



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

July 18, 2019

Mr. Thomas Bergman  
Vice President Regulatory Affairs  
NuScale Power, LLC  
1100 NE Circle Blvd., Suite 200  
Corvallis, OR 97330

SUBJECT U.S. NUCLEAR REGULATORY COMMISSION VENDOR INSPECTION OF  
NUSCALE POWER, LLC, REPORT NO. 05200048/2019-203

Dear Mr. Bergman:

From June 3 through June 6, 2019, the U.S. Nuclear Regulatory Commission (NRC) staff conducted an inspection of NuScale Power, LLC (NuScale) at the Target Rock (TR) facility in Farmingdale, New York. The purpose of this technically focused inspection was to verify NuScale's oversight and effective implementation of the design certification application (DCA) Emergency Core Cooling System (ECCS) valve design demonstration testing activities being performed by TR in support of paragraph 47(c)(2) in Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants," and paragraph 43(e) in Part 50, "Domestic Licensing of Production and Utilization Facilities," in Title 10, of the *Code of Federal Regulations* (10 CFR). This NRC inspection was performed concurrently with an NRC regulatory audit and focused on assessing NuScale's oversight of TR's testing activities for compliance with the selected portions of 10 CFR Part 50, Appendix B, "Quality Assurance Program Criteria for Nuclear Power Plants and Fuel Reprocessing Plants." The enclosed report presents the results of this inspection. This NRC inspection report does not constitute NRC endorsement of NuScale's overall quality assurance (QA) program.

Based on the results of this inspection, the NRC inspection team found the implementation of NuScale's QA program oversight of TR for ECCS valve design demonstration testing activities met the requirements of Appendix B to 10 CFR Part 50. Within the scope of this inspection, no violations were identified during this inspection.

In accordance with 10 CFR 2.390, "Public Inspections, Exemptions, Requests for Withholding," of the NRC's "Rules of Practice," the NRC will make available electronically for public inspection a copy of this letter and its enclosure through the NRC Public Document Room or from the NRC's document system (ADAMS), which is accessible at <http://www.nrc.gov/readingrm/adams.html>.

Sincerely,

Kerri A. Kavanagh, Chief **/RA/**  
Quality Assurance Vendor Inspection Branch  
Division Inspection and Regional Support  
Office of Nuclear Reactor Regulation

Docket No.: 05200048

EPID No.: (I-2019-203-0000)

Enclosure:  
Inspection Report No. 05200048/2019-203  
and Attachment

SUBJECT: NUCLEAR REGULATORY COMMISSION VENDOR INSPECTION OF  
NUSCALE POWER, LLC, REPORT NO. 05200048/2019-203

Dated: July 18, 2019

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**U.S. NUCLEAR REGULATORY COMMISSION  
OFFICE OF NUCLEAR REACTOR REGULATION  
DIVISION OF INSPECTION AND REGIONAL SUPPORT  
DESIGN CERTIFICATION TESTING INSPECTION REPORT**

Docket No.: 05200048

Report No.: 05200048/2019-203

Applicant: NuScale Power, LLC  
1100 NE Circle Boulevard, Suite 200  
Corvallis, OR 97330

Applicant Contact: Mr. Cyrus Afshar  
Supervisor, Regulatory Affairs  
cafshar@nuscalepower.com  
(541) 360-0609

Nuclear Industry Activity: NuScale Power, LLC, submitted its design certification application (DCA) for the NuScale Small Modular Reactor in December 2016. NuScale contracted Target Rock (TR) to perform ECCS valve design demonstration testing in support of 10 CFR 52.47(c)(2) and 10 CFR 50.43(e) requirements.

Inspection Dates: June 3 – June 6, 2019

Inspectors: Aaron Armstrong      NRR/DIRS/IQVB, Team Leader  
Paul Prescott              NRR/DIRS/IQVB

Technical Support: Thomas Scarbrough      NRO/DESR/MEB

Approved by: Kerri A. Kavanagh, Chief  
Quality Assurance Vendor Inspection Branch (IQVB)  
Division of Inspection and Regional Support  
Office of Nuclear Reactor Regulation

Enclosure

## **EXECUTIVE SUMMARY**

NuScale Power, LLC, at Target Rock  
05200048/2019-203

The U.S. Nuclear Regulatory Commission (NRC) conducted this design certification testing inspection to verify NuScale Power, LLC, (hereafter referred to as NuScale) implemented an adequate quality assurance (QA) program in support of the Design Certification Application (DCA) submission that complies with the requirements of Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities." In addition, the NRC inspection team verified that NuScale implemented adequate oversight of Emergency Core Cooling System (ECCS) valve design demonstration testing services performed at the Target Rock (TR) facility in Farmingdale, New York. This NRC inspection was performed concurrently with an NRC regulatory audit from June 3 to June 6, 2019, at the TR facility. This is the third inspection of NuScale.

