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ENVIRONMENT

RULEMAKING ISSUE

September 26, 2001

(NEGATIVE CONSENT)

SECY-01-0178

FOR: The Commissioners

FROM: William D. Travers
Executive Director for Operations

SUBJECT: MODIFIED RULEMAKING PLAN: 10 CFR Part 72 -- "GEOLOGICAL AND SEISMOLOGICAL CHARACTERISTICS FOR SITING AND DESIGN OF DRY CASK INDEPENDENT SPENT FUEL STORAGE INSTALLATIONS"

PURPOSE:

To request, by negative consent, Commission approval of the attached Modified Rulemaking Plan for amending certain sections in 10 CFR Part 72 dealing with seismic siting and design criteria for dry cask independent spent fuel storage installations (ISFSIs). The staff proposes modifications to the approved Rulemaking Plan, SECY-98-126, "Rulemaking Plan: Geological and Seismological Characteristics for the Siting and Design of Dry Cask Independent Spent Fuel Storage Installations, 10 CFR Part 72."

SUMMARY:

The Commission is amending certain sections in 10 CFR Part 72 dealing with seismic siting and design criteria for dry cask independent spent fuel storage installations (ISFSIs). The staff proposes modifications to the approved Rulemaking Plan, SECY-98-126, "Rulemaking Plan: Geological and Seismological Characteristics for the Siting and Design of Dry Cask Independent Spent Fuel Storage Installations, 10 CFR Part 72."

The Rulemaking Plan in SECY-98-126 provided three options. Option 3, recommended by the staff and approved by the Commission in its SRM to SECY-98-126, adopted the Probabilistic Seismic Hazard Analysis (PSHA) and also provided an option to use the risk-informed graded approach to seismic design for ISFSI SSCs. An additional change was recommended in SECY-98-126 to require that the design of cask storage pads and areas account for dynamic loads in addition to static loads for general licensees.

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State's
Exhibit 128

NRC-01731

SECY-02

Template = SECY-028

**MODIFIED RULEMAKING PLAN
GEOLOGICAL AND SEISMOLOGICAL CHARACTERISTICS
FOR THE SITING AND DESIGN OF DRY CASK ISFSIs
10 CFR PART 72**

REGULATORY PROBLEM

In 1980, the Commission added 10 CFR Part 72 to its regulations to establish licensing requirements for the storage of spent fuel in an independent spent fuel storage installation (ISFSI), (45 FR 74693). Subpart E of Part 72 contains siting evaluation factors that must be investigated and assessed with respect to the siting of an ISFSI, including a requirement for evaluation of geological and seismological characteristics. The original provision (10 CFR 72.66) (45 FR 74708) distinguished between massive water basin and air-cooled canyon types of ISFSI structures and other types of ISFSI designs. For the former, section 72.66 (now section 72.102) required seismic evaluations equivalent to those required for nuclear power plants (NPPs) when the ISFSI was located west of the Rocky Mountain Front (approximately 104° west longitude) or in areas of known potential seismic activity. At that time, ISFSIs were largely envisioned to be spent fuel pools or single, massive dry storage structures. A seismic design requirement, equivalent to the requirements for an NPP (Appendix A of 10 CFR Part 100) seemed appropriate for these types of facilities, given the potential accident scenarios. For other types of ISFSI designs, the regulation required a site-specific investigation to establish site suitability commensurate with the specific requirements of the proposed ISFSI. The Commission explained that "[f]or ISFSI's which do not involve massive structures, such as dry storage casks and canisters, the required design earthquake will be determined on a case-by-case basis until more experience is gained with the licensing of these types of units." [45 FR 74697 (1980)]. The NRC staff believed that a major seismic event at an ISFSI storing spent fuel in dry casks or canisters would most likely have minor radiological consequences compared with a major seismic event at an NPP, spent fuel pool, or single massive storage structure.

