

NuScaleDCRaisPEm Resource

From: Cranston, Gregory
Sent: Friday, June 02, 2017 6:23 PM
To: RAI@nuscalepower.com
Cc: NuScaleDCRaisPEm Resource; Lee, Samuel; Chowdhury, Prosanta; Hayes, Michelle; Franovich, Rani; Caruso, Mark
Subject: RE: Request for Additional Information No. 51, RAI 8854
Attachments: Request for Additional Information No. 51 (eRAI No. 8854).pdf

Attached please find NRC staff's request for additional information concerning review of the NuScale Design Certification Application.

Please submit your response within 60 days of the date of this RAI to the NRC Document Control Desk.

If you have any questions, please contact me.

Thank you.

Gregory Cranston, Senior Project Manager
Licensing Branch 1 (NuScale)
Division of New Reactor Licensing
Office of New Reactors
U.S. Nuclear Regulatory Commission
301-415-0546

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From: Cranston, Gregory

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Request for Additional Information No. 51 (eRAI No. 8854)

Issue Date: 06/02/2017

Application Title: NuScale Standard Design Certification - 52-048

Operating Company: NuScale Power, LLC

Docket No. 52-048

Review Section: 19 - Probabilistic Risk Assessment and Severe Accident Evaluation

Application Section: 19

QUESTIONS

19-3

10 CFR 52.47(a)(27) states that a design certification (DC) application must contain a final safety analysis report (FSAR) that includes a description of the design-specific probabilistic risk assessment (PRA) and its results. SECY-93-087, Section II.N, "Policy, Technical, and Licensing Issues Pertaining to Evolutionary and Advanced Light-Water Reactor Designs," Agency-Wide Document Access and Management System (ADAMS) Accession No. ML003708021, dated April 2, 1993, and the related staff requirements memorandum, ADAMS Accession No. ML003708056, dated July 21, 1993, also provide guidance on use of a sequence-level seismic margins analysis (SMA) in lieu of a seismic PRA. In particular, the Commission approved the Staff's recommendation that since a seismic PRA cannot be performed until a plant is built, DC applicants should use PRA insights to support a margin-type assessment of seismic events. In accordance with the Statement of Consideration (72 FR 49387) for the revised 10 CFR Part 52, the staff reviews the information contained in the applicant's FSAR Chapter 19, and issues requests for additional information (RAI) and conducts audits of the complete PRA (e.g., models, analyses, data, and codes) to obtain clarifying information as needed. The staff uses guidance contained in Standard Review Plan (SRP) Chapter 19.0 Revision 3, "Probabilistic Risk Assessment and Severe Accident Evaluation for New Reactors." In accordance with SRP Chapter 19.0 Revision 3, the staff determines whether: 1) The applicant has performed a PRA-based SMA to determine the seismic capacity of the plant and for each sequence that may lead to core damage or large release; and 2) The design-specific plant system and accident sequence analysis for a PRA-based SMA is performed in accordance with, at a minimum, the Capability Category I requirements of Section 5-2.3 of Part 5 of the ASME/ANS PRA Standard, with the exceptions that the analysis does not need to be based on site-specific and plant-specific information and does not have to rely on an as-built and as-operated plant.

The staff has reviewed the information in the FSAR and examined additional clarifying information from an audit of the complete PRA-based SMA and determined that it needs additional information to confirm that the system modeling portion of the PRA-based SMA was performed in accordance with, at a minimum, the Capability Category I requirements for supporting requirements SPR-B8 and B9 of Section 5-2.3 of Part 5 of the ASME/ANS PRA Standard. These requirements deal with modeling system recovery and restoration. Restoration of safety equipment by plant personnel can be inhibited by any of several types of causes related to a seismic event. Treatment of the impact of earthquake damage on system restoration was not discussed in the FSAR. Please describe the extent to which system recovery was credited in the PRA. Please identify systems recovered and the accident sequences in which the recovery of systems, if any, was credited. Please justify credit for any system restorations.