The following regulations served as the bases for the NRC inspection:

- Appendix B to 10 CFR Part 50
- 10 CFR 50.43(e)
- 10 CFR 52.47(c)(2)

During this inspection, the NRC inspection team implemented NRC Inspection Procedure (IP) 35034, "Design Certification Testing Inspection," dated January 27, 2010; as supplemented by IP 35017, "Quality Assurance Implementation Inspection," dated July 29, 2008.

The NRC inspection team concluded that NuScale's QA policies, procedures and oversight of ECCS valve design demonstration testing services complied with the applicable requirements of Appendix B to 10 CFR Part 50. The NRC inspection team also confirmed that NuScale's personnel were implementing these policies and procedures effectively in support of the ECCS valve design demonstration testing. The results of this inspection are summarized below.

### **Test Control and Configuration Management**

The NRC inspection team concluded that the test specifications were appropriately incorporated into NuScale's ECCS valve design demonstration testing in accordance with Criterion III, "Design Control," of Appendix B to 10 CFR Part 50. The NRC inspection team also concluded NuScale's test specifications were translated and implemented into TR's test control program consistent with the regulatory requirements of Criterion XI, "Test Control," of Appendix B to 10 CFR Part 50. The NRC inspection team observed portions of the inadvertent actuation block (IAB) valve functional testing of NuScale's ECCS valve design demonstration testing. NuScale initiated Condition Report (CR) CR-0619-65832 on June 4, 2019, for a test failure resulting from the main valve opening prematurely. NuScale issued CR-0619-65857 on June 5, 2019, in response to IAB valve functionality testing when the main valve failed to open at the proper pressure conditions. NuScale initiated CR-0619-65860 on June 5, 2019, in response to a loss of test data, which required a subsequent test run. For these identified testing issues, the NRC inspection team concluded that NuScale's policies and procedures for corrective actions were implemented consistent with the regulatory requirements of Criterion

XVI, "Corrective Action," of Appendix B to 10 CFR Part 50. No findings of significance were identified.

#### Control of Measuring and Test Equipment

The NRC inspection team concluded that NuScale established a measuring and test equipment (M&TE) program consistent with the regulatory requirements of Criterion XII, "Control of Measuring and Test Equipment," of Appendix B to 10 CFR Part 50. Based on the limited sample of M&TE documents reviewed, the NRC inspection team determined that TR was adequately implementing its approved M&TE program in support of NuScale's ECCS valve design demonstration testing activities. The NRC inspection team reviewed a sample of M&TE calibration records and observed the use of M&TE during testing activities. No findings of significance were identified.

#### Training and Qualification of Personnel

The NRC inspection team concluded that NuScale established training and qualification programs consistent with the regulatory requirements of Criterion II, "Quality Assurance Program," of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the NRC inspection team determined that TR was adequately implementing their approved policies and procedures in support of NuScale's ECCS valve design demonstration testing activities. No findings of significance were identified.

#### Quality Assurance Records

The NRC inspection team concluded that NuScale established a quality records program consistent with the regulatory requirements of Criterion XVII, "Quality Assurance Records," of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the NRC inspection team determined that TR was adequately implementing their approved policies and procedures in support of NuScale's ECCS valve design demonstration testing activities. No findings of significance were identified.

#### Oversight of Contracted Activities and Audits

The NRC inspection team concluded that NuScale established a program of oversight of contracted activities consistent with the regulatory requirements of Criterion VII, "Control of Purchased Material, Equipment, and Services," and Criterion XVIII, "Audits," of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the NRC inspection team determined that TR was adequately implementing their approved policies and procedures in support of NuScale's ECCS valve design demonstration testing activities. No findings of significance were identified.

## **REPORT DETAILS**

### 1. Test Control and Configuration Management

#### a. Inspection Scope

The U.S. Nuclear Regulatory Commission (NRC) inspection team reviewed NuScale's policies and implementing procedures that govern its oversight of the design certification application (DCA) Emergency Core Cooling System (ECCS) valve design demonstration testing program, test plans and configuration management procedure to verify compliance with the requirements of Criterion III, "Design Control," Criterion XI, "Test Control," and Criterion XVI, "Corrective Action," of Appendix B to 10 CFR Part 50.

