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The Atomic Energy Act of 1954 requires the Nuclear Regulatory Commission (NRC) to hold a public hearing before it issues a license to construct a nuclear powerplant. This gives the public an opportunity to intervene or question licensing decisions and to resolve technical or environmental questions relating to the proposed construction. A recent report discussing the NRC's procedures for submitting information to the Licensing Boards described: how the Licensing Boards receive information, how the NRC's staff submits information to the Boards, and whether proposed changes in procedures will improve the level of communication between the Boards and the NRC staff. The report noted that instances where the Boards had not been notified of important information by the licensing staff appeared to have been caused by the staff who handled the information rather than by specific deficiencies in the Commission's procedures. No efforts have ever been made by the NRC to evaluate the Board members' performance, establish minimum qualifications for persons appointed to the Boards, or determine if a more formal training program is needed. To improve the licensing review process, the Chairman of the NRC should: require training of all technical staff members on the role and activities of the Licensing Boards and their responsibilities for keeping the Boards informed, establish minimum qualifications for persons appointed to the Licensing Boards, and develop an open and competitive selection system for filling Board vacancies. (RRS)

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

FOR RELEASE ON DELIVERY
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STATEMENT OF
MONTE CANFIELD, JR., DIRECTOR
ENERGY AND MINERALS DIVISION
BEFORE THE
SUBCOMMITTEE ON NUCLEAR REGULATION
SENATE COMMITTEE ON ENVIRONMENT
AND PUBLIC WORKS
ON
LICENSING PRACTICES OF THE
NUCLEAR REGULATORY COMMISSION

Mr. Chairman and Members of the Subcommittee:

We appreciate the opportunity to be here today to discuss our views on the Nuclear Regulatory Commission's procedures for submitting information to the Atomic Safety and Licensing Boards. This was the subject of our report to you last month. We are also prepared to discuss two other very important topics, if the Subcommittee desires: the Government's program for decontaminating and decommissioning nuclear facilities and disposing of radioactive nuclear waste.

INFORMATION SUBMITTED TO THE LICENSING BOARDS

As you are aware, the Atomic Energy Act of 1954 requires the Commission to hold a public hearing before it issues a license to construct a nuclear powerplant. This gives the public an opportunity to intervene or question licensing decisions and to resolve technical or environmental questions relating to the proposed construction of the plant. Similar

hearings are also required before a Commission decision to issue an operating license for the plant if an interested member of the public requests the hearing and submits a petition that meets the requirements of the Commission.

By statute, these public hearings are conducted by an Atomic Safety and Licensing Board which also has the initial authority--after considering all information presented to it by the applicant, the Commission, and intervenors--to grant the construction permit or operating license. Because the Boards must often weigh opposing facts or interpretations of facts before deciding on the acceptability of a license application, it is important that it have the best and most current information available. Recent events, however, have highlighted a specific instance where, in 1973 the Commission staff withheld important information on a geological fault from the Licensing Board for almost 3 months. In 1976 the Commission admonished the staff for not providing this information to the Boards in a more timely manner and late last year the Justice Department concluded that the staff's delay, in this case, prevented the Government from taking legal action against the applicant for also failing to notify the Boards about the fault.

The Commission told this Subcommittee, during hearings on this matter last October, that since 1973 it has changed its procedures and that the Commission staff now informs Licensing Boards promptly of significant matters.

Our recent report to you discussed the Commission's procedures for submitting information to the Boards. Among other things the report describes:

--how the Licensing Boards receive information,

--how the Commission staff's method of submitting information to the Licensing Boards has changed since 1973 and whether there are still problems, and

--whether proposed changes in procedures will improve the level of communication between the Licensing Boards and the Commission staff.

We reported that in 1973 and again in 1976 the Commission changed its reporting practices for submitting new information to the Atomic Safety and Licensing Boards by the licensing staff. These changes are good in substance but they have not been effectively communicated to the licensing staff and they do not apply directly to other offices within the Commission, such as the Offices of Standards Development or Inspection and Enforcement. Until these deficiencies are corrected, new information which is material and relevant to licensing proceedings may not reach the Licensing Boards in a timely manner.

We also reported four instances where the Boards had not been notified of important information by the licensing staff. While we did not determine whether these instances were representative of the staff's notification process or were

exceptions to the norm, they appear to have been caused by the staff who handled the information rather than by specific deficiencies in the Commission's procedures.

Since your October 1977 hearings, the Commission has been developing new procedures for improving the staff practice of submitting information to the Boards. The staff advocated at the time of our report, sending all documents in a licensing proceeding to the Boards. The Chairmen of the Licensing Board Panel and the Appeal Board Panel, however, favored a practice closely resembling the current procedure.

If the staff's preference were to be accepted by the Commission, the Licensing Boards would probably have to expand its record keeping capacity and be given some technical staff to review the documents and determine which are applicable or important to the licensing proceedings. We are not in favor of this because the Commission already has staff experienced in performing these technical reviews and we see no reason to establish another review staff within the structure of the Licensing Boards. The Boards have historically been responsible for ruling on the information presented to them by the parties to the licensing proceedings, and we see no reason why this should not continue. We noted, however, that it would require some positive action by the Commission to insure that its staff submits all relevant information to the Boards in a timely manner.

Our report also focused on the opinions of several parties both inside and outside the Commission that the Licensing Boards' performance has been less than satisfactory. While we did not review the adequacy of the Boards' performance, we found that no efforts have ever been made by the Commission to (1) evaluate the Board members' performance, (2) establish minimum qualifications for persons appointed to the Licensing Boards, or (3) determine if a more formal training program is needed for the lawyers and technical members of the Boards.

To improve the licensing review process for nuclear powerplants, we recommended that the Chairman of the Commission

- require training of all Commission technical staff members on the role and activities of the Licensing Boards and their responsibilities for keeping the Boards informed,
- --establish minimum qualifications for persons appointed to the Licensing Boards and determine if a more formal training program is needed for both legal and technical members appointed to the Licensing Boards, and
- --develop an open and competitive selection system for filling vacancies to the Boards.

We also have another on-going review which is addressing, as a generic question, the desirability of evaluating the performance of administrative law judges. Once that report is finished, we plan to determine its applicability to the

Licensing Boards and report on what actions can or should be taken to evaluate the performance of Licensing Board members.

