

February 16, 2018

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

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

SUBJECT: AUDIT SUMMARY REPORT FOR THE NUSCALE POWER, LLC
DESIGN CERTIFICATION APPLICATION AUDIT OF PHYSICAL
SECURITY UNDER CHAPTER 13, "CONDUCT OF
OPERATIONS" (DOCKET NO. 52-048)

On December 5 and 6, 2017, the U.S. Nuclear Regulatory Commission (NRC) staff conducted an audit of the physical security elements of NuScale Power, LLC (NuScale) design certification application. The audit was conducted at the NuScale offices located at 1100 NE Circle Blvd., Suite 200, Corvallis, Oregon 97330. The purpose of the audit was to examine the supporting documentation for the design of physical security systems described for the NuScale Standard Plant.

The detailed information related to the subject contains safeguards, security-related, and/or proprietary information and the details are protected in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR), Section 73.21, "Protection of Safeguards Information: Performance Requirements," and 10 CFR 2.390, "Public inspections, exemptions, requests for withholding." The audit plan can be found in the Agencywide Documents Access and Management System under Accession No. ML17318A512 dated November 29, 2017. The results of the audit are summarized in Enclosure 1. The List of Attendees and the List of Documents Made Available to the NRC Staff are documented in Enclosures 2 and 3, respectively.

Docket No. 52-048

Enclosure:

1. Audit Summary Report
2. List of Attendees
3. List of Documents Made Available to the NRC Staff

cc w/Enclosures: NuScale DC Listserv

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301-415-1647

SUBJECT: AUDIT SUMMARY REPORT FOR THE NUSCALE POWER, LLC DESIGN
CERTIFICATION APPLICATION AUDIT OF PHYSICAL SECURITY UNDER
CHAPTER 13, "CONDUCT OF OPERATIONS" (DOCKET NO. 52-048)

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ADAMS Accession No: ML18031A454

*via email

NRO-002

OFFICE	NRO/DNRL/LB1: PM	NRO/DNRL/LB1: LA	NSIR/DPCP/RSB: BC	NRO/DNRL/LB1: PM
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**U.S. NUCLEAR REGULATORY COMMISSION
NUSCALE POWER, LLC DESIGN CERTIFICATION APPLICATION AUDIT OF PHYSICAL
SECURITY UNDER CHAPTER 13, "CONDUCT OF OPERATIONS"**

DECEMBER 5 – 6, 2017

SUMMARY REPORT

NRC Audit Team:

Pete Lee (NSIR, Technical Lead)
Gregory Cranston (NRO, Project Manager) (joined remotely)
Andrew Nelson (U.S. Army Corps of Engineers, NRC Contractor)

1.0 SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) staff conducted an audit of the physical security elements of the NuScale Power, LLC (NuScale or the applicant) Design Certification Application (DCA), which included safeguards and security-related information supporting the Tier 1 and Tier 2 of the Final Safety Analysis Report (FSAR). The audit was conducted on December 5 - 6, 2017, at the NuScale offices located at 1100 NE Circle Blvd., Suite 200, Corvallis, Oregon 97330. The staff conducted the audit in accordance with the NRC's Office of New Reactors (NRO) Office Instruction NRO-REG-108, "Regulatory Audits" (Agencywide Document Access and Management System (ADAMS) Accession No. ML081910260, April 2, 2009). The audit plan, dated November 29, 2017, can be found under ADAMS Accession No. ML17318A512.

2.0 BASIS

This audit was conducted in order for the NRC staff to gain an understanding of NuScale designs and design bases for physical security systems within the scope of the NuScale design certification. The supporting information on how an applicant designs physical security systems to meet performance and/or prescriptive regulatory requirements allows for the NRC staff to arrive at informed security findings. In addition, the descriptions of design bases for engineered physical protection systems are required for the inspections, tests, and/or analyses for verifying physical security Inspections, Tests, Analyses, and Acceptance Criteria, and the supporting documents (e.g., analyses, evaluations, engineering calculations, etc.) provide direct evidence for the designs of physical security systems and hardware within the scope of the design certification.

The selected subjects of the audit included the review of: (1) NuScale's methods and assumptions for determining bounding minimum safe standoff distances for protecting against the design basis threat vehicle bombs; and (2) design drawings and specification documents, engineering reports, analyses, assessments, and referenced standards for the designs of physical security systems.

