

July 21, 1997

SECY-97-155

FOR: The Commissioners

FROM: L. Joseph Callan /s/
Executive Director for Operations

SUBJECT: STAFF'S ACTION REGARDING EXEMPTIONS FROM 10
CFR 70.24 FOR COMMERCIAL NUCLEAR POWER PLANTS

PURPOSE:

To inform the Commission of the action staff is taking associated with exemptions from 10 CFR 70.24 for commercial nuclear power plants.

BACKGROUND:

The Commission's regulations in 10 CFR 70.24 require that each licensee authorized to possess more than a small amount of special nuclear material (SNM) maintain in each area in which such material is handled, used, or stored a criticality monitoring system "using gamma- or neutron-sensitive radiation detectors [minimum of two detectors] which will energize clearly audible alarm signals if accidental criticality occurs." The regulation also specifies sensitivity requirements for these monitors and details the training that licensees must conduct in connection with criticality monitor alarms. The purpose of 10 CFR 70.24 is to ensure that, if a criticality were to occur during the handling of SNM, personnel would be alerted to that fact and would take appropriate action.

Most nuclear power plant licensees were granted exemptions from 10 CFR 70.24 during the construction of their plants as part of the Part 70 license issued to permit the receipt of the initial core. Generally, these exemptions were not explicitly renewed when the Part 50 operating license, which now contained the combined Part 50 and Part 70 authority, was issued.

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NOTE: ENFORCEMENT
TO NRC UNLESS THE
DETERMINES

In August 1981, the Tennessee Valley Authority (TVA), in the course of reviewing the operating licenses for its Browns Ferry facilities, noted that the exemption to 10 CFR 70.24 that had been granted during the construction phase had not been explicitly granted in the operating license. By letters dated August 11, 1981, and August 31, 1987, TVA requested an exemption from 10 CFR 70.24. On May 11, 1988, NRC informed TVA that "the previously issued exemptions are still in effect even though the specific provisions of the Part 70 licenses were not incorporated into the Part 50 license." Recently, the Office of the General Counsel (OGC) determined that, in cases where a licensee received the exemption as part of the Part 70 license issued during the construction phase, both the Part 70 and Part 50 licenses should be examined to determine the status of the exemption. OGC's view is that, where the licenses and SERs are silent, an exemption expires with the expiration of the Part 70 license.

As part of NRC's effort to achieve regulatory improvement in granting exemptions to regulations (SECY-96-147, dated July 1, 1996), the Office of Nuclear Reactor Regulation (NRR) conducted a survey, in the summer of 1996, to determine licensee compliance with 10 CFR 70.24. Project managers reviewed the licenses for their assigned plants and contacted the licensees to determine if licensees satisfied the requirements of 10 CFR 70.24 or if an exemption to the requirements of the regulation had been granted. This survey indicated that 38 plants are in compliance, 6 plants are working on coming into compliance, 29 plants have exemptions, and 37 plants do not yet have exemptions; of these 37, 30 had already submitted exemption requests for staff review. Of the 29 plants that have exemptions, 13 received their exemption upon issuance of their operating license and 16 as the result of an exemption request.

DISCUSSION

At a commercial nuclear power plant, there are only three locations where amounts of SNM sufficient to cause a criticality may be found: the reactor core, the fresh fuel storage area, and the spent fuel pool. SNM other than fuel, such as in fission chamber neutron detectors and in neutron sources, may also be

found in some laboratory and storage locations of these plants, but an inadvertent criticality is not considered credible in these areas due to the amount and configuration of the SNM. The SNM that could be assembled into a critical mass at a commercial nuclear power plant is in the form of nuclear fuel. This fuel is not enriched beyond 5.0 weight percent (wt %) uranium-235 (U-235) and commercial nuclear plant licensees have procedures and design features that prevent inadvertent criticality. The inadvertent criticality with which 10 CFR 70.24 is concerned could only occur during fuel-handling operations.

The staff concludes that, when one considers the administrative and design controls established and maintained at nuclear power plants, the criticality monitoring requirement of 10 CFR 70.24 is not necessary. At power reactor facilities with uranium fuel enriched to no greater than 5 wt% U-235, the SNM in the fuel assemblies cannot go critical without both a critical configuration and the presence of a moderator. The SNM in the reactor core is intended to become critical and need not be subjected to the provisions of 10 CFR 70.24. The fresh fuel storage array and the spent fuel pool are designed and analyzed to prevent inadvertent criticality, even in the presence of an optimal density of unborated moderator. Inadvertent criticality during fuel handling is precluded by limitations on the number of fuel assemblies permitted out of storage at the same time. In addition, General Design Criterion (GDC) 62 in Appendix A to 10 CFR Part 50 reinforces prevention of criticality in fuel storage and handling. Fuel handling at power reactor facilities occurs only under strict procedural control and supervision, including the use of certified fuel handlers.

