

**NUCLEAR REGULATORY COMMISSION****10 CFR Part 50****[Docket Nos. PRM-50-73 and PRM-50-73A]****Mr. Robert H. Leyse; Denial of Petition for Rulemaking****AGENCY:** Nuclear Regulatory Commission.**ACTION:** Denial of petition for rulemaking.

**SUMMARY:** The Nuclear Regulatory Commission (NRC) is denying two related petitions for rulemaking submitted by Mr. Robert H. Leyse (PRM-50-73 and PRM-50-73A). The petitioner requested that the NRC revise its regulations to address the effect of crud on the cooling of the reactor core under the turbulent coolant flow conditions of a loss-of-coolant-accident (LOCA), and during normal operations. Crud is a colloquial term for corrosion and wear products (rust particles, etc.) that become radioactive (*i.e.*, activated) when exposed to neutron irradiation. The petitioner states that crud buildup during normal operations and its detachment and resuspension during a LOCA could obstruct flow of coolant, resulting in inadequate cooling and ultimately leading to melting of the nuclear fuel. In addition, the petitioner requested that the NRC amend its regulations to include comparisons to applicable experimental data that address the impact of crud deposits on the ability to cool fuel rods.

**ADDRESSES:** Copies of the petitions for rulemaking, the public comments received, and the NRC's letter of denial to the petitioner may be examined, and/or copied for a fee, at the NRC's Public Document Room, located at One White Flint North, 11555 Rockville Pike, Public File Area 01 F21, Rockville, Maryland. These documents are also available electronically at the NRC's Public Electronic Reading Room on the Internet at <http://www.nrc.gov/reading-rm/adams.html>. From this site, the public can gain entry into the NRC's Agencywide Document Access and Management System (ADAMS), which provides text and image files of NRC's public documents. For further information contact the PDR reference staff at 1-800-387-4209, (301) 415-4737 or by e-mail to [pdr@nrc.gov](mailto:pdr@nrc.gov).

**FOR FURTHER INFORMATION CONTACT:**

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**SUPPLEMENTARY INFORMATION:****Background**

Section 50.46 specifies the performance criteria against which the emergency core cooling system (ECCS) must be evaluated. Appendix K to part 50 provides the required and acceptable features of ECCS evaluation models. The criteria are: (1) Peak cladding temperature that cannot be exceeded, (2) the maximum cladding oxidation thickness, (3) the maximum total hydrogen generation, (4) assurance of a core geometry that can be cooled, and (5) assurance of abundant long term cooling. The regulations also state that assessments of cooling performance following postulated LOCAs must be calculated in accordance with an acceptable evaluation model and that in applying the model, comparisons to applicable experimental data must be made.

The petitioner identified numerous elements of the specified ECCS evaluation procedures and the evaluation model that he believed need to include additional comparisons to applicable experimental data.

**The Petitions**

The petition for rulemaking designated PRM-50-73 addressing potential crud interference with coolant flow during a fast-moving (large-break) LOCA, was sent to the NRC September 4, 2001, and the notice of receipt of the petition and request for public comment was published in the **Federal Register** (FR) on October 12, 2001 (66 FR 52065). The public comment period ended on December 26, 2001. On November 5, 2001, the supplemental petition, designated PRM-50-73A, was sent by the same petitioner alleging crud interference with coolant flow during normal operations. The notice of receipt of the second petition was published on January 29, 2002 (67 FR 4214). The public comment period ended on April 15, 2002. Five letters of public comment were received on PRM-50-73 and seven letters were received on PRM-50-73A. The NRC staff determined that the two petitions should be addressed as one action.

**PRM-50-73**

The petitioner stated that § 50.46 and Appendix K to part 50 do not address the impact of crud on core cooling during a fast-moving (large-break) LOCA. The petitioner noted that a licensed power reactor had operated with heavy crud deposits on many of the fuel rods. The petitioner stated that had a fast-moving (large-break) LOCA occurred before shutdown for refueling,

extensive blockage of flow channels within the fuel bundles would have developed, leading to a degradation of core cooling and compromising defense-in-depth. The petitioner further stated that significant crud deposits could lead to an extensive fuel failure during full-power operation and that the amount of failed fuel would then lead to a decision to shut down the reactor as the inventory of radioactive material in the reactor coolant reached the limits allowed by the technical specifications.

**PRM-50-73A**

The petitioner stated that § 50.46 and Appendix K to part 50 do not address the impact of severe crud deposits on fuel bundle cooling during normal power operations. The petitioner stated that a licensed power reactor had operated with unusually heavy crud deposits which, had they been allowed to build, would likely have blocked flow channels, interfered with core cooling and led to significant damage to structural components of the core. The petitioner requested that § 50.46 and Appendix K be revised to include consideration of the impact of crud deposits on fuel bundles during normal operations.

**Public Comments on the Petitions****PRM-50-73**

The five letters of public comment received were opposed to this petition. Framatome ANP, a nuclear vendor, did not agree that crud would collect within the core as the petitioner suggested, nor that it would pose blockage problems. Framatome discussed the effects of crud for the sections of the regulations addressed by the petition, and stated that for each section, the effects of crud are adequately addressed. In Framatome's experience, typical crud formed on the surface of fuel cladding does not have the consistency to create coolant flow blockage during either normal operation or blowdown (*i.e.*, a LOCA). Framatome ANP stated that thermal transients in the cladding and movement resulting from strain might promote crud breakoff from the cladding but would produce small pieces that would be further broken down by the turbulence and velocity of the blowdown flow rates.

Exelon Nuclear, a power reactor licensee, stated that the petitioner's requested action was not necessary because 10 CFR 50.46 already requires that the cooling performance of the ECCS following postulated LOCAs meet certain acceptance criteria. Exelon stated that NRC regulatory guidance and approved ECCS evaluation models