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PETITIONABLE PRM 71-11
(59 FR 8143)

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[7590-01-P]

NUCLEAR REGULATORY COMMISSION

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10 CFR Part 71

[Docket No. PRM-71-11]

U.S. Department of Energy, Receipt of
a Petition for Rulemaking

AGENCY: Nuclear Regulatory Commission.

ACTION: Petition for rulemaking; Notice of receipt.

SUMMARY: The Nuclear Regulatory Commission (NRC) has received and requests public comment on a petition for rulemaking filed by the U.S. Department of Energy (DOE). The petition has been docketed by the Commission and has been assigned Docket No. PRM-71-11. The petitioner requests that the NRC amend its regulations governing packaging and transportation of radioactive materials to specifically exempt canisters containing vitrified high-level waste from the double containment requirement specified in NRC's regulations. The petitioner believes such an amendment would permit more cost-effective high-level radioactive waste management by DOE in the geologic repository and would not adversely affect the safety of the transportation package.

DATE: Submit comments by (75 days ^{5/4/94} following publication in the Federal Register). Comments received after this date will be considered if it is practical to do so, but assurance of consideration cannot be given except as to comments received on or before this date.

ADDRESSES: Submit comments to: Secretary, U.S. Nuclear Regulatory Commission, Washington, DC 20555. Attention: Docketing and Service Branch.

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Deliver comments to 11555 Rockville Pike, Rockville, Maryland, between 7:45 am and 4:15 pm on Federal workdays.

For a copy of the petition, write: Rules Review Section, Rules Review and Directives Branch, Division of Freedom of Information and Publications Services, Office of Administration, U.S. Nuclear Regulatory Commission, Washington, DC 20555.

FOR FURTHER INFORMATION CONTACT: Michael T. Lesar, Office of Administration, U.S. Nuclear Regulatory Commission, Washington, DC 20555. Telephone: 301-492-7758 or Toll Free: 800-368-5642.

SUPPLEMENTARY INFORMATION:

Background

The Nuclear Regulatory Commission (NRC) received a petition for rulemaking dated November 30, 1993, submitted by the U.S. Department of Energy (DOE). The petition was docketed as PRM-71-11 on December 6, 1993. The petitioner requests that the NRC amend its regulations specified in 10 CFR Part 71 that govern packaging and transport of radioactive materials. Specifically, the petitioner is seeking a specific exemption for canisters containing vitrified high-level waste (HLW) from the requirements currently contained in 10 CFR 71.63(b) regarding special requirements for plutonium shipments. The petitioner notes that current NRC special requirements for plutonium shipments (10 CFR 71.63) specify that all shipments of plutonium with an activity greater than 20 curies per package must meet the double containment requirement in 10 CFR 71.63(b).

Under the Nuclear Waste Policy Act of 1982 (NWPA), as amended, DOE is responsible for developing a geologic repository for the disposal of high-level radioactive waste and spent fuel. Shipments of HLW must be approved for shipment through DOE's Civilian Radioactive Waste Management System (CRWMS) for transport to and disposal in the geologic repository. Also, under the NWPA, all packages used to transport spent fuel and HLW must be certified by NRC. On June 17, 1974 (39 FR 20960), the NRC published a final rule requiring that shipments of plutonium with activity greater than 20 curies per package meet the double containment requirement of 10 CFR 71.63(b).

The petitioner admits that 10 CFR 71.63(b) applies to the shipments of vitrified HLW. However, the petitioner also claims that these shipments should be exempt from the double containment requirement because this material is analogous to spent fuel. As the petitioner notes, the preamble to the final rule states that spent fuel is exempt from the double containment requirement specified in 10 CFR 71.63(b) because these solid forms of plutonium were determined to be "essentially nonrespirable." The petitioner also indicates that the evaluation of the respirability potential of canisters filled with vitrified HLW is based mainly on the results of impact tests.

In support of the petition for rulemaking, the petitioner has included a document entitled "Technical Justification to Support the PRM by the DOE to Exempt HLW Canisters from 10 CFR 71.63(b)" (technical justification). The petitioner claims that

the tests described in the technical justification demonstrate that the canisters containing vitrified HLW compare favorably with the physical integrity of the metal cladding surrounding the spent fuel pellets in reactor assemblies. The petitioner believes that because canisters containing vitrified HLW are analogous to spent fuel, these canisters should be exempt from the double containment requirement specified in 10 CFR 71.63(b).

The NRC is soliciting public comment on the petition submitted by DOE that requests the changes to the regulations in 10 CFR Part 71 as discussed below.

