



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

May 24, 2018

MEMORANDUM TO: Samuel S. Lee, Chief
Licensing Branch 1
Division of New Reactor Licensing
Office of New Reactors

FROM: Demetrius Murray, Project Manager /*RA Prosanta Chowdhury*
for:/
Licensing Branch 1
Division of New Reactor Licensing
Office of New Reactors

SUBJECT: AUDIT REPORT SUMMARY FOR THE REGULATORY AUDIT
OF NUSCALE POWER, LLC DESIGN CERTIFICATION
APPLICATION HUMAN FACTOR ENGINEERING

From July 25, 2017, through February 14, 2018, the U.S. Nuclear Regulatory Commission (NRC) staff conducted a regulatory audit of NuScale Power, LLC (NuScale) Design Certification Application (DCA) Human Factors Engineering (HFE) Topics.

The purpose of the audit was to: (1) review non-docketed information related to verification and validation methods to evaluate conformance with regulatory guidance and (2) identify information that will require docketing to support the basis of the licensing or regulatory decision. The NRC staff conducted the audit at NuScale's offices in Rockville, Maryland and also reviewed documents in the NuScale electronic reading room.

The NRC staff's audit plan, dated July 25, 2017, can be accessed via the NRC's Agencywide Documents Access and Management System under Accession No. ML17205A465. The NRC staff conducted the audit in accordance with the Office of New Reactors (NRO) Office Instruction NRO-REG-108, "Regulatory Audits."

The objectives of the audit, based upon the purpose stated above, were met during or shortly after the audit. The enclosed report summarizes the NRC staff's activities and conclusions involving the audit.

Docket No. 52-048

Enclosure:

1. Audit Summary Report

CONTACT: Prosanta Chowdhury, NRO/DNRL
301-415-1947

SUBJECT: AUDIT REPORT SUMMARY FOR THE REGULATORY AUDIT OF NUSCALE
POWER, LLC DESIGN CERTIFICATION APPLICATION HUMAN FACTOR
ENGINEERING; DATED: MAY 24, 2018

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NRO- 002

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NUSCALE POWER, LLC DESIGN CERTIFICATION APPLICATION - HUMAN FACTORS

ENGINEERING AUDIT SUMMARY REPORT

Audit Team Members

- Lauren Kent
- Amy D'Agostino
- Maurin Scheetz
- Brian Green

Background and Audit Bases

By letter dated December 31, 2016, NuScale submitted a design certification application (DCA) for review (Agencywide Documents Access and Management System (ADAMS) Accession No. ML17013A229). The DCA includes Final Safety Analysis Report (FSAR) Tier 2, Chapter 18, "Human Factors Engineering," which describes the human factors engineering (HFE) program for the NuScale Standard Design Power Plant (ADAMS Accession No. ML17013A289). Consistent with NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," Chapter 18, "Human Factors Engineering," the NRC staff is using the review criteria in NUREG-0711, "Human Factors Engineering Program Review Model," Revision 3, to determine whether the NuScale design complies with HFE-related NRC regulatory requirements. The HFE Program Review Model described in NUREG-0711 consists of 12 elements (refer to Figure 1-1, "Elements of the HFE program's review model," of NUREG-0711 for additional information).

The FSAR Tier 2, Section 18.0, "Human Factors Engineering – Overview," states the NuScale HFE program incorporates accepted HFE standards and guidelines including the applicable guidance provided in NUREG-0711. NuScale submitted two types of technical reports to address the 12 elements in NUREG-0711, "Implementation Plans and Results Summary Reports." NUREG-0711, Section 1.2.2, "Review Elements," explains that implementation plans describe processes and methods for performing HFE activities and results summary reports describe the results of performing those activities.

NuScale submitted, "Human Factors Verification and Validation Implementation Plan" (V&V IP), Revision 2, with the DCA. In a letter dated April 8, 2016, from Mr. Thomas Bergman, NuScale, Vice-President, Regulatory Affairs to Mr. Frank Akstulewicz, Director, Division of New Reactor Licensing, NRC (ADAMS Accession No. ML 16099A270), NuScale stated that NuScale would submit the V&V Results Summary Report (RSR) prior to Phase 4 of the NRC's review of the NuScale DCA.

As described in NUREG-0711, Section 11.1, "Background," a significant V&V activity is the integrated system validation (ISV) test. The V&V IP, Section 4.6, "Test Design," says, "Upon approval, the ISV scenarios and test plan will be available for review or audit by the NRC

sufficiently before the conduct of ISV so that comments or concerns can be adequately addressed prior to commencing ISV.”

In May 2017, the NRC staff conducted an audit consistent with the audit plan dated April 25, 2017 (ADAMS Accession No. ML17110A254). The audit included a review of the ISV Test Plan and scenario bases documents to verify the V&V scenarios and ISV test methods conform to selected review criteria in NUREG-0711, Section 11.4, “Review Criteria.” The results of the audit are documented in the audit summary report dated July 17, 2017 (ADAMS Accession No. ML17181A415).

Audit Activities

The NRC staff commenced a follow-up audit on July 24, 2017 as discussed in the audit plan dated July 25, 2017 (ADAMS Accession No. ML17205A465). The objective of the audit was to verify the V&V methodology conforms to the review criteria in NUREG-0711, Section 11.4, that was not assessed as part of the previous audit and to identify information that will require docketing to support the basis of the licensing or regulatory decision. This objective is identified as Objective 1 in the audit plan. The audit plan includes Objectives 2, 3, 4, and 5, which were not assessed during this audit because the NRC staff determined they could be verified during subsequent audit(s) that will be more appropriately timed to coincide with the activities discussed in the response from NuScale to the NRC staff’s request for additional information (RAI) 9123, Question 18-12 (ADAMS Accession No. ML18002A554).

The NRC staff reviewed the following documents in NuScale’s Electronic Reading Room (ERR):

- The V&V IP, Revision 4,
- Integrated Systems Validation Test Plan, Revision 0,
- ISV Scenario Basis Documents, Original Revision,
- Human System Interface Design and Validation Process, Revision 1, and
- Design verification test plan, Original Revision.

Additionally, the NRC staff held discussions with the NuScale staff¹ about the proposed V&V methods and the scope of information to be included in the application.

Audit Results

The NRC staff began reviewing non-docketed information on July 24, 2017, via NuScale’s ERR and concluded the audit on February 14, 2018. The NRC staff issued the following RAIs as a result of this audit: RAI Nos. 8805, 9394, 9371, 9395, 9396, 9397, 9398, 9399, and 9414.

Conclusion

The NRC staff conducted an audit exit call with NuScale staff on February 14, 2018. The NRC

¹ The NuScale staff members who participated in substantive conversations include Timothy Tovar, Manager, Plant Operations; Doug Bowman, Supervisor, Plant Operations; and Ryan Flamand, Operations Engineer.

staff stated they were able to accomplish the audit objective, and was able to identify areas where RAIs were warranted.