

April 11, 2016

MEMORANDUM TO: Mark Tonacci, Chief  
Licensing Branch 1  
Division of New Reactor Licensing  
Office of New Reactors

FROM: Rocky D. Foster, Project Manager /RA/  
Licensing Branch 1  
Division of New Reactor Licensing  
Office of New Reactors

SUBJECT: SUMMARY OF FEBRUARY 8, 2016, PUBLIC MEETING WITH  
NUSCALE POWER, LLC TO DISCUSS HUMAN FACTORS  
ENGINEERING TOPICS (PROJ0769)

On February 8, 2016, a Category 1 open public meeting was held at the NuScale Power, LLC's (NuScale) Rockville, Maryland office between representatives of the U.S. Nuclear Regulatory Commission (NRC) staff and NuScale, to discuss topics related to NuScale's small modular reactor human factors engineering (HFE), specifically to discuss clarification of the letter dated January 14, 2016, from Mr. Frank Akstulewicz NRC, Director, Division of New Reactor Licensing to Mr. Thomas Bergman, NuScale, Vice-President, Regulatory Affairs, titled, "NuScale Control Room Configuration and Operator Staffing Levels," (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15302A516). In particular, the meeting focused on topics relating to questions provided in the letter to the NRC staff from Mr. Bergman, dated February 2, 2016, titled, "NuScale Questions on the NRC Letter to NuScale dated January 14, 2016, titled "NuScale Control Room Configuration and Staffing Levels,"" (ADAMS Accession No. ML16035A393) and "Human Factors Engineering Documentation for the NuScale Design Certification Application Submittal," (ADAMS Accession No. ML16034A181). The NRC staff and NuScale discussed these topics during the meeting, and this meeting summary documents the highlights of the discussion.

NuScale Question #1, Issue Finality and Regulatory Certainty

The January 14, 2016, letter described the process NuScale could use to achieve the greatest degree of issue finality and regulatory certainty for control room configuration and staffing levels. NuScale questioned if a different process could be selected. The NRC staff stated that the January 14, 2016, letter was written in response to the letter dated July 22, 2015, from Mr. Steven Mirsky, Licensing Manager, NuScale to the NRC, titled, "NuScale Power, LLC Key Issue Resolution Prior to Design Certification Application (NRC Project No. 0769)," (ADAMS Accession No. ML15203B306), which stated that NuScale preferred an approach that includes an exemption to Title 10 *Code of Federal Regulations* (10 CFR), Part 50.54(m) in the design certification (DC) because it provides regulatory certainty.

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The NRC staff stated that regardless of the approach NuScale selects, the NRC staff will need NuScale to provide sufficient technical justification with the DC application submittal to support the proposed control room staffing described in the letter dated September 15, 2015, from Mr. Mirsky, to the NRC, titled, "NuScale Power, LLC Submittal of NuScale Preliminary Concept of Operations Summary and Response to NRC Questions on Control Room Activities (NRC Project No. 0769)," (ADAMS Accession No. ML15258A846). The NRC staff identified two reasons for this:

1. Design configurations that do not conform to existing regulation must demonstrate a reasonable assurance of safety in order for the NRC staff to approve the new configuration as an exemption from, or the basis for an exemption from, the regulation. The NRC staff verifies a reasonable assurance of safety has been established by using the guidance in NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition," and other guidance documents identified in NUREG-0800.
2. The number of control room personnel is an input to the control room design and the design of plant systems that interface with the control room (e.g., habitability systems).

#### NuScale Question #2, NUREG-1791

NuScale questioned if it was the NRC staff's intent that all sections of NUREG-1791, "Guidance for Assessing Exemption Requests from the Nuclear Power Plant Licensed Operator Staffing Requirements Specified in 10 CFR 50.54(m)," be completed. The NRC staff said that all sections should be completed in order to perform a staffing plan validation and also acknowledged that some portions of NUREG-1791 overlap with sections in NUREG-0711, "Human Factors Engineering Program Review Model," (e.g., task analysis). NuScale also questioned if the staffing plan validation was expected to meet the acceptance criteria for the integrated systems validation (ISV) test that is part of the verification and validation (V&V) activity described in NUREG-0711. NuScale cited a statement contained in Brookhaven National Laboratory (BNL) Technical Report (TR) No. 20918-1-2015, "Methodology to Assess the Workload of Challenging Operational Conditions in Support of Minimum Staffing Level Reviews" (ADAMS Accession No. ML15083A205), as the basis for the question. The NRC staff clarified that the BNL technical report provided specific guidance on building test scenarios that would maximize operator workload, and the report was used as an input to the development of NUREG-0800, Revision 3, Attachment B, "Methodology to Assess the Workload of Challenging Operational Conditions In Support of Minimum Staffing Level Reviews." The NRC staff noted that NUREG-1791 does not specifically address test controls, and therefore NuScale can use the applicable guidance in NUREG/CR-6838, "Technical Basis for Regulatory Guidance for Assessing Exemption Requests from the Nuclear Power Plant Licensed Operator Staffing Requirements Specified in 10 CFR 50.54(m)," Section 5.2.4, "Simulator Studies," which refers to guidance in NUREG-0711 for test controls. Additionally, the NRC staff stated that guidance in NUREG-1791 provides additional detail on how to address the NUREG-0711 elements when staffing levels less than those specified in 10 CFR 50.54(m) are proposed. The NRC staff also reiterated that NuScale could choose to use alternate methods that are comparable to the methods described in NUREG-1791.

