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## POLICY ISSUE (Notation Vote)

October 3, 1996

SECY-96-212

FOR: The Commissioners

FROM: James M. Taylor  
Executive Director for Operations

SUBJECT: REVIEW OF DEPARTMENT OF ENERGY'S PROPOSAL FOR TRITIUM  
PRODUCTION IN COMMERCIAL LIGHT-WATER REACTORS

### PURPOSE:

This paper requests Commission approval of the process by which the NRC staff intends to conduct its review of DOE's proposal for production of tritium in commercial light-water reactors (CLWRs) under the provisions of the Memorandum of Understanding (MOU) between the Department of Energy (DOE) and the Nuclear Regulatory Commission (NRC) dated May 22, 1996.

### BACKGROUND:

In SECY-96-058, "Memorandum of Understanding Between the Department of Energy and the Nuclear Regulatory Commission," dated March 15, 1996, the staff provided an MOU between the DOE and the NRC, establishing the basis for NRC review and consultation of DOE's possible use of CLWRs for the production of tritium. Tritium is an essential material in U.S. nuclear weapons that decays at a rate of approximately 5 percent per year (a 12.3-year half-life).

The subject MOU supplements an earlier more general MOU between DOE and NRC (February 24, 1978) and relates solely to NRC's review of and consultation concerning DOE's possible use of CLWRs for producing tritium needed to maintain the U.S. nuclear weapons stockpile and the U.S. nuclear deterrent. The MOU recognizes that the use of commercial reactors is subject to

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an additional set of issues concerning the use of civilian commercial reactors for purposes that support military requirements. The MOU states that: "The manner in which these concerns are resolved and a final determination on the mode of tritium production chosen will not involve NRC technical or policy review and is not a subject of this memorandum".

In a Staff Requirements Memorandum dated April 19, 1996, the Commission approved the new MOU with DOE, subject to three comments. The first comment added a clarifying phrase to the first paragraph of the MOU. The second comment directed the staff to include a mechanism in the separate reimbursable agreement to resolve reimbursement disagreements if they develop. The reimbursable agreement contains a provision for resolving billing disagreements, should they occur. This agreement was signed on September 30, 1996. Finally, the Commission inquired as to "the extent of NRC's obligations with regard to protection of the public health and safety if DOE adopts the accelerator production method." This comment, as well as an update on the status of DOE's proposal for tritium production in CLWRs, is discussed below.

DOE is responsible for establishing the capability to produce tritium by the end of 2005, in accordance with a presidential decision directive. DOE has selected a dual-path strategy to meet the schedule. One path is the accelerator production of tritium. If DOE adopts an accelerator design utilizing a tungsten target (as is currently contemplated), the Commission does not have statutory authority to regulate this option. The NRC is responsible for regulating production and utilization facilities (as defined by the Atomic Energy Act, as amended) and possession and use of byproduct and special nuclear material.

The other path is one that would require NRC oversight. DOE proposes to produce tritium in CLWRs, either through acquisition of reactor(s) under government ownership or by contracting for target irradiation services under private ownership. Should DOE choose to purchase (acquire) a reactor outright, additional license transfer issues may be involved in the staff's review. The staff will inform the Commission and provide additional information regarding any licensing and staff resource implications if DOE chooses this option.

Regardless of whether the commercial reactor option or the accelerator option is selected as the primary approach for tritium production, DOE intends to complete confirmatory testing and fabricate the first core load of targets during the years 2002 and 2003. Irradiation, cooling, and shipment of the irradiated targets is scheduled during the years 2004 and 2005 to support the presidential decision directive that calls for extraction operations to begin (probably at Savannah River) by the end of 2005. Extraction would take place at Savannah River and would not involve oversight by NRC.

Under the terms of the MOU, NRC will provide review and consultation to assist DOE in assessing and resolving technical and licensing issues associated with CLWR production of tritium (including physical security, security clearance, and environmental issues) in order to support a Secretarial decision on the primary and backup tritium production approaches in late 1998.

## DISCUSSION:

On April 11, 1996, DOE staff met with NRC staff to discuss the tritium production program and presented a schedule for LWR production of tritium.

DOE has developed a design for burnable poison rods using lithium, rather than boron, in PWR fuel assemblies. As a result of irradiation by neutrons in the reactor core, the lithium in the target rods is converted to tritium. The irradiated burnable poison rods can then be removed from the fuel assemblies and shipped to another location (Savannah River) for tritium extraction. DOE has prepared a program for tritium production that would proceed in three phases.