The NRC inspection team evaluated NuScale's test program description to verify that it clearly describes the test program objectives and controls necessary for the ECCS valve design demonstration testing. The NRC inspection team reviewed the test plans to verify that adequate controls were translated from technical information and contract requirements into test parameters and were monitored during testing. The NRC inspection team also reviewed the configuration controls to perform the test; verified that critical dimensions and physical attributes of the design features were tested; and verified that the critical aspects of the test conformed to NuScale's design specifications. In addition, the NRC inspection team reviewed test procedures, test criteria, and test requirements with respect to the responsibilities and oversight of test personnel. The NRC inspection team reviewed a sample of test runs to verify that the documentation clearly described the objectives of the test, test prerequisites, instrumentation and data acquisition hardware and software to be used. The NRC inspection team also reviewed completed test records for compliance with the quality assurance (QA) program, operating procedures, instrument diagrams, and personnel training and qualification requirements.

The NRC inspection team verified that NuScale's ECCS valve design demonstration test plans and procedures provided adequate descriptions of pre-testing, testing and post-testing activities and reviewed implementation of the test plan and procedures to ensure the adequacy for testing activities.

The NRC inspection team verified NuScale's configuration control was developed and implemented to appropriately record the testing facility arrangement and any changes and modifications. The NRC inspection team also verified the test facility configuration controls were adequate to support design demonstration testing and that test components were correctly identified in as-built drawings and test procedures. The NRC inspection team noted that administrative controls were established to control temporary modifications of the test facility. Additionally, the NRC inspection team also verified controls were established to document test anomalies or deviations that may potentially occur during the testing.

The NRC inspection team verified that appropriate QA requirements were implemented for data collection during the ECCS valve design demonstration testing and processes and responsibilities were established to ensure effective evaluation of recorded test

results. The attachment to this inspection report lists the individuals interviewed and documents reviewed by the NRC inspection team.

b. Observations and Findings

NuScale contracted Target Rock (TR) to conduct ECCS valve design demonstration testing to provide reasonable assurance that 10 CFR 52.47(c)(2) and 10 CFR 50.43(e) are satisfied for this first-of-a-kind (FOAK) safety feature for reactor emergency core cooling to support NuScale's DCA.

NuScale's reactor design relies on the ECCS, which is comprised of three Reactor Vent Valves (RVVs) and two Reactor Recirculation Valves (RRVs) to open and allow natural circulation cooling of the reactor core by releasing reactor coolant system (RCS) steam from the top of the reactor pressure vessel (RPV) through the RVVs into the containment vessel (CNV) with the condensed RCS fluid returning to the RPV from the CNV through the RRVs. Each RVV and RRV consists of a main valve, an inadvertent actuation block (IAB) valve, a solenoid trip valve, and a solenoid reset valve. These valves comprise an RVV or RRV system to prevent the main valve from opening when the RCS is at high pressure conditions, and to open the main valve at reduced RCS pressure conditions to allow natural circulation cooling of the reactor core in response to a plant event.

The NRC inspection team reviewed the NuScale statement of work (SOW), test specifications, test plans, test procedures, and design test report for the demonstration testing of a model RRV valve system. The NRC inspection team observed the performance of an RRV system test and conducted a walkdown of the test setup. A list of NuScale and TR documents related to test control reviewed as part of this inspection is provided in the attachment to this report.

The NRC inspection team noted that the NuScale SOW for the ECCS valve design demonstration testing implemented the appropriate QA controls for the testing activities. The SOW required that TR implement a QA program that meets the requirements of American Society of Mechanical Engineers (ASME) Standard NQA-1-2008 and the 2009 Addenda, which the NRC has found as an acceptable method of meeting the requirements of Appendix B to 10 CFR Part 50. The NuScale ECCS valve design demonstration test specification defined the testing requirements to demonstrate ECCS valve performance. In addition, NuScale's Project Specific Quality Plan identified the quality controls of Appendix B to 10 CFR Part 50 to be applied to the ECCS valve design demonstration testing. NuScale's Project Execution Plan specified the purpose of the ECCS valve design demonstration testing was to perform testing using a valve of similar geometry to the RRV to demonstrate that the valve will operate as expected over the range of possible RCS conditions, and that the testing will show that the presence of boric acid will not adversely affect valve performance. NuScale's Test Procedure and Plan identified the test hardware setup and specified the fluid conditions for the Main Valve Actuation Testing Series, IAB Valve Functionality Testing Series, and the Boric Acid Effects Testing Series. NuScale will perform three test-runs for each set of fluid conditions to demonstrate repeatability of the valve performance for each fluid condition set. NuScale's Test Design Report provided a comparison of the main valve, IAB valve, trip valve, and reset valve used for the ECCS valve design demonstration testing and the actual valve design. The NuScale Test Design Report



also described the test setup, elevations, arrangements, and heating of the valve hydraulic lines. NuScale's Test Equipment Error and Accuracy Report further described the measurement and accuracy of the data acquisition system (DAS) to be used for the ECCS valve design demonstration tests. NuScale's As-Built and Dimensional Inspection Report also provided detail for the as-built dimensions for the test hardware and setup required for the ECCS valve design demonstration testing.

