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Report to Sen. Lloyd Bentsen, Vice Chairman, Joint Economic Committee; by Elzer B. Staats, Comptroller General.

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The Nuclear Regulatory Commission's (NRC's) role in Federal efforts to select nuclear fission technologies for future development needs to be strengthened. It is likely the President and Congress will use Department of Energy proposals on which nuclear reactor and fuel cycle technologies should be selected for future research, development, and demonstration programs. Better decisions could be made if NRC were actively and independently involved in the selection process, but the NRC has no current plans for becoming involved in the evaluation and planning effort. The Chairman of the NRC should: establish a program to systematically and independently monitor the development of alternative fission reactor and fuel cycle technologies for the future; and identify and report to the President and congressional committees known or suspected licensing issues and problems associated with technologies under consideration by the Department of Energy before any are scheduled to be selected for future development. The Secretary of the Department of Energy should inform NRC of the reactor and fuel cycle technologies under consideration for future development and recognize the NRC's reports on known or potential licensing issues and problems when formulating proposals to the President and the Congress. (RBS)



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

5651
B-164105

March 7, 1978

The Honorable Lloyd Bentsen
Vice Chairman, Joint Economic
Committee
United States Congress

Dear Mr. Vice Chairman:

We are bringing to your attention the need to strengthen the Nuclear Regulatory Commission's (NRC's) role in Federal efforts to select nuclear fission technologies for future development. Our concern over NRC's role arises from work we have done in response to a May 12, 1977, request from the former Vice Chairman, Joint Economic Committee, that we review the status, potential, and problems of alternative nuclear fission technologies. Our report on the status, potential, and problems will be issued to the Congress in early spring. We are reporting on the need to strengthen NRC's role at this time because we believe prompt attention is required.

In April 1977 the President proposed to (1) defer indefinitely commercial reprocessing and recycling of plutonium, as well as the commercial introduction of the Liquid Metal Fast Breeder Reactor (LMFBR); (2) reduce funding for the LMFBR program and redirect it toward evaluation of alternative fission technologies; and (3) cancel construction of the Clinch River Breeder Reactor (CRBR)--the Nation's first LMFBR demonstration powerplant. These actions were taken in the hope they would help reduce the risk of nuclear weapons proliferation.

As a result of the President's proposal, the Department of Energy (DOE) is conducting a major assessment program to recommend nuclear fission technologies for future development. NRC, however, has no systematic ongoing effort to independently monitor and evaluate alternative technologies from a safety, safeguards, and environmental point of view to complement the DOE effort. Such an NRC effort is needed, in our view, to help ensure the selection of the most appropriate nuclear fission technologies for future development by the United States. Accordingly, we are making recommendations to the Chairman, NRC, and the Secretary, DOE, aimed at strengthening NRC's role in the selection process.

FMD-78-44
(30369)

The matters presented here were discussed with NRC and DOE officials and their comments were considered during report preparation.

MAJOR DOE EFFORT TO SELECT
NUCLEAR FISSION TECHNOLOGIES
FOR FUTURE DEVELOPMENT

The Nonproliferation Alternative Systems Assessment Program (NASAP) is DOE's major effort to assess alternative nuclear fission technologies which might meet the energy needs of the Nation while enhancing the Nation's nonproliferation efforts. The overall program goal is to recommend to the Secretary of Energy by July 1979 U.S. development priorities for those systems which, when deployed in the United States and internationally, would offer improved proliferation resistance compared to systems that permit access to plutonium or to other materials directly usable in nuclear weapons.

Under initial consideration as candidate technologies for future development are more than 85 nuclear systems involving 21 reactor types and 12 fuel cycle combinations. The number of candidate systems will be reduced through a series of successive screening steps. Screening of systems will be based on an evaluation of their (1) proliferation resistance, (2) resource utilization, (3) technology status and development needs, (4) economics, (5) commercial feasibility, and (6) environmental and safety acceptability. The results of these screenings will be approved by an interagency management group from DOE, the State Department, and the Arms Control and Disarmament Agency--but not NRC.