Mr. Chairman, this concludes my prepared statement regarding information submitted to the Atomic Safety and Licensing Boards. For the record, I have attached the full text of our March 6, 1978, report to you on this matter. I would also like to point out that last February we submitted another report which deals, in part, with the Atomic Safety and Licensing Boards. In it we note that the Commission has granted the Licensing Boards nearly complete discretion to set schedules for completing the public hearings. While this helps insure that licensing issues can be fully developed, it has resulted in unnecessary and sometimes lengthy delays in the licensing process. We would be glad to provide the full text of this report or answer questions for the record if the Subcommittee desires. Also attached to our testimony is summary information we have developed on two controversial aspects of nuclear power on which we understand this Subcommitte has expressed interest. The first discusses the future problems of cleaning up the remains of nuclear activities, a problem which may be with us for centuries. The second concerns the Government's efforts to manage and store highly radioactive nuclear waste, which is generally considered a pivotal question to the continued growth of nuclear energy.

Mr. Chairman, this concludes my prepared statement. We will be glad to respond to your questions.

ATTACHMENT I

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

B-127945

March 6, 1978

The Honorable Gary W. Hart
Chairman, Subcommittee on Nuclear
Regulation
Committee on Environment and
Public Works
United States Senate

Dear Mr. Chairman:

This report responds to your request for a review of the Nuclear Regulatory Commission's procedure for submitting information to the Atomic Safety and Licensing Board for its consideration in licensing nuclear powerplants. Section 191 of the Atomic Energy Act of 1954 requires that a public hearing be held by the Commission before a license to construct a nuclear powerplant can be issued. Under this statute, the hearing is conducted by an Atomic Safety and Licensing Board which has the initial authority--subject to review by the Atomic Safety and Licensing Appeal Board 1/ and the Commission--to grant the license to construct the powerplant. Additionally, if there is a petition by an interested member of the public that meets the requirements of the Commission, a Board must hold another hearing before a nuclear powerplant can be licensed to operate. Thus, an Atomic Safety and Licensing Board has a key role in the Commission's licensing and decisionmaking process.

In 1976 the Commission admonished its technical review staff 2/ for not providing relevant and material information on a timely basis to the Licensing Board during its 1973 review of a nuclear powerplant license application from the Virginia Electric and Power Company. Because of this and a similar occurrence in 1973, the Commission staff changed its

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1/An independent board with three members who automatically review license application decisions made by the Atomic Safety and Licensing Board.

2/Footnote in the Commission's Opinion in North Anna Power Station, Units 1 and 2.

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(30150)

procedures for notifying Boards of new and important information. As a consequence of the October 1977 hearings before your Subcommittee, the Commission is considering further changes to these procedures.

At your request, we reviewed the changes the Commission has made in its procedures since 1973. You were concerned that these changes may not have corrected the problem and that the Commission staff may still not be providing significant information to the Atomic Safety and Licensing Board in a timely manner. Thus, in our review, we examined

--how the Licensing Board receives information;

--how the Commission staff's method of submitting information to the Licensing Board has changed since 1973 and whether there are still problems; and

--whether the proposed changes in procedures will improve the level of communication between the Licensing Board and the Commission staff.

Our evaluation of each of these areas, as well as our observations on related matters, are provided in the following sections. At your request, we obtained only oral comments from the Commission on this report. These comments have been incorporated in the report as we believe appropriate.

STAFF PRACTICES OF SUBMITTING INFORMATION TO THE LICENSING BOARD

Before 1973 the Commission staff provided information to the Licensing Board in the form of basic testimony at the licensing hearing and staff reports on the safety and environmental aspects of the license application. Any new material and relevant information obtained while the hearing was in progress was first evaluated by the staff and then given--with conclusions--to the Licensing Board by legal brief, testimony, or affidavit.

This began to change in late 1973 as a result of a decision by the Atomic Safety and Licensing Appeal Board in the proceeding for the McGuire nuclear powerplant in North Carolina. In that decision, the Appeal Board admonished the Commission staff and the applicant for not being sufficiently prompt in advising the Licensing Board of a change to the applicant's quality assurance organization. It noted that such information was necessary to insure that the Board would be acting on evidence accurately reflecting existing facts. After

the decision, the Commission staff made a greater effort to promptly inform the Board of material and relevant matters but developed no specific rule or written procedure at that time.

In April 1976 an attorney representing an intervenor 1/ in a particular licensing proceeding wrote to the then-Acting Chairman of the Commission to complain that the staff had not informed the Licensing Board in one proceeding of some relevant information that had been provided to a Board in another proceeding. He requested the Acting Chairman to determine if specific written procedures had been established to insure that all relevant data was made available to the Boards. As a result of that letter, formal procedures for submitting information to the Boards were announced in June 1976 and issued in November 1976.

The procedures made the Commission's Division of Project Management within the Office of Nuclear Reactor Regulation responsible for identifying any new information and notifying the Office of the Executive Legal Director. This Office, in turn, was to determine whether the new information was material and relevant to any licensing proceeding. If so, the information was to be disclosed to the appropriate Licensing Board.

Newly proposed procedure for notifying the Licensing Boards

In October 1977, following your Subcommittee's hearings on the failure of the Commission staff to promptly notify the Licensing Board of the North Anna, Virginia, geological fault, the Office of Nuclear Reactor Regulation proposed further changes to the procedures for submitting information to the Licensing Boards. These would require that (1) individual Boards be routinely given all correspondence and documentation flowing between the staff and the applicant relevant to the specific application, (2) once the public hearing in a particular proceeding begins, all information sent to the Board is assessed, at that time or soon thereafter, by the staff for its significance, and (3) all other Commission offices would provide information to the Office of Nuclear Reactor Regulation or the Office of Nuclear Material Safety and Safeguards who would be responsible for notifying the Boards.

The advantages of the proposed procedure are that (1) all new information on a particular application will be routinely

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1/A person who has alleged his interest may be affected by the proposed action.

given to the Boards for consideration and (2) the staff will not have the burden of deciding what to send to the Boards, because everything will go.

On the other hand, the Boards will receive larger volumes of unreviewed information. Some Board members have already said that they will not accept unreviewed information and will return it to the staff. Both the Chairman of the Licensing Board Panel and the Chairman of the Atomic Safety and Licensing Appeal Board Panel have said they do not have the clerical and technical staff to review the information, nor the space or facilities to store it.

On January 24, 1978, the Commissioners reviewed the newly proposed procedure and, because of the criticism, asked the Office of Nuclear Reactor Regulation to reevaluate its proposal. No time frame has been established for this reevaluation.

