RAIO-0518-59779

May 01, 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. 389 (eRAI No. 9414) on the NuScale Design Certification Application

REFERENCE: U.S. Nuclear Regulatory Commission, "Request for Additional Information No. 389 (eRAI No. 9414)," dated March 19, 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 Enclosures to this letter contain NuScale's response to the following RAI Question from NRC eRAI No. 9414:

- 18-23

Enclosure 1 is the proprietary version of the NuScale Response to NRC RAI No. 389 (eRAI No. 9414). NuScale requests that the proprietary version be withheld from public disclosure in accordance with the requirements of 10 CFR § 2.390. The enclosed affidavit (Enclosure 3) supports this request. Enclosure 2 is the nonproprietary version of the NuScale response.

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

If you have any questions on this response, please contact Steven Mirsky at 240-833-3001 or at smirsky@nuscalepower.com.

Sincerely,

Zackary W. Rad
Director, Regulatory Affairs
NuScale Power, LLC

Distribution: Samuel Lee, NRC, OWFN-8G9A
Prosanta Chowdhury NRC, OWFN-8G9A
Demetrius Murray, NRC, OWFN-8G9A

Enclosure 1: NuScale Response to NRC Request for Additional Information eRAI No. 9414, proprietary

Enclosure 2: NuScale Response to NRC Request for Additional Information eRAI No. 9414, nonproprietary

Enclosure 3: Affidavit of Zackary W. Rad, AF-0518-59780

NuScale Power, LLC
1100 NE Circle Blvd., Suite 200 Corvalis, Oregon 97330, Office: 541.360.0500, Fax: 541.207.3928
www.nuscalepower.com

Enclosure 1:

NuScale Response to NRC Request for Additional Information eRAI No. 9414, proprietary

NuScale Power, LLC
1100 NE Circle Blvd., Suite 200 Corvalis, Oregon 97330, Office: 541.360.0500, Fax: 541.207.3928
www.nuscalepower.com

Enclosure 2:

NuScale Response to NRC Request for Additional Information eRAI No. 9414, nonproprietary

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

eRAI No.: 9414
Date of RAI Issue: 03/19/2018

NRC Question No.: 18-23

Title 10 of the *Code of Federal Regulations* (10 CFR) 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 its human factors engineering (HFE) program incorporates accepted HFE standards and guidelines including the applicable guidance provided in NUREG-0711, Revision 3.

NUREG–0711, Section 11.4.3.2 (1) states, "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.
- Validate that the design has adequate capability for alerting, informing controlling, and feedback such that personnel tasks are successfully completed during normal plant evolutions, transients, design-basis accidents, and also under selected, risk-significant events beyond-design basis, as defined by sampling operational conditions.
- Validate that specific personnel tasks can be accomplished within the time and performance criteria, with effective situational awareness, and acceptable workload levels that balance vigilance and personnel burden.
- Validate that the HSIs minimize personnel error and assure error detection and

recovery capability when errors occur.
- Validate the assumptions about performance on important HAs.
- Validate that the personnel can effectively transition between the HSIs and procedures in accomplishing their tasks, and that interface management tasks, such as display configuration and navigation, are not a distraction or an undue burden."

The applicant's test objectives are described in Section 4.2 of the Verification and Validation Implementation Plan. The objectives described correspond to those identified in the review criterion with the exception of the last bullet. Please explain how the final bullet in criterion 11.4.3.2 (1) is addressed or why it is not applicable to the NuScale design.

NuScale Response:

The last test objective from NUREG-0711, Criterion 11.4.3.2(1) is applicable to the NuScale design. RP-0914-8543, Human Factors Verification and Validation Implementation Plan, Section 4.2, "Test Objectives." has been revised to include the objective.

Computer-based procedures (CBPs) have been designed to facilitate the transition between human-system interface (HSI) and procedures in accomplishing tasks. The Integrated System Validation will provide a performance based assessment of this test objective and the results will be provided in the Verification and Validation Results Summary Report.