The NASAP plan notes that considerable interaction with NRC is required to obtain a consensus on the licensability of candidate systems, and that NRC assistance will be needed to identify major generic environmental and safety problems which may lead to difficulty in meeting existing or proposed regulatory requirements. No agreements, however, exist between NRC and DOE on how or when this interaction and assistance will take place or in what form it will be.

NEED TO STRENGTHEN NRC'S ROLE

NRC has no responsibility for developing nuclear fission technologies; such efforts are the responsibility of DOE and industry. NRC's principal function is to independently assess and regulate the safety, safeguards, and environmental adequacy of civilian nuclear facilities and procedures proposed to them for licensing action by DOE and the nuclear industry. Accordingly, NRC is primarily a reactive organization.

NRC's primary efforts regarding alternative nuclear fission technologies for the future have been to provide a staff response to a request from us on the licensing issues associated with a number of nuclear fission technologies, and requests from DOE on preliminary planning documents relating to NASAP. In addition, NRC has recently become involved to a limited extent in an international study of nuclear fuel cycle issues. As noted above, NRC is not a member of the inter-agency management group that will approve the screening of candidate systems.

Since there is no systematic ongoing NRC effort to monitor and evaluate alternative fission technologies for the future, the NRC staff is not prepared to make extensive evaluations of such technologies. On August 17, 1977, we requested the written views of the NRC staff on the safety, safeguardability, and environmental acceptability of various reactor and fuel cycle concepts. We asked the staff to identify areas of known problems and the areas it anticipates would have to be emphasized in any future licensing review of each concept. Further, we asked the NRC staff to rank or categorize the concepts according to their probable licensability.

In order to respond to our request, NRC had to establish an internal coordinating committee to draw together the views of its various program groups. In its response to us, the NRC staff committee did not rank or categorize the probable licensability of the nuclear concepts. According to NRC officials, they did not have the resources, time, or necessary information to do so.

In commenting on our report, NRC officials stated that the Commissioners had earlier stressed that no major new commitment of resources or funds should be made in this area until more definitive proposals were brought to the agency's attention which could conceivably lead to licensing actions by NRC. We were told that although the Commissioners felt that it was too early to devote substantial levels of resources and manpower to the variety of study efforts being pursued by DOE, the NRC staff was expected to keep abreast of activities in the area. Without specifying the exact amount, it was noted that NRC's fiscal year 1979 budget request to the Congress provides limited funds among various program offices for this general monitoring effort.

POSSIBLE CONSEQUENCES OF NOT HAVING
EARLY COMMISSION INVOLVEMENT

The failure to establish an organized effort within NRC to independently monitor and evaluate nuclear fission technologies for future development could result in

- the Federal Government selecting and funding the development of nuclear reactor and fuel cycle technologies that are not among the most acceptable from the safety, safeguards, and environmental point of view; and
- serious delays and cost overruns if NRC is not adequately prepared or unable to express timely views on the licensing aspects of the construction and operation of demonstration projects and/or if the licensing staff and the developers disagree on the design requirements for such projects.

Regarding the first possible consequence, a brief synopsis of the history of LMFBR development will illustrate our concern. In the 1960s the LMFBR was essentially selected as the next generation of nuclear fission power. Eventually, it became the highest priority energy research and development program in the United States and several other nations.

Unfortunately, the select on process in the 1960s did not give full consideration to how this technology could be used to supply the material for developing a nuclear weapons capability. This was changed by the President when he directed that proliferation of nuclear weapons capability become a major factor in assessing nuclear alternatives for the future. If a nuclear fission technology other than the LMFBR is ultimately selected for future development, the Federal Government would have spent hundreds of millions of dollars on a technology that yielded no direct tangible benefits as a commercial power source.

While the Nation could still select a technology that might not be the most acceptable, we believe that an independent evaluation of future technologies by NRC before the selection is made would help reduce this risk. The Nation would not have to rely only on DOE's technical opinion. Instead, it would have the benefit of the expert opinion of the agency which would ultimately be responsible for licensing the plant that would result from the program.

With respect to the second possible consequence, millions of dollars in cost overruns could result due to slipped licensing milestones unless NRC is able to license future

demonstration projects in a timely manner. Again, the LMFBR illustrates our concern.