They also requested the Chairmen of the Licensing Board Panel and the Appeal Board Panel to submit their recommendations for a new procedure. Their reply, dated February 7, 1978, recommends that the staff not submit any information to the Licensing Board on a particular application until after the staff has completed its environmental and safety reviews and submitted its final environmental impact statement and safety evaluation report. Afterwards, all information would be submitted to the Board with either an immediate or promised evaluation by the staff.

OTHER PROBLEMS AFFECTING THE FLOW OF INFORMATION TO THE LICENSING BOARDS

During our review, we found that the flow of information within the Commission was not good and that the procedures for submitting information to the Boards did not apply directly to the technical review staff within the Office of Nuclear Reactor Regulation or to other operational units within the Commission. These units include the Offices of Nuclear Regulatory Research, Inspection and Enforcement, Standards Development, and Nuclear Material Safety and Safeguards. Unless these offices are specifically included in the procedure, new information which comes to them first and is material and relevant to licensing proceedings may not reach the Licensing Boards in a timely manner.

Flow of information within the Commission needs to be improved

In 1975 a Commission task force identified problems with the flow of information within the Commission. It said that

the staff members within each of the Commission offices tended to retain information in their own offices. Consequently, staff members (in particular those in the Office of Nuclear Reactor Regulation) who needed much of the information contained in the reports of other offices did not see the information and often did not know of its existence. This is important because the Office of Nuclear Reactor Regulation has the prime responsibility for identifying information in reactor licensing proceedings which should be provided to the Licensing Boards.

As a result of the task force report, a special division was established to develop an action plan to improve the Commission's flow of information. In November 1976, the Commissioners approved the action plan, which calls for an automated microfiche storage, retrieval, and distribution system. The Commissioners' approval of a contract to develop such a system is now pending.

Staff members are unaware of the flow of information to the Licensing Boards or the Boards' responsibility

In October 1977 the Acting Director, Office of Nuclear Reactor Regulation, reminded his staff of their responsibility to inform Licensing Boards about material and relevant information that becomes available during the course of their reactor license application reviews. In keeping with this policy, the Acting Director asked each staff member on a one-time basis to search his memory and files to recall any instances where there might be an appearance of withholding, or proposing to withhold, information from the Boards.

Some of the staff members who responded in writing to this request said they really did not have a clear picture of what information flows or should flow from the Office of Nuclear Reactor Regulation to the Licensing Boards. One staff member said that the November 1976 operating procedures for notifying Licensing Boards were written for project managers and not for technical reviewers, such as himself. He identified an instance when a decision was made to notify a particular Licensing Board of new information. However, this staff member said that, because the project manager was not available, the notification was not made because he did not know how to do so. In providing oral comments on this report, a Commission official said that this information was later submitted to the Licensing Board without any appreciable delay. He also said that it is the responsibility of all staff members to identify and submit information to the Boards but

conceded that the Commission has not done a good job of educating its people in this area.

Another staff member said that in July 1974, he became aware of a possible geological fault at the Millstone, Connecticut, site after public hearings were completed and just weeks before a construction license was due to be issued for the plant. After a site visit and a determination that the fault was not active, he said no consideration was ever given to notifying the Board. The response showed that this staff member was unaware that knowledge of the fault and the staff's investigation should have been provided to the Licensing Board.

OTHER INSTANCES WHERE LICENSING BOARDS HAVE NOT BEEN PROVIDED INFORMATION ON A TIMELY BASIS

During our review, members of the Commission staff and the Licensing Boards told us that since 1973 the staff's submission of information which was material and relevant to a particular licensing proceeding or proceedings has been acceptable. However, in addition to the fault at the Millstone site discussed earlier, we identified these examples to the contrary.

1. In 1973 and 1974 the Turkey Point nuclear plants in Florida experienced a loss of offsite electric power as a result of a number of disturbances in the Florida power network. Offsite electric power is the primary source for operating the powerplant as well as its safety-related equipment. Thus, even though back-up onsite power supplies are available, a reliable offsite system is necessary to adequately protect the public.

   In August 1974 the initial staff reaction to this problem was that the instability in the power network might also involve the two St. Lucie powerplants which were farther north but under construction at the time. However, a Commission staff member told us that because any further investigations could have delayed the licensing of the two St. Lucie plants, the subsequent Commission investigation was restricted to the offsite power failures at Turkey Point. On May 12, 1977, one of the St. Lucie plants experienced a loss of offsite power caused by network disturbances. Data surrounding the power network problems of 1974 and their possible relationship to the St. Lucie site were not submitted by the staff to the Licensing Board until

October 1977 after an intervenor brought this to the attention of the U. S. Attorney General and charged the Commission staff with actions bordering on criminal negligence. The Commission is currently investigating this situation.

2. In September 1976 the New England Power Company submitted an application to build two nuclear plants on Federal property held in excess by the General Services Administration. The General Services Administration must issue an environmental impact statement that considers alternative uses for the property other than a powerplant. This is not expected to be issued in final form until the end of September 1978. Because another Federal agency has also requested use of this site, it is not at all certain that the ownership will be transferred to the utility. Nonetheless, the Commission has proceeded with the New England Power Company's application to construct two nuclear powerplants on the site and is in the process of preparing its own environmental impact statement for the plants.

The Environmental Protection Agency, however, has told the Commission staff that its environmental impact statement is premature at this time because (1) the utility does not own the site and (2) the Environmental Protection Agency will not issue a water discharge permit until the question of site ownership has been resolved. (A water discharge permit is required before the licensing of a nuclear powerplant.) Yet, the Commission staff did not tell the Licensing Board of the ownership problem or the Environmental Protection Agency letter until it was brought to the attention of the Board on November 15, 1977, by an intervenor to the licensing proceeding. The Board told the staff that the information was important because it could affect future hearing schedules.

While commenting on a draft of this report, the Commission advised us that, under present procedures, the Licensing Board would have been notified of this matter in conjunction with the filing of the staff final environmental impact statement preparatory to the start of the hearing, and not before. Further, the Commission believes that the Licensing Board Panel and the Appeal Board Panel agree that this is appropriate and that this type of notification

should continue until a revised procedure is developed and approved by the Commission.

3. In July 1977 Sandia Laboratories in New Mexico found that a type of electrical connector which is used in some operating nuclear powerplants failed to perform properly. The connectors are used to join electrical cables in certain safety-related systems. Sandia forwarded these results to the Commission's Office of Nuclear Regulatory Research which, in turn, discussed them with the Office of Nuclear Reactor Regulation and the Office of Inspection and Enforcement.