The NRC inspection team noted that the NuScale test plans and procedures included appropriate objectives for the ECCS valve design demonstration testing, including demonstration of the main and IAB valve's functionality at operating fluid temperature, pressure and chemistry conditions. The NRC inspection team determined that the testing plans and procedures will provide appropriate demonstration of the performance of the RRV system over the range of fluid conditions applicable to the operating conditions of the NuScale reactor design.

The NRC inspection team observed the performance of a successful test of the RRV system at subcooled pure water conditions as part of the IAB Valve Functionality Testing Series. The NRC inspection team did not identify any concerns with the performance of the test or the test results. Following the test, the NRC inspection team conducted a walkdown of the test setup to verify its consistency with the test plans and verified proper measuring and test equipment (M&TE) identification and calibration.

The NRC inspection team reviewed NuScale's response to three testing issues that were identified by TR. NuScale reported the IAB valve failed to close during an IAB Valve Functionality Test at the specified pressure and temperature range with pure water for the RRV system. NuScale issued Condition Report (CR) CR-0619-65832 on June 4, 2019, in response to the IAB valve test failure that resulted in the main valve opening prematurely. NuScale reported another failure of an IAB Valve Functionality Test as the main valve failed to open at the specified temperature and pressure range for subcooled pure water of the RRV system. NuScale initiated a test stand-down to allow a thorough evaluation of the cause of the test failure. NuScale issued CR-0619-65857 on June 5, 2019, in response to the test failure of the main valve. Following this failure, the test valves were disassembled and the internals of the main valve and IAB valve were inspected. The inspection of the main valve did not reveal internal wear issues. However, the IAB valve disk surface indicated wear. NuScale and TR planned to lap the IAB valve seating surfaces prior to reassembly. Following the inspection of the disassembled main valve and IAB valve, the NRC inspection team conducted a walkdown of the test setup, which included a modification to provide a larger and more direct exhaust line after the trip valve. NuScale planned to conduct testing to evaluate the cause of the main valve failure. NuScale notified the NRC of a loss of data event during an IAB valve functionality test at the specified pressure and temperature for subcooled pure water of the RRV system. NuScale prepared CR-0619-65860 on June 5, 2019, in response to this loss of test data. This issue occurred following the test observed by the NRC inspection team. Immediately following the test, NuScale presented the performance data for the RRV valve system, including the trip valve, IAB valve, and main valve to the NRC inspection team. The NRC inspection team did not identify any concerns with the results obtained from the performance data. NuScale subsequently repeated the test run to provide a complete data set and address the proper control of test data to avoid future data transfer issues. The NRC inspection

team evaluated the corrective actions by NuScale in response to these testing issues. No findings of significance were identified.

c. Conclusions

The NRC inspection team concluded that NuScale is implementing its oversight of TR's test control and configuration management in accordance with the regulatory requirements of Criterion III, "Design Control," Criterion XI, "Test Control," and Criterion XVI, "Corrective Action," of Appendix B to 10 CFR Part 50 for the ECCS valve design demonstration testing to satisfy 10 CFR 52.47(c)(2) and 10 CFR 50.43(e). Based on the sample of documents reviewed and activities observed, the NRC inspection team also determined that NuScale is implementing its policies and procedures associated with test control and configuration management for ECCS valve design demonstration testing. No findings of significance were identified.

2. Control of Measuring and Test Equipment

a. Inspection Scope

The NRC inspection team evaluated NuScale's policies and implementing procedures that govern the control of M&TE to verify compliance with the regulatory requirements of Criterion XII, "Control of Measuring and Test Equipment," of Appendix B to 10 CFR Part 50. The NRC inspection team verified that the calibration of M&TE was traceable to an approved standard and reviewed calibration records for a sample of test instrumentation for the ECCS valve design demonstration testing to ensure compliance with testing and procedural requirements. Additionally, the NRC inspection team verified calibrations were current for instrumentation used in the testing activity and verified that the testing instrumentation range, accuracy and uncertainty were adequate for the ECCS valve design demonstration testing.

