

NuScaleDCRaisPEm Resource

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Sent: Monday, July 10, 2017 7:15 AM
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Subject: Request for Additional Information No. 90, RAI 8758
Attachments: Request for Additional Information No. 90 (eRAI No. 8790).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.

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301-415-0546

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Request for Additional Information No. 90 (eRAI No. 8790)

Issue Date: 07/10/2017

Application Title: NuScale Standard Design Certification - 52-048

Operating Company: NuScale Power, LLC

Docket No. 52-048

Review Section: 18 - Human Factors Engineering

Application Section: 18

QUESTIONS

18-1

Title 10 of the Code of Federal Regulations (10CFR) Section 52.47(a)(8) requires an applicant for a design certification to provide a final safety analysis report (FSAR) that must include the information necessary to demonstrate compliance with any technically relevant portions of the Three Mile Island requirements set forth in 10 CFR 50.34(f), except paragraphs (f)(1)(xii), (f)(2)(ix), and (f)(3)(v). Section 10 CFR 50.34(f)(2)(iii) requires an applicant to "Provide, for Commission review, a control room design that reflects state-of-the-art human factor principles prior to committing to fabrication or revision of fabricated control room panels and layouts." Chapter 18, "Human Factors Engineering," of NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition," and NUREG-0711, "Human Factors Engineering Program Review Model," identify criteria the staff uses to evaluate whether an applicant meets the regulation. The applicant stated in the FSAR, Tier 2, Section 18.0, "Human Factors Engineering - Overview," that the HFE program incorporates accepted HFE standards and guidelines including the applicable guidance provided in NUREG-0711, Revision 3.

Question 1:

Criterion 11.4.3.8, "Validation Conclusions," in NUREG-0711, states, "the applicant should document the statistical and logical bases for determining that the performance of the integrated system is, and will be acceptable."

The NuScale Verification and Validation Implementation Plan, Section 4.6.1, "Scenario Sequencing," says a minimum of two operating crews will perform each scenario. However, the bases for determining that the performance of the integrated system will be acceptable using a minimum of two operating crews per scenario is not described in the application.

Additionally, the NRC Commission has previously taken action based on a greater number of scenario trials. The staff is concerned that a minimum of two trials for each ISV scenario does not provide (1) enough opportunities for users of the integrated system to identify errors with the design or (2) reasonable assurance that results from the ISV test will be indicative of the ability of the integrated system to support safe plant operation. Please describe the bases for determining that performance of the integrated system using a minimum of two operating crews per scenario will be acceptable and will provide reasonable assurance that the health and safety of the public would be protected.

18-2

Question 2

Criterion 11.4.3.1 of NUREG 0711 states, "The applicant should describe how the team performing the validation has independence from the personnel responsible for the actual design." Additionally it states, "The members of the validation team should have no responsibility for the design; i.e., they should never have been part of the design team. While they may work for the same organization, their responsibilities must not include contributions to the design, other than validating it."

Section 4.1 of the Human Factors Verification and Validation Implementation Plan (V&V IP states,

"Validation team members can be selected from the HFE Design Team. There is very low risk of impact to the validity of the ISV [integrated systems validation] results. Objective performance measures and success criteria are developed as part of the methodology...The Validation Team members are trained and qualified to conduct the ISV in an objective and unbiased manner." In addition FSAR Tier 2, Chapter 18, Section 18.10.2.3.1, states, "The test team administers the ISV and collects data via questionnaires, post-scenario debriefing, personal observations...Bias is reduced by the training program applicable to each validation team member; in addition, the test results are obtained by consensus of the test team rather than individual observations."

The staff understands that objective performance and success criteria will be used to determine the results of the ISV; however, questionnaires and personal observations, which are subjective in nature, are also used to collect data and to determine the results and any design changes that may need to be made. The main intent of Criterion 11.4.3.1 of NUREG 0711 is to ensure that bias is reduced to the greatest extent during ISV data collection (e.g. observer notes/evaluations) and when the results of ISV are analyzed and evaluated to determine whether design changes are necessary.

Clarify whether the validation will include members who were not part of the design team Explain how training and results by consensus minimize bias and ensure objectivity of the validation team members who are part of the HFE Design Team. Also, if any other means will be established to maximize objectivity, please revise the application to describe them.