   On November 8, 1977, in an attempt to verify the Sandia findings, a bulletin was sent to all operating plants and those under construction asking the utilities to check the type of connector in use. The Commission found that 19 of 65 operating plants had insufficient data on the quality of connectors in use and temporarily shut down two plants because of the lack of any data at all. In mid-December 1977, the Office of Nuclear Reactor Regulation decided to notify appropriate Boards of the Sandia test results based on the results of the bulletin. The staff is now tabulating the results from nuclear plants under construction and will notify the appropriate Licensing Boards at that time--almost 8 months after the potential safety problem with electrical connectors was initially identified, but in the Commission's opinion, only 4 months after Board notification would be required under the staff's proposed new procedure.

LICENSING BOARD PERFORMANCE

Section 191 of the Atomic Energy Act of 1954, as amended, requires that one of the three Licensing Board members must be qualified in administrative proceedings and the other two shall have such technical or other qualifications as the Commission deems appropriate. It has become the Commission practice to appoint a lawyer as Chairman of the Board, a physicist or reactor engineer as the second member, and an environmental scientist as the third. There are currently 63 full- and part-time members in the Licensing Board Panel.

During our review, we spoke with 10 different people that have experience in the licensing proceedings. They are members of the Atomic Safety and Licensing Appeal Board, an intervenor, and attorneys who represent intervenors and utilities. Nine

of these people told us that there was a wide variance in the performance of Licensing Board members. Some said that Board members were either not qualified or well trained for their position, others said that some Board members had a pro-Commission bias and were not truly impartial judges of the facts. While we did not attempt to verify these criticisms, we found that:

--The position descriptions for the Board members do not include minimum qualifications for each position and there is no meaningful criteria for evaluating candidates for vacancies to the Licensing Board. While the Board does have some general evaluation criteria and there are attempts to identify potential candidates for Board vacancies, we found that the criteria was very subjective and that the Commission has not attempted to publicize vacancies or screen all the interested and qualified people available. In fact, four of the five permanent Board members we interviewed said they did not go through any type of open competitive selection system but received their positions through knowing someone already on or connected with the Board.

--There may not be an adequate formal training program for Board members. However, according to the Chairman of the Licensing Board, an extensive in-house training program exists for all new Board members, including a week-long orientation program, periodic seminars, and the availability of informal technical or legal assistance whenever a Board member feels he needs help. For the most part, the Chairman also said Board members are expected to train themselves through experience on the job and by talking with fellow Board members.

Our interviews with five full-time Board members does not indicate that an extensive training program exists. They told us that (1) not all Board members were subjected to the week-long orientation program, (2) in-house seminars have been on selected topics and have not been attended by all Board members, and (3) there is no requirement that Board members attend seminars or instructional courses held outside the Commission.

--There was little attempt to determine the independence of new Board members. According to the Chairman of the Licensing Board, each candidate interviewed for a position on the Board is told that, as a member of the Board, he must be impartial and independent in his views on nuclear matters. The candidate is asked if there is anything in his background that would prevent him from rendering an independent decision. During our

review, we found that 18 Board members were previously employed by the Commission or by national laboratories which do work for the Commission. While the Atomic Energy Act of 1954, as amended, specifically allows the Commission to select persons for the Board from the staff of the Commission, this raises a question whether they can independently decide between contentions of intervenors and the Commission staff.

--There has been no attempt to evaluate the performance of members serving on the Licensing Board. We believe such an evaluation is desirable to insure that Board members are fulfilling their responsibilities. The Chairman of the Licensing Board told us that Federal regulations prohibit the Commission from performing this evaluation. These regulations were intended to protect the independence of such employees. We currently have underway a separate review which will address the problem of evaluating the performance of administrative law judges while assuring their independence is maintained. After this review is concluded, we intend to determine its applicability to the Licensing Board and report on what actions can or should be taken to evaluate Board members' performance.

These factors require the immediate attention of the Commission to decide whether or not the Licensing Board's performance has been satisfactory.

CONCLUSIONS

In 1973 and again in 1976 the Commission changed its reporting practices for submitting new information to the Atomic Safety and Licensing Board. These changes have improved the staff reporting practices, but we still found instances where the Boards were not notified of important information. While we could not determine whether these instances were representative of the staff's notification process or exceptions to the norm, they appear to have been caused by the officials handling of the information rather than by deficiencies in the Commission's procedures for notifying the Licensing Boards of new information. To correct this situation, it is necessary that the information flow within the Commission be improved and that the staff be specifically trained on how and what to submit to the Boards.

New procedures are being developed for improving the staff practice of submitting information to the Boards. The staff advocates sending all documents to the Boards, whereas the Chairmen of the Licensing Board Panel and the Appeal Board

Panel favor a practice closely resembling the current procedure. During a Commission meeting on the new procedures, a question was raised on the responsibility of the Board. Should the Board review only the information submitted to it in reports and testimony by the staff, the applicant, and other parties; or is the Board also responsible for all other information that is available on a license application? The answer to this question will be a determining factor in deciding what information should be submitted to the Boards and whether the Boards need their own technical review staffs. We see no reason to create another review level within the Commission. The Boards have historically been responsible for ruling on information presented to them by the Commission staff, the applicant and intervenors, and we see no reason why this cannot continue. It will require some positive action by the Commission, however, to provide greater assurance that all relevant information is given to the Boards in a timely manner.

The Licensing Boards' performance is regarded by some parties both inside and outside the Commission as less than satisfactory. No efforts, to our knowledge, have ever been made by the Commission to (1) evaluate the Board members' performance, (2) establish minimum qualifications for persons appointed to the Licensing Board, and (3) determine if a more formalized training program is needed for the lawyers and technical members of the Board.

RECOMMENDATIONS TO THE CHAIRMAN, NUCLEAR REGULATORY COMMISSION

The Chairman, Nuclear Regulatory Commission, to improve the licensing review process for nuclear powerplants, should

--require training of all Commission technical staff members on the role and activities of the Licensing Board and their responsibilities for keeping the Board informed;

--establish minimum qualifications for persons appointed to the Licensing Board and determine if a more formalized training program is needed for both lawyer and technical members appointed to the Licensing Board; and

--develop an open and competitive selection system for filling vacancies to the Board.