The Petitioner

Pursuant to the Nuclear Waste Policy Act of 1982, as amended (NWPA), the petitioner is the Federal agency responsible for developing and administering a geologic repository for the deep disposal of high-level radioactive waste and spent fuel. The petitioner proposes to ship the HLW from each of its three storage locations at Aiken, South Carolina; Hanford, Washington; and West Valley, New York, directly to the geologic repository in casks certified by the NRC. The HLW currently exists mostly in the form of liquid and sludge resulting from the reprocessing of defense reactor fuels. The petitioner proposes to solidify (vitrify) this material into a borosilicate glass form in which the HLW is dispersed and immobilized and place it into stainless steel canisters for storage and transport to the geologic repository. The petitioner indicates that it is submitting this petition for rulemaking to amend 10 CFR Part 71 so that it can

manage the transportation and disposal of high-level waste in a cost-effective and efficient manner without adversely affecting the safety of the transportation package.

Discussion of the Petition

The petitioner has submitted this petition for rulemaking because it believes it will be adversely affected by the current regulations that require plutonium shipments with activity greater than 20 curies per package to be shipped in a double containment format. The petitioner's primary concern is that the double containment requirement specified in 10 CFR 71.63(b) will prevent it from effectively performing its responsibility under the NWPA to administer the transportation of canisters containing vitrified high-level radioactive waste for disposal in the geologic repository in an efficient and cost-effective manner.

The petitioner states that although the current regulations are appropriate in exempting reactor fuel elements from the double containment requirement specified in 10 CFR 71.63(b), canisters containing vitrified HLW should also be exempted. The petitioner states that spent fuel was exempted from the double containment requirement in 10 CFR 71.63(b) because the fuel pellet itself and the surrounding metal cladding were found to provide adequate protection against the possible dispersion of plutonium particles both under normal transport conditions and during hypothetical accident conditions. The petitioner believes that the tests described in the technical justification provide sufficient technical information to indicate that the

borosilicate glass mixture and the storage canisters are analogous to spent fuel that is exempt from the double containment requirement.

In the technical justification, the petitioner describes the physical characteristics of the austenitic stainless steel canisters that will house the vitrified HLW and indicates that the packages will pass a 7-meter drop test onto a flat, essentially unyielding surface without a release of its contents. The petitioner emphasized that this test should not be confused with the hypothetical accident tests specified in 10 CFR 71.73, "Hypothetical Accident Conditions." The petitioner also clarifies that the 9-meter drop test required in 10 CFR 71.73(c)(1) applies to the entire package, including the cask which must be certified by the NRC used to transport the canisters containing the vitrified HLW.

The petitioner provides a detailed comparison in the technical justification between the steel canister that will house vitrified HLW and the reactor fuel elements that are exempt from the double containment requirement in 10 CFR 71.63(b). The petitioner notes that the plutonium contained in reactor fuel elements is encased in solid ceramic fuel pellets surrounded by a sealed, sturdy metal cladding that inhibits dispersion of radioactive particles. The petitioner believes the impact tests performed during the past 20 years on canisters containing simulated HLW glass forms indicate that these canisters qualify for exemption from the double containment requirement.

Helium leak tests and dye penetrant tests performed after the impact testing have demonstrated that the vitrified HLW canisters can withstand a 9-meter drop test. The petitioner acknowledges that reactor fuel elements were exempted from the double containment requirement in 10 CFR 71.63(b) because they are considered to be "essentially nonrespirable." The petitioner believes that because the canisters have not been exposed to the high levels of radiation present in a commercial reactor, these packages will not be subject to molecular-level changes in material properties, such as increased embrittlement, unlike spent reactor fuel cladding. The petitioner concludes that the numerous impact and followup tests on simulated vitrified HLW canisters indicate that the canisters provide, at minimum, protection comparable to that provided by spent fuel cladding.

In the technical justification, the petitioner also compares the physical and chemical characteristics of the vitrified HLW glass mixture to spent fuel pellets. The petitioner notes that production of potentially respirable particles from the glass mixture could result from cooldown processes after being poured into the HLW canister, normal handling and transport conditions, and hypothetical accident conditions. Because impact studies of simulated waste glass from the DOE Savannah River site have shown comparable levels of fracture resistance and similar fractions of respirable particles when compared to unirradiated uranium fuel pellets and other potential waste form materials, the petitioner believes that the fracture resistance of simulated HLW glass is

comparable to that of uranium fuel pellets. The petitioner asserts that leak tests performed for both normal transport and hypothetical accident scenarios indicate that the quantity of respirable material produced is minute and fully supports the conclusion that the vitrified HLW canister waste form is "essentially nonrespirable" and, therefore, analogous to reactor fuel elements.