The CBP system guides operator actions in order to minimize human errors and increase the likelihood tasks will be completed safely and reliably. The CBPs include soft controls "embedded" into the procedure display page that can issue control commands to plant equipment directly from the procedure thus minimizing the need to transition from a procedure to an HSI in order to complete a task.

To interface with the embedded procedures NuScale has created the Process Library. This interface helps the operator quickly access any procedure for various plant operations and also aids in directly controlling components. The Process Library is available to every operator in the main control room (MCR).

This state-of-the art technique of embedding the procedure directly into the HSI:

- Eliminates the cumbersome practice of finding and following paper procedures
- Provides a means of quickly obtaining any procedure or automation while maintaining visual contact with the HSI
- Is a more effective way of tracking progress through the steps of a procedure
- Allows multiple procedures to be monitored simultaneously
- Allows all MCR personnel to monitor any active procedure or automation

---

- Greatly reduces transition time between the procedure and the system HSI by bringing the system components and parameters into the procedure

Embedded procedures were used during the staffing plan validation effort. No transition and interface management tasks were found to be a distraction or an undue burden by the observation team. Further, no transition and interface management tasks concerns were raised by the multiple operators using the HSI.

The NuScale HSI Style Guide ES-0304-1381 discusses the use of a CBP system in Section 3.4 and also describes the procedure and automation techniques being used by NuScale in Appendix H.

Impact on DCA:

The Human Factors Verification and Validation Implementation Plan, RP-0914-8543, has been revised as described in the response above and as shown in the markup provided with this response.

All observer comments will be assessed by consensus to determine which will result in HEDs and for priority assignment. The independent observers are equal participants during scenario debriefs. If consensus agreement cannot be met on resultant HEDs or priority, the conflict will be presented to management for resolution.

The administrators (test lead, test bed engineer, and test bed support staff) manage the ISV, control each scenario in accordance with the test procedure, maintain and set up the test bed, and collect the test bed archived data following each scenario. The Validation Team personnel may act as simulated plant personnel as necessary within each scenario. The administrators are trained and qualified using the NuScale training program. Bias is further reduced by the training program applicable to each validation team member, and the fact that results are obtained by consensus of the team rather than individual observations.

Observer training will consist of practice observations to ensure understanding of the measurement techniques and ensure understanding of the test objectives and acceptance criteria.

{{

}}2(a),(c)

4.2 Test Objectives

The objectives of the ISV are to validate

- the acceptability of the shift staffing, the assignment of tasks to operating 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, higher levels, and shift turnover.
- that the design has adequate capability for alerting, informing, controlling, and feedback such that personnel tasks are successfully completed during normal plant evolutions, transients, design-basis accidents, and also under selected risk significant events beyond-design basis, as defined by the SOC.
- that specific personnel tasks can be accomplished within the time and performance criteria, with effective situational awareness, and acceptable workload levels that balance vigilance and personnel burden.
- that the HSIs minimize personnel error and ensure error detection and recovery capability when errors occur.
- the assumptions about performance on important human actions (IHAs).
- personnel can effectively transition between the HSIs and procedures in accomplishing their tasks, such as display configuration and navigation, are not a distraction or an undue burden.

Enclosure 3:

Affidavit of Zackary W. Rad, AF-0518-59780

NuScale Power, LLC
1100 NE Circle Blvd., Suite 200 Corvalis, Oregon 97330, Office: 541.360.0500, Fax: 541.207.3928
www.nuscalepower.com

NuScale Power, LLC

AFFIDAVIT of Zackary W. Rad

I, Zackary W. Rad, state as follows:

1. I am the Director, Regulatory Affairs of NuScale Power, LLC (NuScale), and as such, I have been specifically delegated the function of reviewing the information described in this Affidavit that NuScale seeks to have withheld from public disclosure, and am authorized to apply for its withholding on behalf of NuScale.
2. I am knowledgeable of the criteria and procedures used by NuScale in designating information as a trade secret, privileged, or as confidential commercial or financial information. This request to withhold information from public disclosure is driven by one or more of the following:
    a. The information requested to be withheld reveals distinguishing aspects of a process (or component, structure, tool, method, etc.) whose use by NuScale competitors, without a license from NuScale, would constitute a competitive economic disadvantage to NuScale.
    b. The information requested to be withheld consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), and the application of the data secures a competitive economic advantage, as described more fully in paragraph 3 of this Affidavit.
    c. Use by a competitor of the information requested to be withheld would reduce the competitor's expenditure of resources, or improve its competitive position, in the design, manufacture, shipment, installation, assurance of quality, or licensing of a similar product.
    d. The information requested to be withheld reveals cost or price information, production capabilities, budget levels, or commercial strategies of NuScale.
    e. The information requested to be withheld consists of patentable ideas.
3. Public disclosure of the information sought to be withheld is likely to cause substantial harm to NuScale's competitive position and foreclose or reduce the availability of profit-making opportunities. The accompanying Request for Additional Information response reveals distinguishing aspects about the method by which NuScale develops its human factors engineering.

    NuScale has performed significant research and evaluation to develop a basis for this method and has invested significant resources, including the expenditure of a considerable sum of money.

    The precise financial value of the information is difficult to quantify, but it is a key element of the design basis for a NuScale plant and, therefore, has substantial value to NuScale.

    If the information were disclosed to the public, NuScale's competitors would have access to the information without purchasing the right to use it or having been required to undertake a similar expenditure of resources. Such disclosure would constitute a misappropriation of NuScale's intellectual property, and would deprive NuScale of the opportunity to exercise its competitive advantage to seek an adequate return on its investment.

4. The information sought to be withheld is in the enclosed response to NRC Request for Additional Information RAI No, 389, eRAI 9414. The enclosure contains the designation "Proprietary" at the top of each page containing proprietary information. The information considered by NuScale to be proprietary is identified within double braces, "{{ }}" in the document.
5. The basis for proposing that the information be withheld is that NuScale treats the information as a trade secret, privileged, or as confidential commercial or financial information. NuScale relies upon the exemption from disclosure set forth in the Freedom of Information Act ("FOIA"), 5 USC § 552(b)(4), as well as exemptions applicable to the NRC under 10 CFR §§ 2.390(a)(4) and 9.17(a)(4).
6. Pursuant to the provisions set forth in 10 CFR § 2.390(b)(4), the following is provided for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld:
    a. The information sought to be withheld is owned and has been held in confidence by NuScale.
    b. The information is of a sort customarily held in confidence by NuScale and, to the best of my knowledge and belief, consistently has been held in confidence by NuScale. The procedure for approval of external release of such information typically requires review by the staff manager, project manager, chief technology officer or other equivalent authority, or the manager of the cognizant marketing function (or his delegate), for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside NuScale are limited to regulatory bodies, customers and potential customers and their agents, suppliers, licensees, and others with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or contractual agreements to maintain confidentiality.
    c. The information is being transmitted to and received by the NRC in confidence.
    d. No public disclosure of the information has been made, and it is not available in public sources. All disclosures to third parties, including any required transmittals to NRC, have been made, or must be made, pursuant to regulatory provisions or contractual agreements that provide for maintenance of the information in confidence.
    e. Public disclosure of the information is likely to cause substantial harm to the competitive position of NuScale, taking into account the value of the information to NuScale, the amount of effort and money expended by NuScale in developing the information, and the difficulty others would have in acquiring or duplicating the information. The information sought to be withheld is part of NuScale's technology that provides NuScale with a competitive advantage over other firms in the industry. NuScale has invested significant human and financial capital in developing this technology and NuScale believes it would be difficult for others to duplicate the technology without access to the information sought to be withheld.

I declare under penalty of perjury that the foregoing is true and correct. Executed on 5/1/2018.

Zackary W. Rad