ATTACHMENT I

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As arranged with your office, we are sending copies of this report to interested parties and others upon request.

Sincerely yours,

Comptroller General
of the United States

ATTACHMENT II

CLEANING UP THE REMAINS OF NUCLEAR FACILITIES --A MULTIBILLION DOLLAR PROBLEM (EMD-77-46, JUNE 16, 1977)

As with every industry, nuclear facilities and equipment may be shut down, replaced, or become obsolete. Cleaning up the remains of nuclear activities, however, presents special problems because of radioactivity and contamination which often remain and which can endanger public health and safety. Some radioactivity remains hazardous for thousands of years, making final and absolute disposal at best a difficult and expensive task. Because of radiological hazards on man, changing standards for, and attitudes on the precautions that should be taken to protect man from radiation, this is an important issue.

We first drew attention to these problems in letters we sent to the Department of Energy and the Nuclear Regulatory Commission in April and September 1976. In these letters, we pointed out the need to assure that sites decommissioned 20 or 30 years ago no longer pose a threat to public health and safety. Both agencies agreed with the thrust of our letters and advised us of planned or accelerated actions to identify sites and take corrective measures if needed.

Protecting the public from the hazards of radiation lingering at inactive nuclear facilities is a problem which needs attention if a strategy for finding a solution is to be developed. A strategy to clean up these privately and federally owned nuclear facilities, which continue to accumulate, cannot be developed until basic questions on the magnitude of the problem, such as radioactivity, costs and timing, have been answered.

ATTACHMENT II

Responsibility for cleaning up inactive nuclear facilities rests primarily with two Federal agencies, with additional help from a third and the 50 States:

--The Department of Energy is responsible for disposing of, or decommissioning, the radioactive facilities it owns.

--The Nuclear Regulatory Commission is responsible for regulating private users of nuclear materials, including powerplants, uranium mills and processors of nuclear fuel.

--The 50 States have traditionally been responsible for controlling the hazards associated with using accelerators and radium.

--The Environmental Protection Agency has overall responsibility for issuing standards for the protection of the environment from all sources of radiation.

Two types of hazards could be involved in cleaning up a nuclear facility: induced radioactivity and surface contamination. Induced radioactivity results from a nuclear reaction and is embedded in the equipment or material coming into contact with the nuclear reaction. This induced activity can remain dangerous for thousands of years. For this reason, a structure containing induced radioactivity should be dismantled before deterioration of the structure begins. This is essential to preclude radioactivity from entering the environment.

Surface contamination results from facilities or equipment coming into contact with radioactive material. As opposed to induced activity, material having surface contamination can often be cleaned up by scrubbing and washing.

ATTACHMENT II

In the jargon, the words decontamination and decommissioning are often used in discussions of disposing of nuclear structures. Decontamination denotes the process of cleaning up surface contamination. Decommissioning is a term used to indicate the closing or shutting down of a facility with some actions taken to prevent--at least temporarily --health and safety problems. Decommissioning does not necessarily denote a final and absolute solution.

There are various types of nuclear facilities that comprise the decommissioning problem, including reactors, nuclear fuel fabrication facilities, uranium mills, nuclear fuel reprocessing plants, and accelerators.

THE DEPARTMENT OF ENERGY

The Department of Energy has paid little attention to the obsolete facilities it owns. These facilities, which are located on DOE reservations, continue to accumulate. Reliable estimates have not been made but it seems probable that the cost to decommission these facilities will run into the billions of dollars.

THE NUCLEAR REGULATORY COMMISSION

Almost a quarter of a century has passed since commercial nuclear activities began, and NRC has done relatively little to plan for and to provide guidance for decommissioning commercial nuclear facilities. Studies sponsored by NRC on acceptable alternative methods to decommission are several years from completion. NRC does not require owners of nuclear facilities--except for uranium mills--to develop plans or make financial commitments to cover the cost for future decommissioning.

ATTACHMENT II

Consequently, the true cost of nuclear power is not being reflected in the cost to the consumer of nuclear power. Without this financial commitment, the Federal or State Government can be asked to pay for problems that rightfully should be paid by private industry.

Situations where this can happen have already arisen. For example, the Federal Government will pay about $85 million to clean up residues from inoperative uranium mills that were privately owned. Also, as much as $600 million may be needed to decommission a privately owned nuclear fuel reprocessing plant at West Valley, New York. The State Government is legally responsible for cleaning up the plant but has asked the Federal Government for assistance. In a case at Clinton, Tennessee, the Federal and State Governments shared the cost--approximately $110,000 --to decontaminate a facility that the owners walked away from in 1971.

Although cost estimates to decommission private facilities have not been developed by NRC, a study by a private organization estimated the cost to decommission a commercial nuclear reactor to be as much as $39 million. No cost data, except for wide-ranging estimates, is available for decommissioning other facilities, such as uranium mills or fuel fabrication plants.

STATE EFFORTS

A State may assume responsibility for some of NRC's regulatory authority--if agreed to by the State and NRC. There are now 25 "agreement States" which regulate source, by-product, and small quantities of special nuclear materials. According to NRC officials, all agreement

ATTACHMENT II

States have good radiological control programs but in nonagreement States, radiological programs vary from virtually nonexistent to very comprehensive.

States generally do not have a separate program for decommissioning. With few exceptions, there are no provisions or requirements which would protect the States from financial loss in the event of default.

In joint sponsorship with NRC and the Environmental Protection Agency, the National Conference of Radiation Control Program Directors investigated options available to States to assure licensee financial responsibility in the event of default. They issued a report in April 1976 which concluded that bonding for decommissioning and a trust fund for perpetual care would satisfy many of the situations that an individual State may encounter. Even though this body of State representatives made such recommendations over a year ago, only seven States told us that they require an advance accumulation of funds or some form of bonding for decommissioning. The Conference is also studying control of natural radiation, and NRC is considering whether the responsibility for radium --produced by natural uranium--should be brought under Federal control.

MAJOR QUESTIONS REMAIN UNANSWERED

Thus far, I have tried to highlight first order questions which, unfortunately, have not been answered by the responsible Federal agencies:

--How much will it cost to decommission nuclear facilities?

--Who will pay these costs?

--How many and what kinds of facilities need or will need to be decommissioned?

ATTACHMENT II

There are other important questions which must be answered in order to develop an acceptable decommissioning strategy.

First, how should commercial power reactors be decommissioned? There are generally four recognized methods for decommissioning reactors --dismantlement, entombment, mothballing, and a combination of either entombment or mothballing with subsequent dismantling.

