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SUBJECT: Forwards request for exemption from 10CFR70.24 re  
criticality monitoring requirements.

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AEP:NRC:1156A

April 8, 1996

Docket Nos.: 50-315  
50-316

U. S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, D. C. 20555

Gentlemen:

Donald C. Cook Nuclear Plant Units 1 and 2  
REQUEST FOR EXEMPTION FROM 10CFR70.24  
CRITICALITY MONITORING REQUIREMENTS

Pursuant to the requirements of 10CFR50.12, 10CFR70.14(a), 10CFR70.24(d), and the guidance contained in NRC Regulatory Guide 8.12, we hereby request an exemption from the requirements of 10CFR70.24. 10CFR70.24 requires, in part, a criticality alarm system in each area in which special nuclear material is handled, used or stored, and the performance of drills to familiarize personnel with the evacuation plan. The attachment to this letter contains the exemption request with an evaluation that justifies the exemption. This requested exemption is similar to the one previously granted within Donald C. Cook Nuclear Plant Unit 2 Special Nuclear Material License (SNM-1753).

Sincerely, .

*for W. E. Smith*  
E. E. Fitzpatrick  
Vice President

eh

Attachment

. cc: A. A. Blind  
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NFEM Section Chief  
NRC Resident Inspector - Bridgman  
J. R. Padgett

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ATTACHMENT TO AEP:NRC:1156A

DONALD C. COOK NUCLEAR PLANT UNITS 1 AND 2

REQUEST FOR EXEMPTION TO 10CFR70.24

## EXEMPTION REQUEST

### I. BACKGROUND

This proposed exemption request applies to 10CFR70.24. 10CFR70.24(a) states the requirements for a monitoring system that will energize clearly audible alarms if accidental criticality occurs in each area in which special nuclear material (SNM) is handled, used or stored. Also, 10CFR70.24(a) requires that emergency procedures be maintained for each area in which licensed SNM is handled, used, or stored to ensure that all personnel withdraw to an area of safety upon the sounding of the alarm. These procedures must include the conduct of drills to familiarize personnel with the evacuation plan, designation of responsible individuals for determining the cause of the alarm, and placement of radiation survey instruments in accessible locations for use in such an emergency.

This exemption would be similar to one previously granted within Cook Nuclear Plant's Special Nuclear Material License No. SNM-1753, which was issued on August 18, 1977. This exemption was not explicitly included with the issuance of the operating license for Cook Nuclear Plant Unit 2.

### II. JUSTIFICATION FOR GRANTING THE EXEMPTION REQUESTS

The specific requirements for granting exemptions from Part 70 regulations are set forth in 10CFR70.24(d) and 10CFR70.14(a). Section 70.24(d) anticipates that licensees may need relief from the requirements of 10CFR70.24(a) and allows licensees to apply for an exemption from 10CFR70.24, in whole or in part, if "good cause" is shown. Cook Nuclear Plant believes that good cause exists based on the positions presented below in the context of the requirements of 10CFR70.14(a).

Under Section 70.14(a), the Commission is authorized to grant an exemption upon a demonstration that the exemption: (A) is authorized by law; (B) will not endanger life or property or the common defense and security; and (C) is in the public interest. The following justifications address each of these requirements and demonstrate that the Commission should grant the requested exemption.

#### A. The Exemption Is Authorized By Law

The Commission's authority to grant requests for exemptions from its regulations has existed since 1956. The particular authority to grant exemptions from the requirements of Part 70 was codified in 10CFR70.14 in 1972. See 37 Federal

Register 5745, 5749 (March 21, 1972). Therefore, exemption requests are explicitly authorized under NRC regulations.

B. The Exemption Will Not Endanger Life Or Property Or The Common Defense And Security.

An exemption request will not endanger life or property or the common defense and security if it can be shown that the request meets the statutory standard of adequate protection to the health and safety of the public. Furthermore, to ensure the common defense and security are not endangered, the exemption request must demonstrate that the loss or diversion of SNM is precluded. In light of these standards, we describe below how the use, storage, and handling of SNM at Cook Nuclear Plant provides adequate protection to the health and safety of the public, and precludes against loss or diversion of SNM. In particular, we focus on the following points: design, characteristics, and existing accident analyses.