The petitioner also notes that evaluations show that the total concentration of plutonium in an individual fuel assembly is more than 100 times greater than that in an HLW canister from the Savannah River site. The petitioner indicates that the maximum quantity of plutonium projected for the Hanford and West Valley HLW canisters is much less than that of the Savannah River HLW canisters. The petitioner also notes that canisters containing vitrified HLW will be enclosed within a shipping cask that has been certified by NRC during actual transport conditions. The petitioner concludes that this arrangement will further reduce the potential for canister damage and for a release of respirable particles of radionuclides.

The petitioner asserts that proposed disposal criteria would result in a cost-effective option that would not adversely affect public health, environmental quality, the safety of the transportation package, or the safety of workers who handle the transportation package. The petitioner also asserts that the current regulatory limits on radioactivity in the transportation package are intended to protect not only individuals who

transport and handle the waste but also the general public if a transportation accident enroute to the geologic repository site results in a release of radioactive material.

Adverse Effects on the Petitioner

The petitioner believes that it will be adversely affected if the double containment requirement in 10 CFR 71.63(b) is applied to canisters containing vitrified HLW. The petitioner notes that the only alternative would be to design and construct a double containment transportation cask. The petitioner believes that a double containment requirement would add additional handling steps to the loading and unloading of the HLW canister, resulting in an increase of time and expense in HLW shipments. The additional handling process would increase the radiation dose received by workers and create additional contaminated metal hardware, resulting in increased disposal effort and expense. The petitioner also asserts that a double containment requirement for this HLW form would require additional shipments because of a potential decrease in payload capacity of the cask. Additional shipments would create a corresponding increase in risk to affected populations along the transportation route to the geologic repository. The petitioner believes that the double containment requirement would impose an unnecessary and unduly burdensome rule that cannot be justified in terms of any incremental benefits to public health and safety.

The Petitioner's Proposed Amendment

The petitioner requests that 10 CFR Part 71 be amended to

overcome the problems the petitioner has itemized and recommends the following revision to the regulations:

The petitioner proposes that §71.63 be amended by revising paragraph (b) to redesignate paragraph (b)(3) as paragraph (b)(4) and adding a new paragraph (b)(3) to read as follows:

§71.63. Special requirements for plutonium shipments.

* * * * *

(b) Plutonium in excess of 20 curies per package must be packaged in a separate inner container placed within outer packaging that meets the requirements of Subparts E and F for packaging of material in normal form. If the entire package is subjected to the tests specified in §71.71 (Normal Conditions of Transport), the separate inner container must not release plutonium, as demonstrated to a sensitivity of 10^{-6} A₂ per hour. If the entire package is subjected to the tests specified in §71.73 (Hypothetical Accident Conditions), the separate inner container must restrict the loss of plutonium to not more than A₂ in one week. Solid plutonium in the following forms is exempt from the requirements of this paragraph:

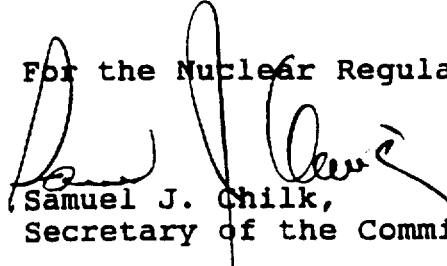
- (1) Reactor fuel elements;
- (2) Metal or metal alloy;
- (3) Canisters containing vitrified high-level waste; and
- (4) Other plutonium-bearing solids that the Commission determines should be exempt from the requirements of this section.

The Petitioner's Conclusion

The petitioner has concluded that the double containment requirement specified in 10 CFR 71.63(b) should not be applied to shipments of canisters containing vitrified HLW because this waste form is analogous to spent reactor fuel elements, which are exempt. The petitioner believes that impact and leak tests on the canisters, chemical analyses of spent fuel and simulated HLW borosilicate glass mixtures, and other studies of the levels of radioactivity present in the proposed transportation packages demonstrate that canisters containing vitrified HLW are analogous to spent reactor fuel elements and, therefore, should be exempt from the double containment requirement in 10 CFR 71.63(b). The petitioner has proposed an amendment to the current regulations in 10 CFR Part 71 that it believes will permit more cost-effective disposal of high-level waste without adversely affecting the safety of the transportation package, the workers who handle the package, affected populations along the transportation corridor, or the environment.

Dated at Rockville, Maryland, this 14th day of February ,
1994.

For the Nuclear Regulatory Commission.


Samuel J. Chilk,
Secretary of the Commission.