



## POLICY ISSUE (Notation Vote)

May 27, 2022

SECY-22-0049

FOR: The Commissioners

FROM: Daniel H. Dorman  
Executive Director for Operations

SUBJECT: DENIAL OF PETITION FOR RULEMAKING "ACCIDENT SOURCE TERM METHODOLOGIES AND CORRESPONDING RELEASE FRACTIONS" (PRM-50-122; NRC-2020-0150)

PURPOSE:

The purpose of this paper is to request Commission approval to deny petition for rulemaking (PRM) PRM-50-122, "Accident Source Term Methodologies and Corresponding Release Fractions." The petition requested the U.S. Nuclear Regulatory Commission (NRC) codify specific source term methodologies in its accident source term regulations. This paper does not address any new commitments or resource implications.

BACKGROUND:

Brian Magnuson (the petitioner) filed a PRM with the NRC on May 31, 2020 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML20170B161). The petition requested that the NRC amend its regulations in Section 50.67 of Title 10 of the *Code of Federal Regulations* (10 CFR), "Accident source term," to codify source term methodologies recommended in Sandia National Laboratories report SAND2008-6601, "Analysis of Main Steam Isolation Valve Leakage in Design Basis Accidents Using MELCOR 1.8.6 and RADTRAD," issued October 10, 2008 (ADAMS Accession No. ML083180196).

CONTACT: Adakou Foli, NRR/DEX  
301-415-1984

The NRC docketed the petition on June 18, 2020, and assigned it Docket No. PRM-50-122. On August 24, 2020, the NRC published a notice of docketing and request for public comment in the *Federal Register* (85 FR 52058). The public comment period closed on November 9, 2020. The NRC received two comments. One commenter (the petitioner) provided supplemental information in support of the petition, and one commenter (an NRC staff member acting in his personal capacity) opposed the petition. The latter comment was withdrawn from the public docket because it included nonpublic information, but it was considered in the staff's evaluation of the petition.

In 10 CFR 50.67, the NRC provides requirements on the acceptable dose criteria from the design-basis analyses based upon a major accident assumed to result in substantial meltdown of the core with subsequent release of appreciable quantities of fission products (see 10 CFR 50.67). The staff used NUREG-1465, "Accident Source Terms for Light-Water Nuclear Power Plants," issued February 1995 to develop Regulatory Guide 1.183, which provides an acceptable method for complying with 10 CFR 50.67. In addition, 10 CFR Part 100 references Technical Information Document-14844, "Calculation of Distance Factors for Power and Test Reactor Sites," dated March 23, 1962, which provides guidance that may be used in developing accident source terms for demonstrating compliance with 10 CFR Part 100.

## DISCUSSION:

### The Petition

The petition requested that the NRC revise 10 CFR 50.67 to codify the following:

- source term methodologies recommended in SAND2008-6601; and
- a modified version of draft regulatory guide DG-1199, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors," issued October 2009 (ADAMS Accession No. ML090960464), which would include the source term methodologies recommended in SAND2008-6601 and the corresponding release fractions.

The petition also requested that 10 CFR 50.67 be revised to account for high burnup fuel pellet fragmentation, relocation, and dispersion outside of the fuel rod during postulated design-basis accidents.

DG-1199 was a proposed revision to Regulatory Guide (RG) 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors," Revision 0, issued July 2000, which was not finalized as an update to RG 1.183. After the issuance of DG-1199, the staff received a number of public comments and spent significant efforts in addressing the comments, including resolving different NRC staff views on the approach in addressing certain comments. The efforts included an independent review of certain aspects of DG-1199 performed by Sandia National Laboratories. In 2017, staff received the final responses from Sandia National Laboratories associated with their independent review.

The staff resumed the RG 1.183 revision efforts in late 2020 after gaining significant insight since the initial issuance of the DG-1199, including the 2017 Sandia National Laboratories responses and research pertaining to state-of-the-art source term knowledge, such as the fuel

fragmentation, relocation, and dispersal. The planned revision will include this information and will also update RG 1.183 to support accident tolerant fuel and higher enrichment and burnup levels.

The petition identified concerns with the current NRC guidance used to calculate radiological doses to comply with the regulations in 10 CFR 50.67. The petition stated that the proposed revision to 10 CFR 50.67 would eliminate inconsistencies resulting from the use of different source term methodologies and release fractions, would provide more recent information on calculation of source term, and would provide the requisite means (calculations) to ensure compliance with the regulations. The petitioner expressed a concern that accident doses have been undercalculated, resulting in inadequately designed nuclear power plants.

### Summary of Staff's Evaluation

In its evaluation of the petition, the staff considered the NRC's existing regulatory approach in 10 CFR 50.67 and in other regulations such as 10 CFR 100.11 "Determination of exclusion area, low population zone, and population center distance," and 10 CFR 50.34, "Contents of applications; technical information," as discussed below.