1. Use of SNM

SNM is present principally in the form of nuclear fuel. However, other quantities of SNM are used (and stored) at Cook Nuclear Plant in the form of fissile material incorporated into primarily fission chamber detectors and movable miniature neutron flux detectors. The small quantity of SNM present in these detectors, and the form in which the SNM is used and stored precludes an inadvertent criticality. The facilities are exempt from Section 70.24(b) for SNM "used or to be used in the reactor" pursuant to Section 70.24(c). Thus, the focus of the exemption request is directed only toward the requirements of 70.24(a).

Inadvertent or accidental criticality in the reactor vessel is precluded through compliance with the facility technical specifications, including reactivity requirements (e.g., shutdown margins, limits on control rod movement), instrumentation requirements (e.g., power and radiation monitors), and controls on refueling operations (e.g., refueling boron concentration and source range monitor requirements). In addition, the operators' continuous attention directed toward instruments monitoring behavior of the nuclear fuel in the reactor assures that the facility is operated in such a manner as to preclude inadvertent criticality. Finally, since access to the fuel in the reactor vessel is not physically possible while in use and is procedurally controlled during refueling (see

Section II.B.3 below), there are no concerns associated with loss or diversion of the fuel.

Therefore, the requirements of Section 70.24(a) are not necessary for SNM in the form of nuclear fuel while used in the reactor vessel, and thus, granting this exemption will not endanger life or property or the common defense and security.

2. Storage of SNM

SNM, as nuclear fuel, is stored in either the spent fuel pool or the new fuel vault. The spent fuel pool is used to store irradiated fuel under water after its discharge from the reactor and new fuel prior to loading into the reactor.

The spent fuel pool is designed to store the fuel in a geometric array that precludes criticality. In addition, existing technical specification limits on the effective neutron multiplication factor,  $k_{eff}$ , are maintained less than or equal to 0.95.

The new fuel vault may be used to receive and store new fuel in a dry condition upon arrival on site and prior to loading in the reactor or spent fuel pool. The acceptance criteria for criticality requires  $k_{eff}$  to be less than or equal to 0.95, including uncertainties, under full water density flooded conditions and less than or equal to 0.98 under optimum moderation conditions. Analyses conforming to NRC Standard Review Plan Section 9.1.1, "New Fuel Storage," have shown that the Cook Nuclear Plant fresh fuel storage racks will meet the above acceptance criteria. A copy of these analyses was submitted to the NRC on December 8, 1989, as submission AEP:NRC:1071F. The technical specification changes that were submitted based on these analyses were approved in Amendments 136 and 121 to the licenses for Units 1 and 2, respectively, in a letter dated May 17, 1990.

On February 26, 1996, additional analyses were forwarded to you as submission AEP:NRC:1071U. These new analyses were performed to support an increase in the Technical Specification 5.6.2 limit on nominal fuel assembly enrichment for new, Westinghouse-fabricated fuel stored in the new fuel storage racks. The current nominal limit for Westinghouse fuel is 4.55 weight percent (w/o) uranium-235 isotope (U-235). The proposed nominal limit is 4.95 w/o U-235, provided that

the fuel assembly contains sufficient zirconium diboride integral fuel burnable absorber (IFBA) material to maintain the maximum reference fuel assembly  $K_{\infty}$  less than or equal to 1.4857 at 68°F. Approval for this submission has not yet been received.

Furthermore, it should be noted that an accidental criticality monitoring system does not ensure against the loss or diversion of SNM material; consequently, the absence of such a system does not affect the capability of Cook Nuclear Plant to ensure SNM is safeguarded.

Therefore, the requirements of Section 70.24 are not necessary for the SNM stored in the new fuel vault or spent fuel pool, and thus, granting this exemption will not endanger life or property or the common defense and security.

3. Handling of SNM

Both irradiated and unirradiated fuel is moved between the new fuel vault, the reactor vessel, and the spent fuel pool to accommodate refueling operations. In addition, fuel is moved into the facility and within the reactor vessel or within the spent fuel pool. In all cases, fuel movements are procedurally controlled and designed to preclude conditions involving criticality concerns. In addition, the technical specifications specifically address the refueling operations and limit the handling of fuel to ensure against an accidental criticality. The technical specifications also preclude certain movements over the spent fuel pool and provide for minimum boron requirements in the spent fuel pool to prevent an inadvertant criticality.