Dismantlement involves the total removal of the facility from the site to radioactive waste burial grounds. The land is then restored to its original condition and released for unrestricted use. The largest problem involved in immediate dismantlement is contending with the radiation hazards from the large amounts of induced activity. To prevent the workers engaged in the dismantling activities from receiving excessive doses of radiation, much of the cutting of the reactor parts must be done underwater by remote-controlled equipment--a costly and time-consuming process.

Entombment consists of sealing the reactor with concrete or steel after as much as possible of the liquid waste, fuel, and surface contamination have been removed and sent to fuel storage facilities or burial grounds. NRC does not require an entombed facility to have security systems to protect against intrusion. However, it does require annual surveillance for possible radiation leaks. Also, periodic maintenance is required to insure the integrity of the entombed structure.

Mothballing is simply removing the fuel and radioactive waste and then placing the facility in protective storage. A mothballed facility requires a security intrustion system, annual radiological surveys, and periodic maintenance.

ATTACHMENT II

The fourth method, which may be the most practical approach, is a combination of either mothballing or entombment with subsequent dismantlement. This method offers the advantage of placing the facility in an entombed or mothballed status for about 65 to 110 years, until the induced activity decays to a level which permits dismantling without undue radiation danger to the workers. The entombment and mothballing methods and, to a lesser extent the combination methods, would limit the use of the affected land.

Another question is will current radiation standards change? There is an historical trend for increased conservatism in radiation standards that guide the decommissioning of facilities. This trend has led to safety problems, or at least safety questions, which are expensive to address. For example, both DOE and NRC are involved in searching for sites of early nuclear projects that had been released for unrestricted use by the general public. Now, because of changed radiation standards and greater caution in dealing with radiological hazards, DOE is in the process of performing radiological surveys at these sites. If this sort of trend continues, the rules that we now use to govern decommissioning might be considered unsafe years from now.

Lastly, what does the future hold for nuclear power and decommissioning? Until recently, the role of nuclear power as an electrical generating source for the future has been a clear and unchallenged government policy. Light water reactors, and then breeder reactors with their ability to replenish their own fuel, have been viewed as long-term, almost perpetual, energy sources.

ATTACHMENT II

The President is now trying to implement an energy program that would change the future of nuclear power. He has established a policy to (1) defer the U. S. commitment to advanced nuclear technologies that are based on the use of plutonium and (2) use more of the current light water reactors to meet our needs.

Light water reactors require a supply of natural uranium. How much natural uranium exists is a major question that, when answered, dictates the viability of light water reactors as an energy source. Sixty-four reactors are now licensed to operate. The number that will be operating in the future is, of course, speculative, but estimates for the number expected in the year 2000 range from less than 200 to several hundred more than that.

Obviously, use of light water reactors cannot be expected to continue indefinitely. If another generation of nuclear reactors cannot be developed or is not needed because another energy source, such as solar energy, has been introduced, the end of light water reactors could also be the end of the commercial nuclear power industry.

The possibility of this industry ending raises questions as to whether there will be nuclear-related organizations, nuclear equipment, and individuals expert in the nuclear field that would be capable of dealing with the decommissioning and decontamination problems that could remain for about 100 years after the last reactor is shut down.

CONCLUSIONS

The problems that nuclear-related operations leave behind are increasing because of the expansion of nuclear technologies. DOE has

ATTACHMENT II

accumulated a large number of excess facilities which will involve a monumental clean-up effort.

While elimination of those facilities that are now excess or obsolete is important, it is also important that DOE begin to consider and plan for decommissioning in all future projects. This requires that decommissioning costs be recognized at the outset of a project.

Similarly, NRC, which has responsibility on the commercial side, has not developed cost estimates, acceptable methods, or standards needed by industry to plan decommissioning or disposal of their facilities. NRC has not paid enough attention to one of the biggest problems that may confront the public in the future--that is, who will pay the cost of decommissioning nuclear power reactors? With the exception of uranium mills, it has not made any plans or established any requirements for advanced accumulation of funds for decommissioning reactors or any facilities it licenses.

We believe the cost of decommissioning should be paid by the current beneficiaries, not by future generations. Just as DOE should consider decommissioning costs in its projects, private companies have an obligation to accumulate funds for decommissioning during the life of their projects. NRC should make advance planning for decommissioning mandatory at the time of licensing, including provision for funding.

If the States are to maintain their responsibility over selected nuclear activities they must be made aware of the problems with decommissioning and be encouraged to adopt legislation that will assure that proper decommissioning and decontamination is carried out. The ultimate

ATTACHMENT II

solution to the decommissioning problem may very well be expensive--but the expense should be known so that it can be planned for and paid for by the responsible parties. In our report, we made several recommendations to DOE and NRC aimed at developing the solution to this problem.

Various approaches could be taken by private industry to provide today for future costs rather than saddling future generations with this responsibility. These approaches include:

--A direct charge to users or customers in the price of a product and depositing such funds into an escrow or trust fund.

--A system for recovering the cost of decommissioning nuclear reactors through depreciation accounts. This depreciation cost could then be passed on to users. The funds could be set up in special accounts to insure their integrity until needed.

--A bonding arrangement to protect the governmental bodies from a financial burden should a licensed nuclear facility not be able to decommission its activities.

Although the task of cleaning up the present problem and preventing future problems will involve a concentrated effort by all those involved, the Federal sector must lead the way and set the example. In the past, the Federal Government has been shortsighted in its approach to solving decommissioning problems. The Federal agencies must now view decommissioning with an eye toward the future, particularly in the areas of financial responsibility, radiation standards, and capability to perform the needed decommissioning tasks.

NRC agreed in principle with all our recommendations, but contended that time was needed to study the alternative approaches and actions

APPENDIX II

necessary. NRC has undertaken various studies in an effort to develop its policy with regards to decommissioning. NRC has taken no action to provide for financial surety of power reactor decommissioning.

ATTACHMENT III

NUCLEAR ENERGY'S DILEMMA: DISPOSING OF HAZARDOUS RADIOACTIVE WASTE SAFELY (EMD-77-41, September 9, 1977)

There is general agreement among nuclear power critics, the public, business leaders, and Government officials that a solution to the nuclear waste disposal problem is critical to the continued growth of nuclear energy. Radioactive wastes are highly toxic to human life. They can damage or destroy living cells, causing cancer and death. Some wastes will remain potentially hazardous for hundreds of thousands of years. Decisions on what we do with our radioactive wastes in our lifetime will affect the lives of countless generations to come.