The NRC inspection team verified that M&TE procedures were controlled, M&TE calibrated, and are verified accurate at prescribed intervals before use. In addition, the NRC inspection team verified the type, range and accuracy of M&TE conform to the procedural requirements, controls were in place for the disposition of M&TE found to be out of calibration, and documented evaluations for acceptability were established. The attachment to this inspection report lists the individuals interviewed and documents reviewed by the NRC inspection team.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The NRC inspection team concluded that NuScale is implementing its oversight of TR's M&TE program in accordance with the regulatory requirements of Criterion XII, "Control of Measuring and Test Equipment," of Appendix B to 10 CFR Part 50. Based on the sample of documents reviewed and activities observed, the NRC inspection team also determined that NuScale is implementing its policies and

procedures associated with control of M&TE for ECCS valve design demonstration testing. No findings of significance were identified.

### 3. Training and Qualification of Personnel

#### a. Inspection Scope

The NRC inspection team reviewed NuScale's procedures to verify that training programs had been established and implemented for the indoctrination and training of TR personnel performing test activities and were consistent with the requirements in Criterion II, "Quality Assurance Program," of Appendix B to 10 CFR Part 50. The NRC inspection team reviewed the training and qualification process for TR's test personnel to verify conformance with NuScale's procedural and regulatory requirements. Specifically, the NRC inspection team reviewed TR's training procedure and the training records for six test personnel supporting NuScale's ECCS valve design demonstration testing.

The NRC inspection team discussed the personnel training and qualification process with NuScale's management. The attachment to this inspection report lists the individuals interviewed and documents reviewed by the NRC inspection team.

#### b. Observations and Findings

No findings of significance were identified.

#### c. Conclusions

The NRC inspection team concluded that NuScale is implementing its oversight of TR's training and qualification programs in accordance with the regulatory requirements of Criterion II, "Quality Assurance Program," of Appendix B to 10 CFR Part 50. Based on the sample of documents reviewed and activities observed, the NRC inspection team also determined that NuScale is implementing its policies and procedures associated with training and qualification for ECCS valve design demonstration testing. No findings of significance were identified.

### 4. Quality Assurance Records

#### a. Inspection Scope

The NRC inspection team reviewed NuScale's policies and implementing procedures that govern QA records program to verify compliance with the Criterion XVII, "Quality Assurance Records," of Appendix B to 10 CFR Part 50. The NRC inspection team verified NuScale's record requirements provide assignment of records, responsibilities, retention periods and storage condition requirements. The NRC inspection team verified sufficient records are generated to document activities affecting quality, such as the results of reviews, inspections, tests, audits, process monitoring, materials analyses and records for qualification for personnel, procedures, and equipment. The NRC inspection team also verified that quality records are retrievable, legible, adequate, and

are adequately protected. The NRC inspection team verified that appropriate provisions have been established to maintain electronic media records.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The NRC inspection team concluded that NuScale is implementing its oversight of TR's QA records program in accordance with the regulatory requirements of Criterion XVII, "Quality Assurance Records," of Appendix B to 10 CFR Part 50. Based on the sample of documents reviewed and activities observed, the NRC inspection team also determined that NuScale is implementing its policies and procedures associated with quality assurance records for ECCS valve design demonstration testing. No findings of significance were identified.

5. Oversight of Contracted Activities and Audits

a. Inspection Scope

The NRC inspection team reviewed NuScale's policies and implementing procedures that govern its oversight of contracted activities to verify compliance with the requirements of Criterion VII, "Control of Purchased Material, Equipment, and Services," and Criterion XVIII, "Audits," of Appendix B to 10 CFR Part 50. The NRC inspection team reviewed procedures and controls for commercial-grade dedication of calibration or testing services and ensured the appropriate requirements were imposed in the procurement documents. The NRC inspection team reviewed a sample of purchase orders to verify inclusion, as appropriate, of the scope of work and the extension of contractual requirements to subcontractors. The NRC inspection team reviewed NuScale's Evaluated Suppliers List and reviewed the methodology of conducting and documenting audits of TR. The NRC inspection team reviewed NuScale's process of selecting and approving TR for ECCS valve design demonstration testing services.

The NRC inspection team reviewed a sample of audits and the qualifications of NuScale's auditors to verify the implementation of the audit program. The NRC inspection team verified that NuScale had prepared and approved plans that identify the audit scope and applicable checklist criteria before the initiation of the audit activity.