Moreover, previous accident analyses have demonstrated that a fuel handling accident (i.e., a dropped fuel element) will not create conditions which exceed acceptance criteria. The analysis uses the ANSI N16.1 double contingency principle that one is not required to assume two unlikely, independent, concurrent events to ensure protection against a criticality accident. If a fuel assembly is dropped in the spent fuel pool, the boron concentrations required by Cook Nuclear Plant Technical Specifications will limit the resulting  $K_{\text{eff}}$  to less than 0.95.





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While movement of nuclear fuel presents a potential opportunity for its loss or diversion, the existing procedural controls also ensure SNM handling is authorized and monitored. Similarly, the absence of an accidental criticality monitoring system does not affect the capability of Cook Nuclear Plant to ensure SNM is safeguarded.

Therefore, the requirements of Section 70.24 are not necessary for the handling of SNM, and thus, granting this exemption will not endanger life or property or the common defense and security.

C. The Exemption Requests Are In The Public Interest

The guidance provided in Section C.1 of Regulatory Guide 8.12, "Criticality Accident Alarm Systems," Rev. 2 (October 1988) states:

"Section 70.24 of 10CFR Part 70 requires alarm coverage in each area 'in which such licensed special nuclear material is handled, used or stored . . .,' whereas paragraph 4.2.1 of the standard states that the need for criticality alarms must be evaluated for such areas. If such an evaluation does not determine that a potential for criticality exists, as for example where the quantities or form of special nuclear material make criticality practically impossible or where geometric spacing is used to preclude criticality, such as in some storage spaces for unirradiated nuclear plant fuel, it is appropriate to request an exemption from 70.24." [Emphasis added.]

This language implies that where a licensee determines that design and/or procedural safeguards ensure against conditions of accidental criticality, compliance with Section 70.24(a) would not serve the underlying purpose of the regulation.

As discussed above in Section II.B, the design of and safety analyses for the spent fuel pool and new fuel vault, as well as the associated procedural control and technical specification requirements, ensure that conditions of accidental criticality are precluded. Therefore, the application of Section 70.24 to Cook Nuclear Plant facilities would not serve and is not necessary to achieve the underlying purpose of this requirement.

The continued maintenance of a criticality accident monitoring system would require a considerable expenditure of resources. These expenses would include the operation and maintenance of the system for the life of Cook Nuclear Plant, as well as the planning and conducting of drills specifically designed to respond to a criticality accident that has been shown by analysis not to be credible. In light of the purpose of an accidental criticality monitoring system, these expenditures could otherwise be put to better use improving the operation of Cook Nuclear Plant. Therefore, Cook Nuclear Plant concludes that compliance with Section 70.24 would result in an undue hardship and other costs that are significantly in excess of those likely contemplated when this regulation was adopted.

It is our understanding that exemptions from the requirements of Section 70.24(a) have previously been granted to Part 50 licensees. As an example, the Haddam Neck Plant and the Millstone Nuclear Power Station were granted an exemption from Section 70.24(a). The approval for the exemption was published in the Federal Register on October 29, 1991 (see 56CFR209 page 55695). Therefore, we conclude that since Cook Nuclear Plant is similar to other facilities granted such an exemption, compliance with Section 70.24(a) would create an undue hardship and other costs significantly in excess of those incurred by others similarly situated.

Continued monitoring based on the guidance in 10CFR70.24 is unnecessary because of the lack of a credible accident that would produce a criticality. The burden of criticality monitoring for new and spent fuel limits Cook Nuclear Plant resources that could be better used to augment the safe operation of the plant in other areas. Consequently, the exemption request is in the public interest and should be granted pursuant to Section 70.14(a).

### III. CONCLUSION

Because an exemption from the requirements of 10CFR70.24 for Cook Nuclear Plant is authorized by law, will not endanger life or property or the common defense and security, is in the public interest, and is requested for good cause, we respectfully submit that, in accordance with the requirements of 10CFR70.14(a) and 70.24(d), the NRC should grant the requested exemption.

