March 31, 1999

FOR: The Commissioners

FROM: William D. Travers /s/
Executive Director for Operations

SUBJECT: TRANSMITTAL OF THE STAFF'S SAFETY EVALUATION OF DOE'S TOPICAL REPORT ON THE TRITIUM PRODUCTION CORE

PURPOSE:

This paper transmits to the Commission the NRC staff's evaluation of the Department of Energy's (DOE's EXIT) topical report on the tritium production core (TPC).

BACKGROUND:

The staff has been providing review and consultation services to assist DOE under the provisions of the memorandum of understanding between the NRC and DOE dated May 22, 1996.

DOE has developed an alternative design for burnable absorber rods using lithium-6 in place of boron-10 to control reactivity in the core and to also produce tritium. DOE expects that approximately 3300 tritium-producing burnable absorber rods (TPBARs) would be included in each core reload of a TPC.

DOE has prepared a topical report addressing how the inclusion of a full-core load of TPBARs in a reactor core affects nuclear plant systems, safety and components analyses, and performance of a representative commercial light-water reactor (CLWR). DOE intended that its topical report would establish an envelope of design, methodology, and analysis, serving as a guide and referenceable document for plant-specific applications to incorporate TPBARs in any CLWR design in the United States for the production of tritium.

In SECY-96-212, "Review of Department of Energy's Proposal for Tritium Production in Commercial Light-Water Reactors," dated October 3, 1996, the staff described the process by which it intended to conduct its review of DOE's proposal for producing tritium in CLWRs. Regarding the production phase of DOE's CLWR tritium program, the staff proposed to review the topical report submitted by DOE concerning the TPC, to transmit the results of its review to the Commission before issuing it, and to place a notice in the *Federal Register* announcing the availability of the staff's safety evaluation.

In its staff requirements memorandum (SRM) dated December 10, 1996, the Commission approved the staff's proposed review approach and, in addition, directed that public meetings be held in the vicinity of each reactor facility that undertakes irradiation of TPBARs for the production of tritium.

DISCUSSION:

On July 30, 1998, DOE submitted its TPC topical report for the staff's review. This topical report presented the results of DOE's systematic and comprehensive evaluation of the impact of using TPBARs in all available core locations on all aspects of reactor and balance-of-plant design, using the staff's review criteria in NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants" (SRP), as guidance. The topical report addresses each section of the SRP and contains an assessment of the impact of the TPC on a representative plant safety analysis report. The staff has reviewed DOE's TPC topical report and has prepared the attached safety evaluation documenting its review.

CONCLUSIONS:

The staff has reviewed DOE's topical report on the TPC and the related supporting information. Many technical issues have been satisfactorily addressed in the DOE topical report, as documented in the staff's safety evaluation. During its review, the staff identified a number of interface issues that will require changes to the plant safety analysis report and that must be reviewed by the staff before the staff can determine the acceptability of irradiating a full-core load of TPBARs in any particular reactor facility. Therefore, the staff concludes that if any licensee wishes to undertake production irradiation of TPBARs, it must first submit an application for an amendment to the individual facility operating license for authorization to conduct such irradiation. Such application must address the plant-specific interface issues identified in the staff's safety evaluation and must include the necessary changes to the plant technical specifications located in Appendix A to the operating license.

RECOMMENDATIONS:

1. That the Commission note that the staff intends to approve the attached Safety Evaluation 10 days after the date of the paper unless otherwise directed by the Commission. Action will not be taken until the SRM is received. The staff intends to issue the attached safety evaluation as NUREG-1672. At that time, the staff will prepare a *Federal Register* notice announcing the availability of the staff's safety evaluation related to DOE's topical report on the TPC. We consider this action to be within the delegated authority of the EDO.
2. That the Commission note that the staff intends to hold public meetings in the vicinity of each host facility before the irradiation of TPBARs to produce tritium.

COORDINATION:

The Office of the General Counsel has no legal objection to this paper.

The staff briefed the Advisory Committee on Reactor Safeguards during the March 1999 meeting and discussed the conclusions in its safety evaluation.

original /s/ by
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Attachment: Safety Evaluation