RAIO-0718-60920

July 17, 2018

Docket No. 52-048

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2738

SUBJECT: NuScale Power, LLC Response to NRC Request for Additional Information No. 485 (eRAI No. 9392) on the NuScale Design Certification Application

REFERENCE: U.S. Nuclear Regulatory Commission, "Request for Additional Information No. 485 (eRAI No. 9392)," dated June 01, 2018

The purpose of this letter is to provide the NuScale Power, LLC (NuScale) response to the referenced NRC Request for Additional Information (RAI).

The Enclosure to this letter contains NuScale's response to the following RAI Questions from NRC eRAI No. 9392:

- 18-48
- 18-49
- 18-50

This letter and the enclosed response make no new regulatory commitments and no revisions to any existing regulatory commitments.

If you have any questions on this response, please contact Carrie Fosaaen at 541-452-7126 or at cfosaaen@nuscalepower.com.

Sincerely,

Zackary W. Rad
Director, Regulatory Affairs
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Enclosure 1: NuScale Response to NRC Request for Additional Information eRAI No. 9392

Enclosure 1:

NuScale Response to NRC Request for Additional Information eRAI No. 9392

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NuScale Power™

Response to Request for Additional Information
Docket No. 52-048

eRAI No.: 9392
Date of RAI Issue: 06/01/2018

NRC Question No.: 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.

NuScale Response:

The operating crews participating in the staffing plan validation were not available when the task load index weighting was determined. The subject matter experts had the necessary knowledge to complete the task load index weighting. Also, the use of subject matter experts limited operating crew bias that could occur with foreknowledge of the tasks to be included in the staffing plan validation scenarios.

There were no significant differences in the results between weighted and non-weighted workload value.

Impact on DCA:

There are no impacts to the DCA as a result of this response.

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eRAI No.: 9392
Date of RAI Issue: 06/01/2018

NRC Question No.: 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.

NuScale Response:

For the scenario described, the environment would not change since the deenergized electrical buses were re-powered from backup diesels.

The NuScale design provides for multiple backup power supplies including two diesel generators, an alternate AC power supply (e.g., gas turbine) and/or a unit operating in "island mode." Loss of offsite AC would not be expected to have an effect on the control room

environment and therefore would not impact the staffing plan. FSAR reference 20.1-10, NuScale Power LLC, Mitigation Strategies for Extended Loss of AC Power Event, TR-0816-50797, section 6.7.2, Control Room Habitability, describes the control room environment on an extended loss of AC power. Analysis shows that, in the unlikely event of an extended loss of all AC power, main control room environment conditions remain well below the wet bulb globe termperature limit of 90 degrees F and would not impact the staffing plan.

Impact on DCA:

There are no impacts to the DCA as a result of this response.

Response to Request for Additional Information
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eRAI No.: 9392
Date of RAI Issue: 06/01/2018

NRC Question No.: 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.

NuScale Response:
Several scenarios include reduced licensed operator staffing of one or two operators. The operators are outside the control room and can be recalled via the plant page. Because of the highly automated design and limited dependency on operator actions, reduced manning has had little or no impact on scenario performance during pilot testing. Full control room staffing is anticipated to be established within 5-10 minutes of a recall page, therefore, reduced staffing during the integrated system validation will only verify that a plant page can be made and plant control can be maintained for 5-10 minutes. The NuScale design does not require operator actions within this time frame to maintain nuclear safety. Therefore, further reduction in manning level has not been added into the integrated system validation scenarios.

Impact on DCA:

There are no impacts to the DCA as a result of this response.