### NuScale Question #3, Clarification of Scope of HFE Activities

In the January 14, 2016, letter, NuScale indicated that the scope of the HFE analyses would include activities performed by licensed control room operators, and would not include maintenance or refueling activities, activities completed by craft/technical personnel, or activities associated with the emergency response facilities unless they impact licensed operator workload, in which case the activities would be analyzed to determine any required human-system interface(s). The NRC staff stated that these kinds of activities should be included in the scope of the HFE analyses if they do indeed impact licensed operator workload.

### NuScale Question #4, Submittal Date for the V&V Results Summary Report

The January 14, 2016, letter stated that the NRC staff would docket and commence the review of the NuScale DC application if NuScale submitted an implementation plan for the V&V activity with the DC application; however, the NRC staff cannot issue a final safety evaluation for the DC until the review of the V&V results summary report (RSR) is complete. NuScale asked when the V&V RSR should be submitted in order to allow the NRC staff to complete the HFE review. The NRC staff stated that the V&V RSR should be submitted no later than the start of Phase 4 of the DC review; however, the NRC staff also emphasized that the time to review the V&V RSR will depend on whether the report is of high quality and contains a sufficient level of detail for the NRC staff to determine whether or not the acceptance criteria have been satisfied. The actual submittal date of the V&V RSR will need to be determined.

### NuScale Question #5, Procedures and Training Needed to Support the V&V

NuScale questioned if the procedure development and training program development elements needed to be completed to perform the V&V activity. The NRC staff stated that, as described in NUREG-0711, applicants do not submit materials for the procedure development and training program development elements with the DC application Chapter 18, "Human Factors Engineering," because these materials are submitted with the DC application Chapter 13, "Conduct of Operations," and are typically addressed with combined license (COL) applicant action items. Further, as stated in NUREG-0711, there are NRC staff reviews separate from ISV that validate plant procedures and training programs. An ISV performed by a DC applicant should include procedures needed to support the conduct of the ISV scenarios and facilitate the test participant's interaction with the human-systems interfaces (HSI). Training for validation participants should conform to guidance in NUREG/CR-6838, Section 5.2.4.

### NuScale Question #6, Staffing and Number of Modules

NuScale asked if it was sufficient to state that the minimum number of control room personnel required to operate 12 modules would be maintained for configurations consisting of fewer than 12 modules. The NRC staff said that it would be reasonable to extrapolate from the results of analyses as long as the staffing configuration reflected the staffing analysis results in a conservative manner. For example, if six licensed operators are required to remain in the control room for configurations that include 12 modules, then the same number of personnel would be required to remain in the control room for configurations less than 12 modules in order for the conclusion about staffing levels to remain valid. The distribution of personnel holding Senior Reactor Operator/Reactor Operator (SRO/RO) licenses in the control room would also need to remain consistent with the analysis.

#### NuScale Question #7, Dedicated versus Non-Dedicated Operators

NuScale asked the staff to clarify a portion of the January 14, 2016, letter that requested NuScale distinguish between dedicated and non-dedicated operators. The NRC staff stated that if NuScale is going to designate operators as “dedicated” operators and “non-dedicated” operators, then NuScale should describe these terms to enable the staff to understand the roles and responsibilities of the control room personnel.

#### NuScale Question #8, Assumptions for ISV Scenario Development

NuScale asked if it would be sufficient to assume that the shift manager will be 100 percent occupied with emergency plan implementation activities during scenarios that would require its activation. The NRC staff stated that would be a reasonable approach because it reflects what typically happens at operating reactors: when the emergency plan must be implemented, the shift manager assumes the role of emergency coordinator and primarily performs duties required by the emergency plan until relieved by an emergency coordinator that is part of the emergency response organization.

#### NuScale Question #9, Test Subjects for Staffing Plan Validation Scenarios

NuScale asked the NRC staff to clarify expectations for the test personnel that will be used to perform staffing analyses as part of the staffing and qualifications element. The NRC staff stated that NuScale could submit an implementation plan for the staffing plan validation activity, and the NRC staff would review the methodology.