19-4

10 CFR 52.47(a)(27) states that a design certification (DC) application must contain a final safety analysis report (FSAR) that includes a description of the design-specific probabilistic risk assessment (PRA) and its results. SECY-93-087, Section II.N, "Policy, Technical, and Licensing Issues Pertaining to Evolutionary and Advanced Light-Water Reactor Designs," Agency-Wide Document Access and Management System (ADAMS) Accession No. ML003708021, dated April 2, 1993, and the related staff requirements memorandum, ADAMS Accession No. ML003708056, dated July 21, 1993, also provide guidance on use of a sequence-level seismic margins analysis (SMA) in lieu of a seismic PRA. In particular, the Commission approved the Staff's recommendation that since a seismic PRA cannot be performed until a plant is built, DC applicants should use PRA insights to support a margin-type assessment of seismic events. In accordance with the Statement of Consideration (72 FR 49387) for the revised 10 CFR Part 52, the staff reviews the information contained in the applicant's FSAR Chapter 19, and issues requests for additional information (RAI) and conducts audits of the complete PRA (e.g., models, analyses, data, and codes) to obtain clarifying information as needed. The staff uses guidance contained in Standard Review Plan (SRP) Chapter 19.0 Revision 3, "Probabilistic Risk Assessment and Severe Accident Evaluation for New Reactors." In accordance with SRP Chapter 19.0 Revision 3, the staff determines whether: 1) The applicant has performed a PRA-based SMA to determine the seismic capacity of the plant and for each sequence that may lead to core damage or large release; and 2) The design-specific plant system and accident sequence analysis for a PRA-based SMA is performed in accordance with, at a minimum, the Capability Category I requirements of Section 5-2.3 of Part 5 of the ASME/ANS PRA Standard, with the exceptions that the analysis does not need to be based on site-specific and plant-specific information and does not have to rely on an as-built and as-operated plant.

The staff has reviewed the information in the FSAR and examined additional clarifying information from an audit of the complete PRA-based SMA and determined that it needs additional information to confirm that the PRA-based SMA was performed in accordance with, at a minimum, the Capability Category I requirements for high level requirement HLR-SPR-A of Section 5-2.3 of Part 5 of the ASME/ANS PRA Standard. It is clear to the staff that the SMA accounts for seismic failures due to the seismic load exceeding the seismic capacity of an SSC. The staff could not identify any information in the FSAR nor in clarifying documents as to whether the SMA also accounts for failures of SSCs that survive the loads from the earthquake, but are damaged from interaction with a SSC that does not have sufficient capacity to survive the seismic hazard (e.g., a seismic class I SSC damaged by a non-seismic class SSC). Please describe how such seismically induced failures of robust SSCs, if any, are treated in the SMA.

19-5

10 CFR 52.47(a)(27) states that a design certification (DC) application must contain a final safety analysis report (FSAR) that includes a description of the design-specific probabilistic risk assessment (PRA) and its results. SECY-93-087, Section II.N, "Policy, Technical, and Licensing Issues Pertaining to Evolutionary and Advanced Light-Water Reactor Designs," Agency-Wide Document Access and Management System (ADAMS) Accession No. ML003708021, dated April 2, 1993, and the related staff requirements memorandum, ADAMS Accession No. ML003708056, dated July 21, 1993, also provide guidance on use of a sequence-level seismic margins analysis (SMA) in lieu of a seismic PRA. In particular, the Commission approved the Staff's recommendation that since a seismic PRA cannot be performed until a plant is built, DC applicants should use PRA insights to support a margin-type assessment of seismic events. In accordance with the Statement of Consideration (72 FR 49387) for the revised 10 CFR Part 52, the staff reviews the information contained in the applicant's FSAR Chapter 19, and issues requests for additional information (RAI) and conducts audits of the complete PRA (e.g., models, analyses, data, and codes) to obtain clarifying information as needed. The staff uses guidance contained in Standard Review Plan (SRP) Chapter 19.0 Revision 3, "Probabilistic Risk Assessment and Severe Accident Evaluation for New Reactors." In accordance with SRP Chapter 19.0 Revision 3, the staff determines whether: 1) The applicant has performed a PRA-based SMA to determine the seismic

capacity of the plant and for each sequence that may lead to core damage or large release, has shown that the design satisfies the Commission's goal to have seismic margin greater than or equal to 1.67 times the safe shutdown earthquake; and 2) The design-specific plant system and accident sequence analysis for a PRA-based SMA is performed in accordance with, at a minimum, the Capability Category I requirements of Section 5-2.3 of Part 5 of the ASME/ANS PRA Standard, with the exceptions that the analysis does not need to be based on site-specific and plant-specific information and does not have to rely on an as-built and as-operated plant.

The staff has reviewed the information in the FSAR and examined additional clarifying information from an audit of the complete PRA-based SMA and determined that it needs additional information to confirm that the plant level seismic capacity determined by the applicant is in conformance with the Commission's goal of being at least 167% of the safe shutdown earthquake level. The applicant has determined the plant level seismic capacity to be .88g which is only slightly larger than .84g which corresponds to 1.67 times the safe shutdown earthquake for the NuScale design. The discussion in Section 19.1.5.1.2 of the FSAR indicates that uncertainties in the SMA were assessed, but no results are given. Please provide a description of the uncertainty analysis that was conducted and a summary of the results and include this information in the FSAR.