage facility will be followed, including possible State participation?
21. Should the Federal Government exercise preemptive authority over State and local Governments in the regulation of spent fuel?
22. Do the Nuclear Regulatory Commission and the Department of Transportation have overlapping jurisdiction in the regulation of nuclear shipments?
23. Are local emergency response plans adequate to deal with transportation accidents?

TRANSPORTATION

24. Is there a potential shortage of licensed spent fuel shipping casks?
25. Is an integrated approach toward transportation of all types of wastes needed?
26. Would a potential terrorist attack on a spent fuel shipment result in contamination of the surrounding area?

27. Does uncertainty exist in the nuclear industry concerning its role in accident response and liability for cleanup in the event of nuclear transportation accidents?
28. Is a policy needed on acceptable risks versus economic trade-offs for transportation of spent fuel?
29. Should shipping containers and transport vehicles be standardized for nuclear shipments?

PRINCIPAL OFFICIALS
RESPONSIBLE FOR ADMINISTERING
ACTIVITIES DISCUSSED IN THIS REPORT

Tenure of office
From To

DEPARTMENT OF ENERGY

SECRETARY:

James R. Schlesinger

Aug. 1977 Present

ASSISTANT SECRETARY OF ENERGY
TECHNOLOGY:

Robert D. Thorne

Oct. 1977 Present

DIRECTOR, OFFICE OF ENERGY
RESEARCH:

John M. Deutch

Oct. 1977 Present

Single copies of GAO reports are available free of charge. Requests (except by Members of Congress) for additional quantities should be accompanied by payment of \$1.00 per copy.

Requests for single copies (without charge) should be sent to:

U.S. General Accounting Office
Distribution Section, Room 1518
441 G Street, NW.
Washington, DC 20548

Requests for multiple copies should be sent with checks or money orders to:

U.S. General Accounting Office
Distribution Section
P.O. Box 1020
Washington, DC 20013

Checks or money orders should be made payable to the U.S. General Accounting Office. NOTE: Stamps or Superintendent of Documents coupons will not be accepted.

PLEASE DO NOT SEND CASH

To expedite filling your order, use the report number and date in the lower right corner of the front cover.

GAO reports are now available on microfiche. If such copies will meet your needs, be sure to specify that you want microfiche copies.

AN EQUAL OPPORTUNITY EMPLOYER

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

**OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, \$300**

**POSTAGE AND FEES PAID
U. S. GENERAL ACCOUNTING OFFICE**



THIRD CLASS

ERDA Technical Information
Center C67
P.O. Box 62
Oakridge, Tenn. 37830