Part 72 was amended in 1988 to include the U.S. DOE Monitored Retrievable Storage Installation (MRS), (53 FR 31651). The 1988 amendment also relocated the provision governing evaluation of geological and seismological characteristics to section 72.102. It also eliminated the distinction formerly made between criteria for massive water basin and air-cooled canyon types of ISFSI structures and other types of ISFSI designs such that the criteria designed for massive structures now applied to all ISFSI and MRS facilities. Thus, section 72.102 requires that, for any site located west of the Rocky Mountain Front or in any areas of known potential seismic activity, seismicity be evaluated by the techniques of Appendix A of Part 100 and that, for sites evaluated under the Appendix A criteria, the design earthquake be equivalent to the safe shutdown earthquake (SSE) for an NPP. For sites located east of the Rocky Mountain Front and not in areas of known seismic activity, the Appendix A criteria may be used to determine a site-specific design earthquake or, alternatively, a standardized design earthquake described by an appropriate response spectrum anchored at a peak ground acceleration of 0.25 g may be used.

The procedures in Appendix A of Part 100 for determining the design basis vibratory ground motion at a site require the use of "deterministic" approaches in the development of a single set

surrounding the fuel assemblies would confine these nuclides. Therefore, the radiological risk associated with an ISFSI facility is significantly less than the risk associated with an NPP and the use of a lower design earthquake ground motion is justified.

The Commission indicated in the Statement of Considerations accompanying the initial Part 72 rulemaking that "[f]or ISFSI's which do not involve massive structures, such as dry storage casks and canisters, the required design earthquake will be determined on a case-by-case basis until more experience is gained with the licensing of these types of units." [45 FR 74697 (1980)]. With more than 10 years of experience licensing dry cask storage systems, together with analyses demonstrating their robust behavior in accident scenarios involving earthquakes, the NRC staff concludes that designing ISFSI SSCs using a single-level design earthquake with a ground motion that is commensurate with the level of risk associated with an ISFSI, is sufficient to provide reasonable assurance in demonstrating public health and safety.

The rationale for the proposed mean annual probability of exceedance of $5.0E-04$ (return period of 2,000 years) for a design earthquake is based on several points:

- Use of a mean annual probability of exceedance of $5.0E-04$ (return period of 2,000 years) for the design earthquake is consistent with the Commission's approval of DOE's request for an exemption from section 72.102(f)(1) for a proposed ISFSI at the INEEL to store spent fuel generated at the Three Mile Island Unit-2 nuclear power plant. Section 72.102(f)(1) requires that for sites that have been evaluated under the criteria of Appendix A of Part 100, the design earthquake must be equivalent to the SSE for an NPP. In its evaluation of the request, NRC staff considered the relative risk posed by the ISFSI. The staff concluded that considering the minor radiological consequences expected from a cask failure resulting from a seismic event, and the lack of a credible mechanism to cause such a failure, the NRC staff believes that the design earthquake using a mean annual probability of exceedance of $5.0E-04$ for dry storage facilities at INEEL would be conservative.
- The total probability of exceedance for a design earthquake at an ISFSI facility with an operational period of 20 years ($20 \text{ years} \times 5.0E-04 = 1.0E-02$) is the same as the total probability of exceedance for an earthquake event at the proposed pre-closure facility at Yucca Mountain with an operational period of 100 years ($100 \text{ years} \times 1.0E-04 = 1.0E-02$).
- Because SSCs important to safety in an ISFSI are few, relative to those found in an NPP, the use of a graded approach for classifying ISFSI SSCs into one of two different categories for earthquake designs would unnecessarily increase the complexity in applications, without a commensurate improvement to safety. The SSCs important to safety in an ISFSI are associated with the storage cask, and include the canister, the canister handling systems, concrete pad supporting the cask, the transfer building supporting the handling systems, and the transfer cask. Since these SSCs are needed to be functional to prevent the dose limit of 5 rem being exceeded at the controlled area boundary, they would be required to be designed for a Category 2 design basis earthquake. Other SSCs important to safety may include the pressure monitoring system, protective cover, security lock and wire, etc. and can be designed for a lower Category 1 earthquake. However, it would be simpler to design all SSCs for a bounding Category 2 earthquake.

NUCLEAR REGULATORY COMMISSION

License No. _____ PF 5 ORD 128

In the matter of _____

Staff _____ IDENTIFIED _____ ✓

Applicant _____ RECEIVED _____ ✓

Intervenor _____ ✓ REJECTED _____

Other _____ WITHDRAWN _____

DATE 5-17-02 Witness _____

Clerk D. Kent