The NRC inspection team also discussed the oversight of contracted activities and the audit program with NuScale's management and technical staff. The attachment to this inspection report lists the documents reviewed and personnel interviewed by the NRC inspection team.

b. Observations and Findings

No findings of significance were identified

c. Conclusions

The NRC inspection team concluded that NuScale is implementing its oversight of contracted activities in accordance with the regulatory requirements of Criterion VII and Criterion XVIII of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed and activities observed, the NRC inspection team determined that NuScale is implementing its policies and procedures associated with oversight of contracted activities for ECCS valve design demonstration testing. No findings of significance were identified.

6. Exit Meeting

On June 3, 2019, the NRC inspection team discussed the scope of the inspection with Cyrus Afshar, NuScale's Supervisor, Regulatory Affairs, and NuScale and TR personnel. On June 6, 2019, the NRC inspection team presented the inspection results and observations during an exit meeting with Mr. Afshar, and NuScale and TR personnel. The attachment to this report lists the attendees of the entrance and exit meetings, as well as those individuals whom the NRC inspection team interviewed.

## ATTACHMENT

### 1. PERSONS CONTACTED

<b>Name</b>	<b>Title</b>	<b>Affiliation</b>	<b>Entrance</b>	<b>Exit</b>	<b>Interviewed</b>
Aaron Armstrong	Reactor Operations Engineer	NRC	X	X	
Paul Prescott	Senior Reactor Operations Engineer	NRC	X	X	
Robert Houser	Manager, Testing & Code Development	NuScale	X	X	X
Cyrus Afshar	Licensing Supervisor	NuScale	X	X	X
Michael Smith	QA Specialist	NuScale	X	X	X
Maurice LaFountain	Program Manager	NuScale	X	X	X
Zack Houghton	Engineering Manager	NuScale	X	X	X
Thomas Scarborough	Senior Mechanical Engineer	NRC	X	X	
Clint Ashley	Reactor Systems Engineer	NRC	X		
Greg Sanh	HR Manager	Target Rock	X		
Steve Pauy	VP Nuclear	Target Rock	X	X	X
Shanlai Lu	Senior Reactor Systems Engineer	NRC	X		
James D. White	Senior General Manager TR Group	Target Rock	X		
Michael Cinque	General Manager	Target Rock	X	X	
Bradyn Wuth	Test Program specialty	NuScale	X	X	X
Daniel Lassiter	Design Engineer	NuScale	X	X	X
Alex DiMeo	Director of Quality Assurance	Target Rock	X	X	X

Hugh O'Brien	Chief Engineer	Target Rock	X	X	X
William Velkoff	Design Engineering Manager	Target Rock	X	X	X
Chris Lewis	Project Manager	Target Rock	X	X	X
Scott Schoeps	Manager Assembly and Test	Target Rock	X	X	X
John DeBonis	QA Manager	Target Rock	X	X	X
Stewart Bynoe	Unit Controller	Target Rock	X	X	
Mike Grant	Director of Manufacturing Operations	Target Rock	X		
Thomas W. Carr	Program Manager	Target Rock	X	X	
Ed Bradshaw	Director Program Manager	Target Rock		X	
Timothy Beville	Program Manager	Department of Energy		X	

2. INSPECTION PROCEDURES USED

Inspection Procedure 35034, "Design Certification Testing Inspection," dated January 27, 2010

Inspection Procedure 35017, "Quality Assurance Implementation Inspection," dated July 29, 2008

3. LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

None

4. LIST OF ACRONYMS USED

ADAMS	Agencywide Documents Access and Management System
ASME	American Society of Mechanical Engineers
CFR	<i>Code of Federal Regulations</i>
CNV	Containment Vessel
CR	Condition Report
DAS	Data Acquisition System
DCA	Design Certification Application
DIRS	Division of Inspection and Regional Support
ECCS	Emergency Core Cooling System
FOAK	First-of-a-Kind
IAB	Inadvertent Actuation Block
IP	Inspection Procedure
M&TE	Measuring and Test Equipment
NRC	(U.S.) Nuclear Regulatory Commission
NRO	Office of New Reactors
NRR	Office of Nuclear Reactor Regulation
PO	Purchase Order
QA	Quality Assurance
QAPD	Quality Assurance Program Description
IQVB	Quality Assurance Vendor Inspection Branch
RCS	Reactor Coolant System
RPV	Reactor Pressure Vessel
RRV	Reactor Recirculation Valve
RVV	Reactor Vent Valve
SOW	Statement of Work
TR	Target Rock
U.S.	United States (of America)



## 5. DOCUMENTS REVIEWED

### NuScale Documents

NuScale Final Safety Analysis Report, Tier 2, Section 6.3, "Emergency Core Cooling System," Revision 2

