



POLICY ISSUE **(Notation Vote)**

April 22, 2019

SECY-19-0040

FOR: The Commissioners

FROM: Margaret M. Doane
Executive Director for Operations

SUBJECT: DENIAL OF PETITION FOR RULEMAKING ON POWER REACTOR
IN-CORE MONITORING (PRM-50-111; NRC-2015-0124)

PURPOSE:

To obtain Commission approval to publish the enclosed *Federal Register* notice (FRN) (Enclosure 1) denying petition for rulemaking (PRM)-50-111, submitted to the U.S. Nuclear Regulatory Commission (NRC) by Mr. Mark Edward Leyse. This paper does not address any new commitments or resource implications.

BACKGROUND:

Mr. Mark Edward Leyse filed PRM-50-111 with the NRC on March 13, 2015 (NRC's Agencywide Documents Access and Management System (ADAMS) Accession No. ML15113B143). This petition requests that the NRC require all holders of operating licenses for nuclear power plants to install in-core temperature monitoring devices (e.g., thermoacoustic sensors or thermocouples) located at different elevations and radial positions throughout the reactor core.

The NRC assigned docket number PRM-50-111 to this petition and published a notice of docketing in the *Federal Register* (FR) on July 16, 2015 (80 FR 42067). The NRC did not request public comment on PRM-50-111 because the staff had sufficient information to review the issues raised in the petition.

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DISCUSSION:

Petitioner's Requests

The petitioner asked the NRC to require all holders of operating licenses for nuclear power plants to use in-core temperature-monitoring devices (e.g., thermoacoustic sensors or thermocouples) in the operation of the plants. These devices would be located at different elevations and radial positions throughout the reactor core to enable nuclear power plant operators to accurately measure a large range of in-core temperatures under steady-state and transient conditions.

The petitioner stated that, in the event of a severe accident, in-core temperature-monitoring devices would enable nuclear power plant operators to accurately measure in-core temperatures, providing crucial information to help them track the progression of core damage and manage the accident (e.g., indicating the correct time to transition from emergency operating procedures to implementing severe accident management guidelines).

Summary of the Petition Evaluation

The petitioner previously submitted a related petition to the NRC. On February 28, 2012, Mr. Leyse requested similar actions in a petition that the NRC docketed as PRM-50-105 (ADAMS Accession No. ML12065A215). In that petition, the petitioner's request was limited to pressurized-water reactors and the usage of core-exit thermocouples in those plants. The NRC published a notice denying PRM-50-105 on September 12, 2013 (78 FR 56174).

In PRM-50-111, the petitioner expanded on the previous request in PRM 50-105 to include boiling-water reactors and other instrument types that might be used in the measurement of in-core temperatures. Three issues were identified in PRM-50-111. A summary of the issues and the staff's corresponding evaluation is provided below.

- (1) Measurement of the temperature at various locations within the reactor core would enable nuclear power plant operators to better understand core conditions under normal and transient conditions and more clearly foresee incipient or impending damage to the reactor core.

The staff evaluated the petitioner's assertion that in-core temperature monitoring would provide more accurate information than the core exit temperature monitoring that pressurized-water reactors currently use. Mr. Leyse made a similar assertion in PRM-50-105. The staff determined that the current use of core exit temperature monitoring for these reactors is consistent with the description of its use in the denial of PRM-50-105. Existing core-exit temperature monitors provide an indication of initial core damage during accident conditions and provide the necessary indication to make operational decisions with respect to the approach to imminent core damage. The use of these existing core-exit temperature monitors is one indication in a diagnostic process to determine core damage. Other indications include reactor coolant system level and containment pressure. Based on the current use of the information from core-exit temperature monitors, the staff has determined that a more accurate measurement of temperatures throughout the core – such as that described in PRM-105-111 – would not improve operator decision-making and, therefore, would provide no safety benefit.

- (2) The use of in-core temperature-monitoring devices is needed in boiling-water reactors.

The petitioner asserted that, in the event of a severe accident in a boiling-water reactor, in-core temperature-monitoring devices would be more accurate and immediate for detecting inadequate core cooling and core uncovering than readings of the reactor water level, reactor pressure, containment pressure, or wetwell water temperature.

Nuclear power plant operators are currently directed by emergency operating procedures to take emergency actions based on parameters that anticipate inadequate core cooling conditions. In other words, operators are directed to act before core temperatures rise above acceptable levels, and in-core temperature readings would not feed into that decision-making process. The staff therefore determined that the use of in-core temperature-monitoring devices for the detection of inadequate core cooling and actual core uncovering is not necessary for managing emergency and accident scenarios in these plants. Therefore, no safety benefit would result from the availability of such devices in boiling-water reactors.

- (3) The use of in-core temperature-monitoring devices would satisfy recommendations regarding enhanced reactor instrumentation made in the near-term task force report, "Recommendations for Enhancing Reactor Safety in the 21st Century: The Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident," dated July 12, 2011 (ADAMS Accession No. ML111861807).

The petitioner cited Recommendation 8 in Section 4.2.5, "Onsite Emergency Actions," of the NRC report, which recommends strengthening and integrating onsite emergency response capabilities such as emergency operating procedures, severe accident mitigation guidelines, and extensive damage mitigation guidelines. In addition, the petitioner cited NUREG-1635, "Review and Evaluation of the Nuclear Regulatory Commission Safety Research Program: A Report to the U.S. Nuclear Regulatory Commission," Volume 10, issued on October 13, 2011 (ADAMS Accession No. ML11284A136). The petitioner quoted sections of pages 11 and 12 of the NUREG, in which the NRC stated that: (1) the agency recognized the need for enhanced reactor instrumentation, (2) such instrumentation would help clarify the transition points of various onsite emergency response capabilities, and (3) the NRC was in the process of adding this to the implementation of the near-term task force report recommendations. As an example of a transition point, the petitioner cited the point at which nuclear power plant operators should transition from using emergency operating procedures to severe accident mitigation guidelines.

On October 29, 2015, the staff submitted SECY-15-0137, "Proposed Plans for Resolving Open Fukushima Tier 2 and 3 Recommendations" (ADAMS Accession No. ML15254A006). This paper addressed the enhanced reactor instrumentation recommendations and recommended that the Commission not pursue additional regulatory action beyond the current requirements. The Commission approved the staff's position in the staff requirements memorandum to SECY-15-0137, dated February 8, 2016 (ADAMS Accession No. ML16039A175). The petitioner's request that the NRC require the use of in-core temperature-monitoring instruments is within the scope of that decision.

RECOMMENDATION:

The staff has reviewed the petition and recommends that the Commission deny the petition for the reasons outlined above and further explained in the attached FRN.

The staff requests the Commission's approval to publish the notice denying PRM-50-111 (Enclosure 1). The enclosed letter for signature by the Secretary of the Commission

(Enclosure 2) informs the petitioner of the Commission's decision to deny the petition. The staff will inform the appropriate congressional committees of the Commission's decision.

COORDINATION:

The Office of the General Counsel has reviewed this package and has no legal objection to the denial of the petition.



Margaret M. Doane
Executive Director
for Operations

Enclosures:

1. *Federal Register* notice
2. Letter to the Petitioner

SUBJECT: DENIAL OF PETITION FOR RULEMAKING ON POWER REACTOR IN-CORE MONITORING (PRM-50-111; NRC-2015-0124) DATED: April 22, 2019

ADAMS Accession Nos: ML18323A087 (Pkg.); ML18130A663 (SECY Paper); ML18130A669 (FRN); ML18341A076 (Letter to Petitioner) * concurrence via email

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