Now that the President has indefinitely deferred commercial reprocessing of spent fuel, finding solutions to problems in storing and/or disposing of the spent fuel accumulating at nuclear powerplants is a top priority matter.

The issues surrounding the management and safe disposal of nuclear wastes are both important and complex. Their satisfactory resolution involves analysis of complex technical, social, political and institutional questions. The results of our work are contained in a report we issued to Congress in September 1977, and on which we testified before the Subcommittee on Environment, Energy and Natural Resources, House Committee on Government Operations. This report highlights:

--Public and political opposition to nuclear waste disposal locations.

--Gaps in existing Federal laws and regulations governing the storage and disposal of nuclear waste.

ATTACHMENT III

--Significant geological uncertainties and natural resource trade-offs encountered when selecting so-called "permanent" disposal locations.

--Lack of Nuclear Regulatory criteria for orderly waste management operations, such as solidification of waste, designing proper waste containers, and transportation of nuclear waste.

--Overly optimistic time frames for demonstrating the safety of the Department of Energy's proposed waste disposal locations and waste management practices.

--Lack of a demonstrated technology for the safe disposal of existing commercial and military high level waste.

RADIOACTIVE WASTE VOLUMES

Today there are great amounts of nuclear waste already in existence. Even if all activities which generate radioactive waste were stopped today, we would still be faced with a major radioactive waste disposal problem. Radioactive waste has been accumulating for many years from the Department's military and research and development efforts, fuel reprocessing activities, and commercial nuclear powerplant operations.

Today about 74 million gallons of high level waste, nearly all produced by Department operations as a result of reprocessing, are stored in three locations in the United States. This great volume of waste is being stored "temporarily" while a permanent solution to its ultimate disposal is found.

It is estimated that the Department will generate about 41 million gallons of high level waste from its reprocessing operations through the year 2000. If commercial reprocessing is allowed, it is estimated that

ATTACHMENT III

about 152 million additional gallons of high level waste will be generated by the year 2000. Even without commercial reprocessing the waste problem is growing.

Commercial reactor spent fuel is accumulating at nuclear powerplants because there are no commercial reprocessors operating or sufficient off-site storage facilities available in the United States. Currently there are about 3,000 metric tons of spent fuel being stored, with a projection of an additional 17,000 metric tons over the next 10 years.

Resumption of commercial reprocessing in the near future does not seem probable since the President has indefinitely deferred commercial reprocessing of spent fuel. If it is finally decided that there will be no further commercial reprocessing, spent fuel elements from existing and future civilian power reactors will have to be managed as high level radioactive waste. Meanwhile, nuclear powerplants have had to store their spent fuel in storage pools at the reactor sites. As a result, a backlog of spent fuel is accumulating at the powerplants.

The nuclear industry estimates that by 1985 it could be faced with a severe shortage of storage capacity. DOE estimates that 1985 is the earliest possible date a geological waste disposal facility or other storage facility to receive spent fuel could be ready.

THE COMMISSION LACKS AUTHORITY OVER ALL WASTE STORAGE AND DISPOSAL FACILITIES

The Commission currently does not have regulatory authority over all waste storage and disposal facilities. As a result, nearly all of the high level waste in storage today is not under the regulatory authority of the Commission.

ATTACHMENT III

The Commission was established by the Energy Reorganization Act of 1974 to provide an independent review of nuclear activities, including waste disposal. It has specific responsibility for licensing and regulating all Department facilities used for storage of commercial high level waste. It has similar authority for retrievable surface storage facilities and other long term storage facilities for Department high level waste. However, this does not include authority over the Department's facilities which are used for or are part of research and development activities. This is a key point because nearly 99 percent of all high level waste in storage today is not under the Commission's jurisdiction.

We believe that when dealing with hazardous nuclear materials, the public should have adequate assurance that their health and safety are being protected to the maximum degree possible. No matter how competent or conscientious the managers of a project or facility may be, there can be advantages from an efficient, timely review of their operations by an outside independent review.

Because of the potential dangers of nuclear waste storage and disposal, GAO believes the Congress should either give the Commission authority over those Department facilities--including research and development facilities--intended for the storage and disposal of the Department's high level waste, or provide for other independent oversight and assessment of these facilities. The Congress should also either give the Commission authority over the storage and disposal of other waste and spent fuel at Department facilities, or provide for an alternate means of independent oversight and review. In testimony before congressional committees, GAO has

stated a preference for giving the Commission the authority for independent oversight and assessment over the Department's facilities.

Regardless of how it is achieved, we strongly believe that all of the Department's nuclear waste facilities should receive independent oversight.

DISPOSAL OF MILITARY- AND RESEARCH-RELATED WASTE

After several decades of work, the Atomic Energy Commission did not, and its successor--the Department--has not yet demonstrated acceptable solutions for long term storage and/or disposal of defense- and research-related high level waste, or convinced the public that present storage sites are geologically suited for long term storage or disposal.

The Department is investigating several alternatives for managing its military and research waste, including

--solidification and geological disposal at its Hanford and Savannah River sites, and

--solidification and shipment to a Federal geological repository.

Before this high level waste could be moved to a repository, however, major questions involving retrievability from its temporary storage tanks at Hanford and Savannah River must be resolved.

The Department does not now have the technological capability to extract all of this waste from the storage tanks. This waste has been converted into a chemical form that may be unsuitable for long term storage or for conversion to an acceptable long term storage form using current technologies.

ATTACHMENT III

The Department is testing methods which it believes will enable it to extract up to 99 percent of the high level waste from most storage tanks. The costs of extracting and preparing all of the waste for geological disposal are uncertain. Estimates range from $2 billion to $20 billion. There is very little documentation supporting these estimates at this time.

MANAGEMENT OF COMMERCIAL SPENT FUEL

A tremendous backlog of spent fuel--which is potential high level waste--exists at nuclear powerplants because no commercial reprocessors are currently operating in the United States. As of January 1978, utilities operating 49 of the 65 present nuclear reactors have notified the Commission of their interest to increase storage space for stored fuel elements by decreasing the space between the elements. This is known in the jargon as "compaction."

The safety of such action has been questioned by the Natural Resources Defense Council. In response, the Commission has undertaken a generic environmental impact statement on the storage of fuel elements. While the statement has not been completed, the Commission has allowed compaction on a case-by-case basis. According to the Commission staff, before allowing compaction the safety concerns raised by the Council are addressed in each request for increased storage capacity.