NuScale Design Specification EQ-B020-2140, "ASME Design Specification for Emergency Core Cooling System Valves," Revision 3, dated February 14, 2018

NuScale SW-1018-62176, "ECCS Valve DCA Demonstration Statement of Work," Revision 3, dated May 20, 2019

NuScale Task Order 25, Revision 0, SW-1018-62176, Revision 0, dated February 5, 2019

NuScale Task Order 25, Revision 1, SW-1018-62176, Revision 1, dated March 20, 2019

NuScale Task Order 25, Revision 3, SW-1018-62176, Revision 3, dated May 22, 2019

NuScale Presentation, Entrance Meeting – NRC Inspection and Audit ECCS Valve Demonstration Test, dated June 3-7, 2019

NuScale TSD-B020-6749, "NuScale ECCS Valve DCA Demonstration Test Specification," Revision 1, dated March 12, 2019, and Revision 2, dated April 30, 2019

NuScale SDR-0319-7142, "Project Execution Plan for NuScale ECCS Valve DCA Demonstration Testing," Revision 1, dated May 23, 2019, with TRP 10099, Revision A, dated May 21, 2019

NuScale SDR-0319-7143, "Project Specific Quality Plan for NuScale ECCS Valve DCA Demonstration Testing," Revision 1, dated May 23, 2019, with TRP 10100, Revision A, dated May 21, 2019

NuScale SDR-0419-7206, "ECCS Valve Demonstration Test Program Test Requirements Compliance Matrix," Revision 2, May 28, 2019, with TRP 10101, Revision A, May 21, 2019

NuScale SDR-0519-7256, "Test Design Report for NuScale ECCS Valve DCA Demonstration Testing," Revision 3, dated May 29, 2019, with TRP 10102, Revision C, dated May 24, 2019

NuScale SDR-0519-7257, "Test Procedure and Plan, NuScale Emergency Core Cooling System Valve DCA Demonstration Testing," Revision 2, dated May 29, 2019, with TRP 10103, Revision B, dated May 24, 2019

NuScale SDR-0519-7260, "As-Built and Dimensional Inspection Report, NuScale Emergency Core Cooling System Valve DCA Demonstration Testing," Revision 0, dated May 28, 2019, with TRP 10104, May 23, 2019

NuScale SDR-0519-7261, "ECCS Valve DCA Demonstration Test Equipment Error and Accuracy Report," Revision 0, May 29, 2019, with TRP 10105, dated May 24, 2019

NuScale TRR-0519-65243, "ECCS Valve DCA Demonstration Testing," Revision 0, dated May 30, 2019

Contract Order (CO) 1012-2074, "Task Order for SOW (Statement of Work) SW 1016-6276," Revision 0, dated February 4, 2019

CO 1012-2074, "Task Order for SOW (Statement of Work) SW 1016-6276," Revision 1, dated March 18, 2019

CO 1012-2074, "Task Order for SOW (Statement of Work) SW 1016-6276," Revision 2, dated May 5, 2019

CO 1012-2074, "Task Order for SOW (Statement of Work) SW 1016-6276," Revision 0, dated May 20, 2019.

SW-1018-62176, "ECCS Valve Demonstration Statement of Work," Revision 0, dated January 15, 2015.

TRP No.10100, "Project Specific Quality Plan (PQP)," Revision A, dated May 21, 2019

NuScale Evaluated Suppliers List (ESL)

Audit #A2-0217-52992, NuScale Audit of Target Rock, Revision 0, dated May 19, 2017

Supplier Corrective Action Report (SCAR) SF-0417-53620, "Qualification Records Identified as Nonpermanent," dated April 13, 2017

SCAR SF-0417-53671, "Scope of Accreditation not Identified by Target Rock," dated April 13, 2017

Letter LO-0918-61910, "NuScale Power, LLC, Submittal of Resolution Plans and Classification for ECCS Value FMEA Audit Follow-up Items," dated September 21, 2018

TSD-B020-6749, "ECCS Value DCA Demonstration Test Specification," dated April 30, 2019.

### Policy and Procedures

NuScale QP-1603-12896, "Corrective Action Program," Revision 8, dated January 1, 2019

NuScale Licensing Topical Report NP-TR-1010-859-NP, "NuScale Topical Report: Quality Assurance Plan Description for the NuScale Power Plant," Revision 4, dated April 17, 2017

Target Rock QMP-1010, "Inspection and Testing," Revision H, dated October 1, 2013

Target Rock QMP-1011, "Control of Inspection, Measuring, and Test Equipment," Revision K, dated September 12, 2018

Target Rock QMP-1023, "Energy Products Nuclear Quality Assurance Manual," Edition 10, Revision 2, dated November 8, 2018

Target Rock QMP-104, "Control of Inspection, Measurement and Test Equipment," Revision K, dated September 12, 2018.

