

## NuScaleDCRaisPEm Resource

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**From:** Cranston, Gregory  
**Sent:** Friday, June 29, 2018 3:11 PM  
**To:** NuScaleDCRaisPEm Resource  
**Cc:** Chowdhury, Prosanta; Tesfaye, Getachew  
**Subject:** Request for Additional Information No. 485 eRAI No. 9392 (18.5)  
**Attachments:** Request for Additional Information No. 485 (eRAI No. 9392).pdf

Attached please find NRC staff's request for additional information (RAI) concerning review of the NuScale Design Certification Application. Password will be sent separately. A redacted (public) version of this RAI was issued today.

Please submit your technically correct and complete 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.

**Hearing Identifier:** NuScale\_SMR\_DC\_RAI\_Public  
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## Request for Additional Information No. 485 (eRAI No. 9392)

Issue Date: 06/01/2018

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: 18.5

### QUESTIONS

18-48

#### Review Criteria

NUREG-1791, Section 10.1.2, "Human Performance Measures and Criteria," says,

*The applicant needs to identify the measures of human performance used to evaluate individual and crew performance of the control personnel in the scenarios... In addition to defining the measures of human performance used in validating the staffing plan, the applicant should identify the criteria established to determine the acceptability of the results obtained.*

#### Application and Evaluation

NuScale submitted "Control Room Staffing Plan Validation Methodology," Revision 3, for staff review with the design certification application. Section 8.0, "Analyze Workload," of "Control Room Staffing Plan Validation Methodology" is labeled proprietary and explains the method used to calculate workload. Section 8.0, Paragraph 2.a discusses an activity to be performed by subject matter experts. The staff would like to understand why subject matter experts performed the activity because typically the personnel discussed in Section 8.0, Paragraph 2.c perform this activity (refer to NASA Task Load Index (TLX) v. 1.0 Manual, available at <https://humansystems.arc.nasa.gov/groups/tlx/tlxpaperpencil.php>).

Further, Section 8.0, Paragraph 2.b of "Control Room Staffing Plan Validation Methodology" says more than one type of calculation will be performed. However, the SPV Results TR, Appendix A, Section A.2, "TLX Results;" Appendix B, Section B.3, "TLX Results;" and Appendix C, Section C.3, "TLX Results" only discuss the results determined by one of the calculations discussed in Section 8.0, Paragraph 2.b of "Control Room Staffing Plan Validation Methodology." The staff would like to understand whether there were significant differences in the results provided by the different calculations.

#### Additional Information Requested

(1) Please explain why subject matter experts performed the activity discussed in "Control Room Staffing Plan Validation Methodology," Section 8.0, Paragraph 2.a instead of the personnel discussed in Section 8.0, Paragraph 2.c.

(2) Please also explain whether there were significant differences in the results that were obtained using the calculations discussed in "Control Room Staffing Plan Validation Methodology," Section 8.0, Paragraph 2.b.

18-49

#### Review Criteria

NUREG-1791, Section 10.3.4, "Staffing Plan Validation Outcomes," says, "The reviewer should confirm that the following criteria have been met, as applicable... The staffing plan effectively addressed any identified environmental conditions or staffing practices that could potentially degrade individual or crew performance."

#### Application and Evaluation

NuScale provided technical report "Control Room Staffing Plan Validation Results" (SPV Results TR), Revision 1, for staff review with the design certification application. Appendix E, Section E.2, "Detailed Description," of the SPV Results TR is labeled proprietary and export-controlled information. This section describes a specific scenario event on Page 107. Based on the

information in the last paragraph of this page, it is not clear whether any changes in the main control room environment could occur during this event, and if so, whether such changes would be expected to have an impact on the staffing plan.

#### Additional Information Requested

Please explain whether any changes in the main control room environment could occur during the event described on Page 107 of the SPV Results TR, and if so, whether such changes would be expected to have an impact on the staffing plan.

18-50

#### Review Criteria

NUREG-0711, Section 11.4.3, "Integrated System Validation," contains guidance for the integrated system validation (ISV) test. Review Criterion 11.4.3.2(1) says, "The applicant should develop detailed test objectives to provide evidence that the integrated system adequately supports plant personnel in safely operating the plant, to include the following considerations:

...Validate the acceptability of the shift staffing level(s), the assignment of tasks to crew members, and crew coordination within the control room, between the control room and local control stations and support centers, and with individuals performing tasks locally. This should encompass validating minimum shift staffing levels, nominal levels, maximum levels, and shift turnover."

#### Application and Evaluation

Part 7, Section 6.1.3, "Requested Action," of the NuScale Design Certification Application (DCA) states, "NuScale Power, LLC requests that minimum licensed operator staffing requirements specific to the NuScale Power Plant design be adopted as requirements applicable to licensees referencing the NuScale Power Plant design certification, in lieu of the requirements stated in 10 CFR 50.54(m)." The proposed rulemaking language in the Part 7, Section 6.1.3 says that three operators and three senior operators shall be on site when one or more units are operating. Additionally, the proposed rulemaking language in the Part 7, Section 6.1.3 says at least one senior operator shall be in the control room at all times, and one operator shall be at the controls at all times.

The staff is reviewing the proposed minimum licensed operator staffing requirements specific to the NuScale Power Plant design using the guidance in NUREG-0711. The staff understands that the three operators and the three senior operators who will be required to be on site each shift when one or more units are operating may not necessarily be at their designated consoles in the control room or even in the control room all of the time. For example, operators may need to participate in meetings or field activities outside of the control room while on shift, and it's expected they will need to leave the control room for normal activities such as eating a meal during a multi-hour long shift. It's possible that only one operator and one senior operator may be in the control room at any given time during the operation of one or more units.

Based on the response to RAI 9123, Question 18-12 (ADAMS Accession No. ML18002A554), the staff understands NuScale plans to conduct (ISV) testing later in 2018. NuScale provided the "Human Factor Verification and Validation Implementation Plan" (V&V IP), Revision 4, for staff review. The staff also reviewed NuScale's "ISV Test Plan" and ISV scenario basis documents during an audit as described in the audit plan dated July 25, 2017 (ADAMS Accession No. ML17205A465). The staff did not find information about whether and how the ISV testing will simulate the minimum control room staffing level that could occur during the operation of the facility. The staff requests the information to inform the review of the proposed minimum licensed operator staffing requirements specific to the NuScale Power Plant design that will be applicable to licensees referencing the NuScale Power Plant design certification.

#### Additional Information Requested

Please explain how the ISV testing will simulate the minimum control room staffing level that could occur during the operation of the facility.