According to the Commission staff there are no significant environmental or safety impacts associated with these individual actions. By January 1978, compaction had been approved for 32 of the 49 reactors.

The Commission has, in part, justified allowing compaction for utilities which have shown an immediate need for additional storage capacity

in order to maintain electrical generating capability. However, some utilities have been allowed to use compaction without demonstrating such an immediate need.

GAO believes that until the Commission completes its generic environmental impact statement, it should limit through license restrictions the amount of spent fuel that can be put in storage pools to no more than the amounts for which the storage pools were designed and authorized under the initial operating license. Compaction should only be allowed if the utility can prove to the Commission's satisfaction--not the Commission's staff--that (1) it would be forced to shut down operations if increased storage at that site was not allowed, and (2) such action would not increase the safety risk to the public or environment.

GAO believes that the Commission's interim licensing for increased storage capacity may raise public suspicions and conern, because the overall environmental effects--including safety--of such actions have not yet been fully determined. As a result it is extremely important that NRC complete and issue the generic environmental impact statement as soon as possible so that unanswered questions can be resolved concerning increased fuel storage at reactor pools. A draft of the impact statement was issued in March with final issuance expected for August of this year.

OBSTACLES TO GEOLOGICAL WASTE DISPOSAL

The Department has begun an ambitious program to demonstrate the feasibility of safely placing commercial and military waste in deep geological formations. At the time of our report, it was seeking several sites for facilities in widely separated areas across the country.

ATTACHMENT III

The Department had set 1985 as the target year for completing two geological disposal facilities for commercial high level and transuranic contaminated wastes, and spent fuel (if and when it is defined as a waste). It also had planned to complete four more geological disposal facilities for commercial waste between 1987 and 1991. The Department proposed that six repositories be built in order to (1) spread nuclear waste regionally throughout the Nation, and (2) minimize program setback should a potential site(s) prove unacceptable. Furthermore, the Department planned to build a separate disposal facility by 1983 for waste generated by military and research activities. At this facility, it intends to have the experimental capability to determine site suitability for high level waste disposal. Following the issuance of our nuclear waste report, the Department modified its proposed commercial waste disposal program. While it has not yet been finalized, it appears that the Department will now develop only two commercial waste disposal facilities rather than six. Its plans for a disposal facility for its own high level and other waste by 1983 remain unchanged.

One of the potential geological disposal sites which may be used for the 1983 facility is being developed in New Mexico. According to the Department this facility might eventually be used for routine high level waste storage; however, the Department has not estabished a date for storing such waste.

The Department's position has been that the New Mexico location is for its other highly contaminated waste and to provide experimental capability to determine the suitability of the site for high l
disposal.

ATTACHMENT III

GAO believes that should public and official sentiment in New Mexico not be strongly opposed to a waste disposal facility there, and since the project is further advanced than the commercial waste repository program--which may not have a site ready to receive waste by 1985 --this site could be used to serve the needs of the commercial nuclear industry by becoming the first commercial waste repository.

The obstacles

When it publicly announced its waste repository program objectives and goals, the Department may have promised more than it can deliver. There are, we believe, formidable social, geological, and regulatory problems which must be solved. Foremost among them is opposition of public and some political leaders. The Department may not be successful in gaining their acceptance unless it can convince the public that it has a sound waste management program and that geological disposal risks to man's environment are acceptably low.

The Department has twice been unsuccessful in developing potential waste disposal sites because of insufficient attention to the factor of public acceptance--in Kansas and in Michigan.

Other obstacles in the Department's geological waste disposal program which must be addressed and overcome by the Department are

--geologic uncertainties and natural resource tradeoffs,

--questionable demonstration time period estimates,

--undemonstrated technology for preparing radioactive waste, and

--the lack of Commission criteria for orderly waste management operation.

Let me discuss each of these briefly.

ATTACHMENT III

Certain geological formations which now seem promising may not be suitable for long term disposal. Preliminary geological information on the three most promising salt formations--the Salina formation and the Gulf Coast salt domes for commercial waste, and the Permian Salado salt formation for the Department's other highly contaminated waste--indicates that there are uncertainties, such as the natural instability of salt dome formations. Some potential salt formations are too deep, some are too shallow, and some may be vulnerable to ground water as a result of exploration for natural resources. Others are subject to conflicting uses, such as man's search for natural resources--salt, oil, gas and potash. Furthermore, geological formations may become unstable after placing high level waste in them. These uncertainties must be resolved and/or avoided before a repository can ever be established.

The 5 to 10 year demonstration period the Department plans may not be sufficient to prove that the repository can totally isolate radioactive waste from the environment for hundreds of thousands of years. The experimental data gathered over this period may not be sufficient to establish the degree of confidence needed to make valid extrapolations of long term risks associated with radioactivity escaping to man's environment. United States Geological Survey officials told us that the 5 to 10 year period of retrievability may not be adequate to assess all of the effects on the geologic medium from the emplacement of hot wastes.

Existing high level waste cannot be disposed of in its present form because no technology has thus far been demonstrated to completely remove

ATTACHMENT III

high level waste from temporary storage tanks and convert it into a suitable solid state.

Performance criteria regulating the form and process of solidifying waste, the waste cannisters, and the shipping casks have not yet been written. Developing these criteria--to be completed by April 1978--is a time-consuming process which may result in further delays. Furthermore, the draft waste performance criteria that the Commission is now developing do not address the storage or disposal of spent fuel.

CONCLUSIONS

To better insure public health and safety, our report recommends that the Congress should amend the Energy Reorganization Act of 1974 to provide for independent assessments of the Department's nuclear facilities--including research and development facilities.

We also recommend that the Congress closely scrutinize, through the annual authorization and appropriation process, the progress of the Department's program for long term waste management.

In addition to the recommendations to the Congress, the report recommends that a number of regulatory and program management changes be made by the Department and the Commission.

The Department and the Commission concurred with most of our recommendations and said that work was already underway.

In all, our report discusses and makes recommendations which we hope have provided Congress, the administration, and other interested persons with a reasonably comprehensive, independent assessment of the status of nuclear waste management in this country. While our report

ATTACHMENT III

does not paint a rosey picture of where we stand today, it does point out that much work is currently in progress. Much still needs to be done if the public is to be assured that nuclear power can be a safe source of energy in the future.