The regulatory approach of using design-basis accidents and applying performance-based regulatory requirements is consistent with the approach in other NRC regulations such as 10 CFR 50.46, "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors," and 10 CFR 50.65, "Requirements for monitoring the effectiveness of maintenance at nuclear power plants." Furthermore, when the NRC promulgated 10 CFR 50.67, the agency did not include a defined methodology for demonstrating compliance, consistent with other regulations related to radiological reactor siting criteria, such as 10 CFR 100.11 and 10 CFR 50.34. Instead, 10 CFR 50.67 sets performance-based standards for dose rather than prescribing specific methodologies that must be followed to demonstrate compliance with the regulations. In this way, 10 CFR 50.67 allows changes to the defined source term or the development of other technically sound source term estimates without requiring additional rulemaking or exemptions to the regulations. The NRC still finds this approach to be appropriate. Therefore, instead of codifying a particular source term methodology, the staff used NUREG-1465 and other technical information to develop Regulatory Guide 1.183 as one acceptable methodology for complying with 10 CFR 50.67, but not the only one. This approach has provided the NRC and the nuclear industry with both clarity and the flexibility to consider and incorporate new research and technical advancements while continuing to ensure safety.

The approach in 10 CFR 50.67 is to provide flexibility in applying basic principles to new situations and the use of evolving methods of analyses in the licensing process, and not to include prescriptive methodology in the regulation. This approach reflects the philosophy that the regulation only contains the high-level requirements and that the technical details are contained in guidance and updated, as appropriate, to reflect current knowledge.

The staff finds that 10 CFR 50.67 continues to provide reasonable assurance of adequate protection and safety given new technologies and continued lessons learned. For example, the current 10 CFR 50.67 requires that the application contain an evaluation of the consequences of applicable design basis accidents. In addition, 10 CFR 50.90 requires that applications for license amendments fully describe the desired changes. Therefore, applicants and licensees are required to address significant changes to the fuel design, such as increases to fuel burnup limits and the potential of fuel fragmentation, relocation and dispersal issues, and the NRC will

only approve an amendment to the fuel design if the applicant's analysis demonstrates with reasonable assurance that certain referenced dose values are met.

The NRC continues to leverage its existing licensing and oversight processes to evaluate new information, with consideration of safety margins to determine if proposed analytical approaches are sufficient to ensure safety. Based on its evaluation, and the consideration of public input and past agency actions, the staff concluded that the petition does not warrant rulemaking because codifying the proposed specific source term methodology and release fractions in 10 CFR 50.67 would reduce the intended flexibility in 10 CFR 50.67.

#### RECOMMENDATION:

The staff recommends the Commission deny PRM-50-122 because the petition's approach is overly prescriptive and contrary to the NRC's regulatory approach in 10 CFR 50.67 and other regulations. Specifically, 10 CFR 50.67 allows the use of alternative acceptable methods for demonstrating compliance; the staff determined that codifying the proposed, specific source term methodology and release fractions in 10 CFR 50.67 would unnecessarily limit acceptable options for meeting the requirements and potentially impose significant burdens on licensees that currently use a different approach.

The staff also recommends the Commission approve publication of the *Federal Register* notice (Enclosure 1) denying PRM-50-122. The enclosed letter for signature by the Secretary of the Commission (Enclosure 2) would inform the petitioner of the Commission's decision to deny the petition. The staff would also inform the appropriate congressional committees of the Commission's decision.

#### RESOURCES:

This paper does not address any new commitments or resource implications.

#### COORDINATION:

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



Signed by Dorman, Dan  
on 05/27/22

Daniel H. Dorman  
Executive Director  
for Operations

#### Enclosures:

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

SUBJECT: DENIAL OF PETITION FOR RULEMAKING ON ACCIDENT SOURCE TERM METHODOLOGIES AND CORRESPONDING RELEASE FRACTIONS (PRM-50-122; NRC-2020-0150) DATED: May 27, 2022

**ADAMS Accession Number: PKG: ML21235A160**

**\*via email**

**SECY-012**

<b>OFFICE</b>	NMSS/REFS/MRPB/PM	QTE	NMSS/REFS/RRPB/RS	NMSS/REFS/RRPB/BC
<b>NAME</b>	AFoli	JDougherty	GLappert	IBerrios
<b>DATE</b>	08/26/21	08/30/21	09/13/21	09/21/21
<b>OFFICE</b>	NRR/DRA/ARCB/BC	RES/DSA/FSCB/BC	NRR/DRA/D	RES/DSA/D
<b>NAME</b>	KHsueh	HEsmaili	MFranovich	KWebber
<b>DATE</b>	09/21/21	09/21/21	10/7/21	10/8/21
<b>OFFICE</b>	NMSS/REFS/D	RES/D	NMSS/REFS/RASB/BC	OGC
<b>NAME</b>	JTappert	RFurstenau	CBladey	AGendelman
<b>DATE</b>	10/7/21	10/14/21	11/22/2021	1/27/22
<b>OFFICE</b>	NRR/D	EDO		
<b>NAME</b>	AVeil (AKock for)	DDorman		
<b>DATE</b>	4/1/22	5/27/22		

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