

October 7, 2015

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

SUBJECT: NUCLEAR REGULATORY COMMISSION INSPECTION OF NUSCALE  
POWER LLC REPORT NO. 99901351/2015-201 AND NOTICE OF VIOLATION

Dear Mr. Bergman:

From August 24 through August 27, 2015, the U.S. Nuclear Regulatory Commission (NRC) staff conducted an inspection at the Oregon State University (OSU) facility in Corvallis, Oregon. The purpose of this technically focused inspection was to verify that NuScale Power LLC (NuScale) effectively implemented quality assurance (QA) processes and procedures for testing activities performed in support of the NuScale design certification application. The inspection focused on assessing compliance with the provisions of selected portions of Appendix B, "Quality Assurance Program 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." The enclosed report presents the results of this inspection. This NRC inspection report does not constitute NRC endorsement of your overall QA and 10 CFR Part 21, "Reporting of Defects and Noncompliance," programs.

Based on the results of this inspection, the NRC determined that one violation of NRC requirements occurred. This violation is cited in the enclosed Notice of Violation (Notice) and circumstances surrounding them are described in detail in the subject inspection report. The violation is being cited in the Notice because the NRC inspection team identified that NuScale failed to ensure that changes in configuration from an approved design were adequately documented, evaluated, and approved in accordance with procedural requirements prior to changing as-built conditions in the test facility.

You are required to respond to this letter and should follow the instructions specified in the enclosed Notice when preparing your response. If you have additional information that you believe the NRC should consider, you may provide it in your response to the Notice. The NRC review of your response to the Notice will also determine whether further enforcement action is necessary to ensure compliance with regulatory requirements.

In accordance with 10 CFR 2.390, "Public Inspections, Exemptions, Requests for Withholding," of NRC's "Rules of Practice," a copy of this letter, its enclosures, and your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's Agencywide Documents Access and Management System (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>. To the extent possible, your response should not include any personal privacy, proprietary, or Safeguards Information

so that it can be made available to the public without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request that such material be withheld from public disclosure, you must specifically identify the portions of your response that you seek to have withheld and provide, in detail, the bases for your claim (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information). If Safeguards Information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21, "Protection of Safeguards Information: Performance Requirements."

Sincerely,

Kerri A. Kavanagh, Chief **/RA/**  
Quality Assurance Vendor Inspection Branch  
Division of Construction Inspection  
and Operational Programs  
Office of New Reactors

Project No.: 0769

Enclosure:

1. Notice of Violation
2. Inspection Report No. 99901351/2015-201  
and Attachment

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Sincerely,

Kerri A. Kavanagh, Chief **/RA/**  
 Quality Assurance Vendor Inspection Branch  
 Division of Construction Inspection  
 and Operational Programs  
 Office of New Reactors

Project No.: 0769

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and Attachment

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## NOTICE OF VIOLATION

NuScale Power, LLC  
1100 NE Circle Blvd., Suite 200  
Corvallis, Oregon 97330

Project No.: 0769  
Report Number: 99901351/2015-201

During a Nuclear Regulatory Commission (NRC) inspection of NuScale Power, LLC (NuScale) conducted at Oregon State University (OSU) in Corvallis, OR, on August 24, 2015, through August 27, 2015, a violation of NRC requirements was identified. In accordance with the NRC Enforcement Policy, the violation is listed below:

- A. Criterion III, "Design Control," of Appendix B, Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, states, in part that, "measures shall be established to assure that applicable regulatory requirements and the design basis, as defined in § 50.2 and as specified in the license application, for those structures, systems, and components to which this appendix applies are correctly translated into specifications, drawings, procedures, and instructions." In addition, Criterion III states in part that, "design changes, including field changes, shall be subject to design control measures commensurate with those applied to the original design and be approved by the organization that performed the original design unless the applicant designates another responsible organization."