NuScale EP-1103-2992, "Test Control," Revision 10, dated November 26, 2018

### Valve Drawings

NuScale Engineering Drawing (ED)-B020-2617, "Reactor Vent Valve Drawing," Revision 1, dated March 29, 2018, forwarding Target Rock Drawing No. ECCS-RVV-001, "Reactor Vent

Valve (RVV) Assembly, Pilot Operated, Fail Open, On/Off, NPS 5 Class 2500, Flanged," Revision 2, dated September 15, 2017

NuScale ED-B020-2650, "Reactor Recirculation Valve Drawing," Revision 1, dated March 29, 2018, forwarding Target Rock Drawing No. ECCS-RRV-001, "Reactor Recirculation Valve (RRV) Assembly, Pilot Operated, Fail Open, On/Off, NPS 2 Class 2500, Flanged," Revision 2, dated September 15, 2017

NuScale ED-B020-5679, "Inadvertent Actuation Block Drawing," Revision 1, dated March 29, 2018, forwarding Target Rock Drawing No. ECCS-IAB-001, "IAB Valve Assembly," Revision 2, dated September 15, 2017

NuScale ED-B020-2651, "Trip and Reset Valves Drawing," Revision 1, dated March 29, 2018, forwarding Target Rock Drawing No. ECCS-TRV-001, "Trip/Reset Valve (TRV) Assembly, On/Off, NPS 3 Schedule 160 BW Connection," Revision 2, dated September 15, 2017

NuScale ED-B020-5690, "Single Trip Valve Drawing," Revision 1, dated March 29, 2018, forwarding Target Rock Drawing No. ECCS-TV-001, "Trip Valve (TV) Assembly, On/Off, NPS 3 Schedule 160 BW Connection," Revision 2, dated September 15, 2017

#### Target Rock Reports

Target Rock Report No. 9967, "NuScale ECCS RVV Diffuser Report," Revision B, dated April 30, 2019

Target Rock Report No. 10013, "System Description and Summary Report for Detail Design of the Emergency Core Cooling (ECC) System Valves," Revision A, dated March 9, 2018 (draft update)

Target Rock Report No. 10028, "Technical Manual for the NuScale Power Module ECCS IAB Target Rock Value Model ECCS-IAB-001," Revision 0, dated March 27, 2018

#### Nonconformance and Corrective Action Reports

NuScale Condition Report CR-0619-65832, "Anomaly during ECCS testing," dated June 4, 2019

NuScale Condition Report CR-0619-65857, "Anomalous Test Run of ECCS Main Valve," dated June 5, 2019

NuScale Condition Report CR-0619-65860, "Loss of Test Data," dated June 5, 2019

#### Calibration Certificates

Certificate of Calibration (CCAL) Hot Loop Gauge Calibration System, DAS Serial No. 7342, dated May 28, 2019

CCAL Pressure gage /Digital, ID #TR7375, dated September 22, 2018

CCAL Pressure gage /Digital, ID #TR7377, dated May 22, 2019

CCAL Pressure gage /Digital, ID #TR7376, dated May 21, 2019

CCAL Pressure gage /Digital, ID #TR7374, dated May 21, 2019

CCAL Pressure gage /Digital, ID #TR7373, dated May 21, 2019

CCAL Pressure gage /Digital, ID #TR7372, dated May 22, 2019

CCAL Calibrator/Temperature /Digital, ID #TR5320, dated May 24, 2019

CCAL Volt/mA Calibrator, ID #TR7245, dated May 23, 2019

CCAL Pressure gage /Digital, ID #TR7371, dated May 21, 2019

MSC Calibration, Inc., Certificate of Calibration Test #90322-D04, Stopwatch, Calibration dated April 8, 2019

ANSI National Accreditation Board, Certification of Accreditation for MCS Calibration, dated April 15, 2019

GraLAB Time Serial No. TR 6350 Critical Characteristic Attribute Verification, dated April 30, 2019

#### Miscellaneous Documents

LabChem Certificate of Analysis, Borated Water, Manufacture dated April 8, 2019

Target Rock Purchase Order (PO) #50653, "MCS Calibration Inc services," dated January 11, 2019

Target Rock PRS 07-16, "Procurement Specification on Calibration Services," Revision 2, dated August 10, 2017

Baron Analytical Laboratories, Boric Acid Sample Testing, dated May 30, 2019