NuScaleDCRaisPEm Resource

From:	Cranston, Gregory
Sent:	Wednesday, December 06, 2017 10:55 AM
To:	RAI@nuscalepower.com
Cc:	NuScaleDCRaisPEm Resource; Lee, Samuel; Chowdhury, Prosanta; Hayes, Michelle; Pohida, Marie; Franovich, Rani
Subject:	RE: Request for Additional Information No. 292 RAI No. 9128 (19)
Attachments:	Request for Additional Information No. 292 (eRAI No. 9128).pdf

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

Please submit your technically correct and complete response within 60 days of the date of this RAI to the NRC Document Control Desk. The NRC Staff recognizes that NuScale has preliminarily identified that the response to this question in this RAI is likely to require greater than 60 days.

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

Hearing Identifier: NuScale_SMR_DC_RAI_Public
Email Number: 319

Mail Envelope Properties (MWHPR09MB1200ADEE6E96DDD9C5D72BB690320)

Subject: RE: Request for Additional Information No. 292 RAI No. 9128 (19)
Sent Date: 12/6/2017 10:55:24 AM
Received Date: 12/6/2017 10:55:35 AM
From: Cranston, Gregory

Created By: Gregory.Cranston@nrc.gov

Recipients:
"NuScaleDCRaisPEm Resource" <NuScaleDCRaisPEm.Resource@nrc.gov>
Tracking Status: None
"Lee, Samuel" <Samuel.Lee@nrc.gov>
Tracking Status: None
"Chowdhury, Prosanta" <Prosanta.Chowdhury@nrc.gov>
Tracking Status: None
"Hayes, Michelle" <Michelle.Hayes@nrc.gov>
Tracking Status: None
"Pohida, Marie" <Marie.Pohida@nrc.gov>
Tracking Status: None
"Franovich, Rani" <Rani.Franovich@nrc.gov>
Tracking Status: None
"RAI@nuscalepower.com" <RAI@nuscalepower.com>
Tracking Status: None

Post Office: MWHPR09MB1200.namprd09.prod.outlook.com

Files	**Size**	**Date & Time**
MESSAGE	718	12/6/2017 10:55:35 AM
Request for Additional Information No. 292 (eRAI No. 9128).pdf	94223	

Options
Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

Request for Additional Information No. 292 (eRAI No. 9128)
Issue Date: 12/06/2017
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

19-37

Regulatory Basis:

10 CFR 52.47(a)(27) states that a design certification application must contain an final safety analysis report (FSAR) that includes description of the design-specific probabilistic risk assessment (PRA) and its results.

In accordance with the Statement of Consideration (72 Federal Register 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, "The applicant has performed sensitivity studies sufficient to gain insights about the impact of uncertainties (and the potential lack of detailed models) on the estimated risk. The objectives of the sensitivity studies should include (1) determining the sensitivity of the estimated risk to potential biases in numerical values, such as initiating event frequencies, failure probabilities, and equipment unavailabilities, (2) determining the impact of the potential lack of modeling details on the estimated risk, and (3) determining the sensitivity of the estimated risk to previously raised issues (e.g., motor-operated valve reliability). "

Standard Review Plan (SRP) Section 19.0, Revision 3, also states, "Shutdown and refueling operations for small, modular reactor designs may be performed in ways that are new and completely different from those used at large traditional light water reactors (LWRs) either licensed or under review by the NRC. In these cases, a more in-depth review will be needed to ensure that the PRA model is of acceptable scope, level of detail, and technical adequacy."

As documented in SRP 19.0 Revision 3, "the staff will determine whether the applicant has identified risk-informed safety insights based on systematic evaluations of the risk associated with the design. The applicant should identify and describe the following:

A. The design's robustness, levels of defense-in-depth, and tolerance of severe accidents initiated by either internal or external events

B. The risk significance of potential human errors associated with the design."

Request for Additional Information

Per Chapter 19 of the FSAR, module drop events dominate the NuScale core damage frequency. As such, the staff reviewed the Probabilistic Risk Assessment Notebook for the Reactor Building Crane, ER-P050-3815, Rev. 1 (notebook) and noted that key risk insights from the notebook are not reported in the FSAR.

1. FSAR Table 19.1-70, Listing of Candidate Risk Significant Structures, Systems, and Components (Single Module): Low Power and Shutdown Probabilistic Risk Assessment, identifies the reactor building crane as a single entry, with no supporting detail. However, as described in the notebook, the safety stop function for the main hoist is critical to the safe operation of the crane and its ability to hold the load following any failure or abnormal lift. There are several single failure points for this system including: the main hoist drive controller VFD403 fails to cut power to the motor, the lower command CR1606 fails closed, the raising command CR1602 fails closed, the main hoist safety stop related fails closed CR1733, the main hoist under voltage related TD1744 fails closed, and the common cause of the hoist shoe brakes fail to close. The staff is requesting the reactor building crane entry in Table 19.1-70 be expanded to include the risk importance results of the critical SSCs (listed above) for the crane or justify why these additions are not necessary.

2. In the notebook, several operator errors of commission, which are challenging to quantify in PRAs, were estimated to be important in the module drop frequency including: bridge over speed with an intact module, trolley over speed with an intact module, over travel raise with an intact module, over travel lower with an intact module, over speed event with an intact module, and over load with an intact module. The staff is requesting these operator actions and their risk importance results be added to the FSAR or justify why these additions are not necessary.

3. The notebook assumes the crane will not be permitted to operate with the bypass in place, and the bypass switch itself, a keyed switch, will be locked open during a lift to prevent its inadvertent actuation. The safety stop system contains a bypass function that will permit the load to be lowered after the safety stop system has been actuated and inhibit the automatic actuation of the safety stop due to any fault. The staff requests this key assumption either be added to Table 19.1-71, “Key Assumptions for the Low Power and Shutdown Probabilistic Risk Assessment,” or that the applicant explain why the addition is not necessary. .

4. The notebook reports the failure for the crane operator to activate the safety stop as 1E-3. Given the importance of this action and the absence of operating procedures, please provide the results of a sensitivity study assessing the risk significance of this error on the NuScale core damage frequency or explain why it is not necessary.

5. The notebook states an unmitigated bridge overspeed event may cause the module to collide with a pool wall. The staff requests this event and the consequences (failure of the Ultimate Heat Sink damage another module) be added to the FSAR or explain why this addition is not necessary.