In contrast, at fuel fabrication facilities, any number of these fuel assemblies may be moved many times each day. Fuel fabrication facilities handle SNM in various configurations. Although handling of this material is controlled by procedures, the variety of forms of SNM and the frequency with which it is handled increase the possibility of an inadvertent criticality.

In conclusion, fuel fabrication facilities are significantly different from reactor facilities in their handling of SNM. The staff considers a fuel-handling accidental criticality at a commercial nuclear power plant to be extremely unlikely due to administrative and design controls. Therefore, imposition of the 10 CFR 70.24 criticality monitoring requirement on licensees of operating reactors is not necessary as long as design and administrative controls are maintained.

PLANNED ACTION:

In accordance with the analysis set forth above, the staff has developed seven criteria (attached) to review exemption requests. Generally, these are the criteria that have been used in the past in processing exemptions to 10 CFR 70.24. The staff believes that most of the plants meet these criteria. However,

if a facility does not meet any one of the criteria, the staff will request the licensee to justify deviations from any criteria that cannot be met.

In an effort to gain efficiencies and to expedite staff review of the 30 in-house exemption requests, the staff is planning to ask licensees to voluntarily supplement their exemption requests with a response that verifies that their facility meets the criteria. A similar approach will be taken with the licensees of seven operating plants that do not meet the requirements of 10 CFR 70.24 and have not yet requested exemption from the requirements of that section.

Licensees seeking an exemption from the requirements of 10 CFR 70.24 but have not yet submitted exemption requests will be asked to submit these requests within 60 days, together with statements either confirming their compliance with the staff's criteria or explaining their justification for any deviations.

RULEMAKING ACTION:

NRR and NMSS staff, with assistance from the Office of Nuclear Regulatory Research, are developing a rulemaking plan for modifying 10 CFR 70.24 to address the long-term issue of recurring exemptions to the regulation. This plan will be submitted to the Commission under separate cover by the end of August 1997.

ENFORCEMENT HISTORY:

The staff has issued approximately 20 Notices of Violation for failures by reactor licensees to meet the provisions of 10 CFR 70.24. These violations have been categorized as Severity Level IV violations and Non-Cited Violations. The staff has reconsidered these actions and concluded in light of the issues discussed in this paper that, although violations did occur, it is appropriate to exercise enforcement discretion generally in keeping with Section VII B.6 of the Enforcement Policy. The bases for exercising this discretion are the lack of safety significance of the failure to meet 10 CFR 70.24, provided controls are in place to ensure compliance with GDC 62; the failure of the NRC staff to recognize the need for an exemption during the licensing process; the NRC public position on this

matter, as reflected in its letter of May 11, 1988, to TVA concerning the lack of a need for an exemption at Browns Ferry; and the position underlying the staff's intent to embark on rulemaking to amend 10 CFR 70.24 to provide for administrative controls in lieu of criticality monitors. Therefore, the staff intends to withdraw the issued violations. The staff does not intend to take further enforcement action for failure to meet 10 CFR 70.24 provided the licensee obtains an exemption to this regulation before the next receipt of fresh fuel or before the next planned movement of fresh fuel.

CONCLUSION:

The staff intends to take the actions noted ten days from the date of this paper.

COORDINATION:

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

RESOURCES:

The paper provides the staff's action related to 70.24 exemptions and does not involve changes in resource requirements.

INFORMATION TECHNOLOGY:

No new anticipated impacts on information management or information technology are anticipated as a result of implementing the actions discussed in this paper.

GENERIC REQUIREMENTS:

The Committee to Review Generic Requirements was not requested to review this paper, since the planned staff action does not introduce a generic requirement.

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Attachment: Criteria for evaluating 70.24 Exemption Requests

CRITERIA FOR EVALUATING 70.24 EXEMPTION REQUESTS

1. Plant procedures do not permit more than one pressurized-water reactor or three boiling-water reactor fuel assemblies to be out of an approved storage configuration at one time.
2. The k-effective of the fresh fuel storage racks filled with fuel of the maximum permissible U-235 enrichment and flooded with pure water does not exceed 0.95, at a 95 percent probability, 95 percent confidence level.
3. If optimum moderation of fuel in the fresh fuel storage racks occurs when the fresh fuel storage racks are filled with low-density hydrogenous fluid, the k-effective corresponding to this optimum moderation does not exceed 0.98, at a 95 percent probability, 95 percent confidence level.
4. The k-effective of spent fuel storage racks filled with fuel of the maximum permissible U-235 enrichment and flooded with pure water does not exceed 0.95, at a 95-percent probability, 95-percent confidence level.
5. The quantity of SNM other than nuclear fuel stored on site in any given area is less than the quantity necessary for a critical mass.
6. Radiation monitors, as required by GDC 63, are provided in fuel storage and handling areas to detect excessive radiation levels and to initiate appropriate safety actions.
7. The maximum nominal U-235 enrichment is 5 wt%.