Enclosure 1

3.0 OBSERVATIONS AND RESULTS

- a. The audit provided an understanding of the methods or approaches applied to support the design bases and descriptions for physical security systems in NuScale Technical Report (TR) 0416-48949, "NuScale Design of Physical Security Systems," which is incorporated by reference in Tier 2 of the FSAR.
- b. The audit provided an understanding of the technical bases and assumptions for how NuScale determined bounding minimum safe standoff distances (MSSD) to protect against the design basis threat vehicle bombs. NuScale methods or documents applied for this audit included security engineering methods acceptable for use in the design of physical systems referenced in NUREG/CR-7145, "Nuclear Power Plant Security Assessment Guide," for determining blast effects, such as U.S. Department of Defense (DoD) Single Degree of Freedom Blast Design Spreadsheet (SBEDS) and Convention Weapons Effect (CONWEP) Software and Manual.
- c. NuScale also applied other DoD methods and guidance for predicting blast effects and structural responses. These included DoD UFC 3-040-01, Design and Analysis of Hardened Structures to Conventional Weapons Effects, PDC-TR 06-08, Single Degree Freedom Structural Response Limits for Antiterrorism Design, BlastX - Fast Running Model for Airblast Prediction Involving Internal and External Detonations, In Structure Shock (ISS) 3D, and LS-Dyna Finite Element Analysis Software.
- d. The NRC staff noted that some of the MSSDs indicated in the NuScale TR 0416-48949 were mistakenly smaller than the worst case shown in supporting calculations. In addition, the design basis for the MSSD for doors calculated with SBEDS assumed very specific doors and configurations that must be installed. With the exception of the noted discrepancy, the overall determinations of required MSSDs of the structures within the scope of the NuScale Power Plant standard design applied accepted methods, software, and/or guidance to provide results (with corrected mistakes) that are reasonable.
- e. During the audit, the applicant informed and provided insights to the NRC staff regarding the designs and bases for physical security structures, systems, and components within the scope of the NuScale Power Plant standard design. The NRC staff noted that the information presented and discussed during the audit, addressed subjects included in NRC request for additional information (RAI) No. 8998. The NRC staff did not identify any additional subject areas that are not already included in RAI No. 8998.
- f. The documents the NRC staff examined included information that are outside of the scope of the design certification and are not subject of the ongoing DCA application review. For example, the NuScale application of ConWep cratering calculations, in lieu of the U.S. Department of the Army TM 3-34.82, "Explosive and Demolition," to establish breach radius for a wall and the breaching calculations addressed a specific method, but not necessarily bounding of a worst-case within the DBT, are outside of the scope of the design certification and would be addressed during the review of the application for an operating license.

4.0 CONCLUSION

The summary of observations, as documented above, was communicated to NuScale during the audit and reiterated at the exit briefing. The audit did not identify a need for additional questions to supplement the subjects already addressed in RAI No. 8998. The NRC staff emphasized that the DCA and the technical report that is incorporated by reference, must contain sufficient and necessary details on designs of physical security systems to provide the basis for the NRC staff's adequate regulatory findings.

**U.S. NUCLEAR REGULATORY COMMISSION
NUSCALE POWER, LLC DESIGN CERTIFICATION APPLICATION AUDIT OF PHYSICAL
SECURITY UNDER CHAPTER 13, "CONDUCT OF OPERATIONS"**

DECEMBER 5 - 6, 2017

LIST OF ATTENDEES

NAME	REPRESENTING
Pete Lee	U.S. Nuclear Regulatory Commission (NRC)
Gregory Cranston	NRC Project Manager (joined remotely)
Andrew Nelson	U.S. Army Corps of Engineers (NRC Contractor)
Cyrus Arshar	NuScale Power, LLC (NuScale)
Dale Atkinson	NuScale
Tom Bergman	NuScale
Kevin Deyette	NuScale
Liz English	NuScale
Carrie Fosaaen	NuScale
Dustin Greenwood	NuScale
GL Plumlee III	NuScale

Enclosure 2

**U.S. NUCLEAR REGULATORY COMMISSION
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LIST OF DOCUMENTS MADE AVAILABLE TO THE NRC STAFF

The U.S Nuclear Regulatory Commission staff reviewed the following documents during the audit:

ER-P000-3954	Generation of Location Cutsets for Target Set and Vital Areas Identification, Revision 9, April 29, 2016
ER-0000-4589	Report on Tactical Blast Assessment of Targets in the NuScale Design RXB, Revision 2, August 30, 2016,
ER-0000-4972	Blast Analysis and Minimum Safe Standoff Distance Evaluation for Critical Assets and Function, Revision 0, August 30, 2016
ED-F010-4355	Reactor Building Vital Areas and Equipment Plan View
ED-F010-4356	Reactor Building Physical Security System Plan View
ED-F010-4357	Control Building Vital Areas and Equipment CRB-Plan
ED-F010-4358	Control Building Physical Security Systems CRB-Plan
ED-F010-4359	RWB Physical Security Systems RWB-Plan
ED-F010-4361	Central Alarm Station Layout
ED-F170-4756	Central Alarm Station Section View
Report 15000925-402	Aircraft Impact Assessment for NuScale NP-12 Plant Design Structural Response Analysis, Revision 0, January 2016
NSWC-66-TR 2012/023	Simulation of Explosive Effects in Water Confined in Large Structures, Revision A, August 2012
TR 0315-48929,	NuScale Design of Physical Security Systems, Revision 0, November 16, 2016
EC-FO10-2429	Flooding Analysis, Revision 1, May 25, 2016
EC-B175-3253	Ultimate Heat Sink Boil Off Calculations, Revision 1, July 27, 2017

Enclosure 3

SD-G040-2804 Communication Systems (COM) System Design Description, Revision 0,
June 16, 2016

SD-D070-3609 Plant Lighting System (PLS) System Design Description, Revision 0,
March 28, 2016

SD-D070-2750 Plant Lighting System Function Specification, Revision 1, March 28, 2016

EC-D070-3047 Plant Lighting System (PLS) Scoping Calculation, Revision 1, February 3,
2016

EC-D070-5605 through 5607, Lighting Illumination at MCR and RSS.

FS-D100-2070 Security power System Functional Specification, Revision 2, May 25,
2016

Security Assessment Report Using (intentionally not identified), July 7, 2016

ED-F010-1697 RX Concrete

ED-F107-2330 Control Building Structural Concrete

ED-F090-1136 NuScale Module Plant Site Plan

ED-F012-3661 Bio-Shield General Arrangement and Details

ED-G020-4890 Security System Interconnection Diagram