The first phase of the tritium program requires a lead test assembly (LTA) demonstration. DOE will develop, and submit for NRC staff review and approval, a report that is expected to contain sufficient information to demonstrate that the use of a CLWR to irradiate a limited number of lithium burnable poison rods in LTAs does not raise generic issues involving an unreviewed safety question. The staff will prepare a safety evaluation on the DOE report to address, on a preliminary basis, the acceptability of licensees undertaking the irradiation of the LTAs under the provisions of 10 CFR 50.59 without NRC licensing action. Upon completion of its evaluation, the staff will present its conclusions to the Commission prior to issuance. Licensees participating in the LTA demonstration would be allowed to proceed under 50.59 without NRC licensing action, subject to plant-specific evaluations confirming that no unreviewed safety question exists and that no change in a technical specification is needed. Licensees would be required to maintain documentation to demonstrate that plant- and site-specific considerations fall within the bounds established in the DOE analysis and otherwise meet the criteria in 50.59 on a facility-specific basis. The staff intends to issue Federal Register Notices announcing receipt of the topical report and, later, issuance of the staff's safety evaluation.

DOE expects that LTAs will be available for irradiation in the core of a CLWR in late 1997 or early 1998. At each of the one or more reactors involved in the LTA demonstration, 32 target rods (8 each in 4 LTAs, one LTA in each quadrant of the core) would be irradiated for one fuel cycle. The staff intends to conduct an inspection of licensee's 50.59 evaluations to assure that they are within the bounds established in the DOE LTA report and meet the criteria of 50.59 for installing LTAs without an amendment. This inspection would be conducted before the licensee begins irradiation of the LTAs. Independent of the topical report review, the staff also expects to conduct vendor-related activities with respect to QA plans and fabrication inspections. This will give DOE insights on the NRC overview to be expected for the production phase.

The second phase of DOE's tritium program would require review by NRC of DOE's submittal of a topical report for production irradiation in mid-1998. The staff would review the production topical report concurrently with the irradiation of the LTAs and would document its review in a safety evaluation report to be issued in early 1999. DOE has stated that because the primary purpose of the LTA demonstration is to build confidence among prospective

licensees, completion of the LTA demonstration is not an essential precursor to submittal of the topical report. The NRC staff agrees that it could initiate the topical report review independent of the LTA demonstration. However, information from the LTA demonstration may be required before the staff can complete its review of the production phase topical report. The results of the NRC staff review of the production phase topical report will be provided to the Commission prior to issuance of the staff's safety evaluation.

The third and final phase of DOE's tritium program requiring NRC review is the actual production of tritium. Under one of the DOE options being considered, this review would be conducted, not at the request of DOE, but as a result of a request by a licensee for amendment of its facility operating license. A license amendment would likely be required in order to make changes to the plant technical specifications or to address any unreviewed safety questions involving use of about three thousand lithium burnable poison rods. A request for a license amendment authorizing irradiation of burnable poison rods for production of tritium would be expected at the beginning of the year 2000. Requests for a license amendment would be subject to an opportunity for hearing. If a hearing is requested, the Commission will be notified if the staff intends to make a "no significant hazards consideration" finding which would allow the amendment to become effective before the conclusion of a hearing.

In summary, the staff will take the following actions regarding DOE's proposed production of tritium in CLWRs:

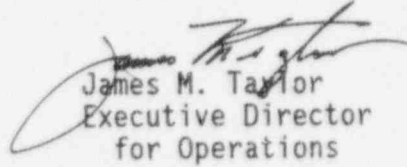
- 1) Upon completion of its evaluation of DOE's LTA report, the staff will consult with the Commission regarding its finding with respect to whether any generic issues involving unreviewed safety questions are raised which would prevent licensees from using the provisions of 10 CFR 50.59 to accomplish irradiation of LTAs without NRC licensing action.
- 2) The staff will provide the Commission with the results of its review of DOE's topical report for production irradiation of lithium burnable poison targets to produce tritium in a CLWR prior to issuance.
- 3) Should a public hearing be requested concerning amendment of an operating license to permit production irradiation of lithium burnable poison targets to produce tritium, the Commission will be notified if the staff intends to issue the amendment upon a finding of "no significant hazards consideration" prior to conclusion of any hearing that may be required.

COORDINATION:

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

RECOMMENDATION:

That the Commission approve the staff's proposed course of action, as described above.

  
James M. Taylor  
Executive Director  
for Operations

Commissioners' comments or consent should be provided directly to SECY by c.o.b. Monday, October 21, 1996. Commission staff office comments, if any, should be submitted to the Commissioners NLT October 11, 1996, with an information copy to SECY. If the paper is of such a nature that it requires additional review and comment, the Commissioners and the Secretariat should be apprised of when comments may be expected.

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