#### NuScale Question #10, RSR for HSI Design

NuScale stated that it wasn't clear why the HSI Design RSR would be required to be submitted with the DC application. NuScale also stated that it planned to submit a style guide and a basic HSI design technical report with the DC application that would describe a detailed HSI design, but that it would not describe a complete design. The NRC staff stated that 10 CFR 52.47 requires that:

*“the application must contain a level of design information sufficient to enable the Commission to judge the applicant's proposed means of assuring that construction conforms to the design and to reach a final conclusion on all safety questions associated with the design before the certification is granted.”*

The NRC staff asked NuScale how the DC application could be submitted if the design was not complete. NuScale described that some items were site-specific items that a COL holder will need to address, such as the brand of turbine generator, the content of computer-based procedures, and emergency operating facilities. The NRC staff stated that in order to docket the application, the NRC staff would need the HSI design RSR, which should describe the HSI design that will be tested in the V&V activities. The NRC staff stated that if site-specific details were not available prior to DC application submittal, then NuScale could make reasonable design assumptions in order to provide an HSI design that can be tested during the V&V activities. The NRC staff also noted that it is already assuming schedule risk by allowing NuScale to submit the V&V RSR at Phase 4 of the DC review.

NuScale Question #11, Difference between Options Described in the January 14, 2016, Letter

NuScale asked the NRC staff to clarify if there was a difference in the two options in terms of scope and level of detail. The NRC staff said there is no difference in terms of the scope of technical information required to be addressed or the level of detail required: both options require that NuScale provide sufficient technical justification for the proposed staffing level.

The discussion continued onto the status of the NRC staff's comments on the Human Factors Engineering Verification and Validation Implementation Plan (ADAMS Accession No. ML15323A503). The NRC staff informed NuScale that they had not completed the full review of the V&V implementation plan but would provide comments to NuScale in the near term. The rescheduling of the NRC staff site visit to the NuScale Corvallis, Oregon facility was discussed with a potential trip to be scheduled for the week of March 28, 2016.

The meeting at that time was open to the public for comment and question of which the public did not have any comment. The meeting ended with an overall summary of the discussion. The agenda and list of meeting attendees are included in Enclosures 1 and 2. The meeting notice is available in ADAMS with Accession No. ML16069A149. The presentation slides are available in ADAMS with Accession No. ML16061A388. Please direct any inquiries to Rocky D. Foster at (301) 415-5787, or email at rocky.foster@nrc.gov.

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Project No.: PROJ0769

Enclosures:

1. Meeting Agenda
2. Meeting Attendees

cc: DC NuScale Power LLC Listserv

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cc: NuScale Power LLC Listserv

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**ADAMS Accession Nos.:**

**ML16060A220 - Package**

**ML16060A221- Meeting Summary**

**ML16061A388 – Meeting Slides**

**\*via email NRC001**

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<b>DATE</b>	03/01/2016	03/04/2016	03/09/2016	04/11/2016

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## **MEETING AGENDA**

**FEBRUARY 8, 2016**

### **NUSCALE HUMAN FACTORS ENGINEERING**

<b>TIME</b>	<b>TOPIC</b>	<b>LEAD</b>
1:00 p.m. – 1:10 p.m.	Introductions	All
1:10 p.m. – 2:00 p.m.	Control Room Configuration and Operator Staffing Levels	NRC/NuScale
2:00 p.m. – 3:00 p.m.	NUREG-0711 Documentation	NRC/NuScale
3:00 p.m. – 3:15 p.m.	Break	All
3:15 p.m. – 3:30 p.m.	Verification and Validation Implementation Plan Comments	NRC/NuScale
3:30 p.m. – 3:40 p.m.	Corvallis, Oregon Trip - Rescheduled	NRC/NuScale
3:40 p.m. – 3:50 p.m.	Public Comments/Questions	All
3:50 p.m. – 4:00 p.m.	Meeting Summary	NRC/NuScale

## MEETING ATTENDEES

NAME	AFFILIATION
Frank Akstulewicz	NRC
Mark Tonacci	NRC
Michael Junge	NRC
Greg Cranston	NRC
Paul Pieringer	NRC
Lauren Kent	NRC
Robert Weisman	NRC
Ann Hove	NRC
Amy D'Agostino	NRC
Rocky Foster	NRC
Thomas Bergman	NuScale
Steve Mirsky	NuScale
Steve Unikewicz	NuScale
Steve Pope	NuScale
Tim Tovar	NuScale
Dale Atkinson	NuScale (Corvallis)
Carl Markurt	NuScale (Corvallis)
Shawn Jerrow	NuScale (Corvallis)
Guy Martin	NuScale (Corvallis)
Paul Kumar	NuScale (Corvallis)
Darrell Gardner	NuScale (Corvallis)
Gary Becker	NuScale (Corvallis)
Jennie Wike	NuScale (Corvallis)
Tim Beville	DOE
Russell Bell	NEI
Peter Hastings	Tennessee Valley Authority
Mason Baker	UAMPS
Sarah Fields	Uranium Watch