The CRBR is a major project in the LMFBR program. One major objective of the CRBR is to demonstrate that LMFBRs are licensable. Therefore, NRC's licensing review--which has been indefinitely suspended as a result of the President's proposal to cancel the plant--was a critical step in the project's construction schedule. The licensing review of the CRBR was hampered during its entire history by disagreement between ERDA and NRC on the fundamental safety design of the plant to cope with low probability accidents. For example, the NRC staff stated in August 1975 that it was not likely that the proposed containment design for the CRBR would be adequate for the site, but it was not until December 1976 that the design was changed to comply with the NRC requirements.

In February 1976 an ERDA official testified before Congress that a 15-month delay in the overall project resulted in a \$214 million cost increase. This delay and cost overrun, according to the ERDA official, was due to both ERDA and NRC underestimating the time that would be needed to license a "first-of-a-kind" plant like the CRBR. Although a number of factors contributed to the licensing delays and cost overruns, the fundamental difference in perspective between NRC and the plant's developers about how the plant would be built to meet certain safety concerns was certainly a major if not the biggest, factor. We previously discussed some of these licensing problems in three reports 1/.

CONCLUSIONS

It is likely that the President and the Congress will use DOE proposals on which nuclear reactor and fuel cycle technologies should be selected for future research, development, and demonstration as a major source for policy decisions on the funding of future nuclear research and development programs. Both would be able to make better decisions if NRC were actively and independently involved in this process as soon as possible. However, NRC does not have any current

1/"Problem Areas Which Could Affect the Development Schedule for the Clinch River Breeder," December 1974; "Cost and Schedule Estimates for the Nation's First Liquid Metal Fast Breeder Reactor Demonstration Powerplant," RED-75-358, May 22, 1975; and "Liquid Metal Fast Breeder Reactor: Promises and Uncertainties," OSP-76-1, July 31, 1975.

plans to become actively involved in this crucial evaluation and planning effort.

This lack of early involvement might eventually cause serious licensing delays for future nuclear technologies. Once before, when NRC and the then ERDA disagreed on fundamental safety design requirements for CRBR, the Federal Government experienced major licensing delays which resulted in large cost overruns. Early NRC involvement would help highlight any differences of opinions and would allow for a more focused debate on the relevant issues.

More important, the Nation needs NRC's early and informed perspective on the various nuclear technologies to preclude technologies from being selected that may not be among the most acceptable from a safety, safeguards, and environmental viewpoint. Further, developers need to be able to rely on the regulators to give them timely and reliable information on the potential licensability of future nuclear technologies.

RECOMMENDATIONS

We recommend that the Chairman, NRC:

- Establish a program to systematically and independently monitor the development of alternative fission reactor and fuel cycle technologies for the future.
- Identify and report to the President and cognizant congressional committees known or suspected licensing issues and problems associated with the reactor and fuel cycle technologies under serious consideration by DOE before any are scheduled to be selected for future development. To the extent possible, the Chairman should rank the reactor and fuel cycle technologies for desired development in the United States from a licensing point of view, and clearly identify the relative safety, safeguards, and environmental advantages and disadvantages of each.

We also recommend that the Secretary, Department of Energy:

- Inform NRC of the reactor and fuel cycle technologies which are under serious consideration for future development as soon as they are selected so the Commission can identify and report on associated licensing issues and problems.

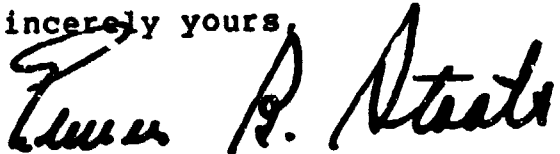
--Recognize NRC's report on known or potential licensing issues and problems as a major factor for consideration in formulating proposals to the President and the Congress on which reactor and fuel cycle technologies should be selected for future research, development, and demonstration.

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As you know, section 236 of the Legislative Reorganization Act of 1970 requires the head of a Federal agency to submit a written statement on actions taken on our recommendations to the House Committee on Government Operations and 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.

As arranged with the former Vice Chairman's office, we are sending copies of this report to DOE and NRC so that the requirements of section 236 can be set in motion. Copies will also be sent to other interested parties.

Sincerely yours,



Comptroller General
of the United States