Section 2.3 of NuScale quality assurance program description (QAPD), "Design Control," Revision 1, states that, "The design process includes provisions to control design inputs, outputs, changes, interfaces, records, and organizational interfaces within NuScale and with suppliers. These provisions assure that design inputs (such as design bases and the performance, regulatory, quality, and quality verification requirements) are correctly translated into design outputs (such as analyses, specifications, drawings, procedures, and instructions) so that the final design output can be related to the design input in sufficient detail to permit verification."

Section 5.2(4), "Oversight and Preparation," of NuScale document No. EP-1103-2992, "Test Control," Revision 1, states in part that, "Key documents and project deliverables from test suppliers shall be reviewed by the test engineer and accepted using the owner's acceptance process (Reference 7.1.7). NuScale approval is required for all changes to approved program documentation and to the configuration of a test facility."

Contrary to the above, as of August 27, 2015, NuScale, which has the overall responsibility for design certification activities, failed to review and approve a design change OSU personnel requested, in accordance with design control measures commensurate with those applied to the original design. Specifically, NuScale failed to adequately review and approve a configuration change to NuScale Power Integral System Test (NIST)-1 test facility for removal of sparger nozzles in the emergency core cooling system (ECCS) line. NuScale did not perform a design change in accordance with their design control process and approved the removal of the sparger via email. This resulted in the as-built configuration of NIST-1 being different from the design and the controlled drawings.

This issue has been identified as Notice of Violation 99901351/2015-201-01.



This is a severity Level IV violation (Section 6.9.d of the NRC Enforcement Policy).

Pursuant to the provisions of 10 CFR 2.201, NuScale is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-001 with a copy to the Chief, Quality Assurance Vendor Inspection Branch, Division of Construction Inspection Programs, New Reactor Office within 30 days of the date of the letter transmitting this Notice of Violation. This reply should be clearly marked as a "Reply to a Notice of Violation 99901351/2015-201-01 and should include for each violation: (1) the reason for the violation, or, if contested, the basis for disputing the violation or severity level, (2) the corrective steps that have been taken and the results achieved, (3) the corrective steps that will be taken, and (4) the date when full compliance will be achieved. Your response may reference or include previously docketed correspondence, if the correspondence adequately addresses the required response. Where good cause is shown, consideration will be given to extending the response time.

If you contest this enforcement action, you should also provide a copy of your response, with the basis for your denial, to the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001.

Because your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>, to the extent possible, it should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the public without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information.

If you request withholding of such material, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim of withholding (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information). If safeguards information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21.

**Dated this the 07 day of October, 2015.**

**U.S. NUCLEAR REGULATORY COMMISSION  
OFFICE OF NEW REACTORS  
DIVISION OF CONSTRUCTION INSPECTION  
AND OPERATIONAL PROGRAMS  
DESIGN CERTIFICATION TESTING INSPECTION REPORT**

Project No.: 0769

Report No.: 99901351/2015-201

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

Applicant Contact: Mr. Steven Mirsky,  
P.E. Lead Licensing  
Engineer

Nuclear Industry Activity: NuScale Power, LLC, notified the U.S. Nuclear Regulatory Commission in January 2008 of its intent to begin the pre-application review process for its small modular reactor design certification. NuScale contracted the services of Oregon State University (OSU) to perform testing services on NuScale Power Integral System Test (NIST)-1 facility, a scaled thermal-hydraulic model of the NuScale design. OSU has performed similar testing for other reactor vendors.

Inspection Dates: August 24 to August 27, 2015

Inspectors: Thomas Kendzia NRO/DCIP/QVIB Team Leader  
Jose Jimenez NRO/DCIP/EVIB  
Annie Ramirez NRO/DCIP/EVIB  
Peter Lien RES/DSA/RSAB  
Timothy Drzewiecki NRO/DSRA/SPSB  
Jeffery Schmidt NRO/DSRA/SPSB

Approved by: Kerri A. Kavanagh, Chief  
Quality Assurance Vendor Inspection Branch  
Division of Construction Inspection  
and Operational Programs  
Office of New Reactors

## **EXECUTIVE SUMMARY**

NuScale Power LLC  
Project No. 0769

The U.S. Nuclear Regulatory Commission (NRC) conducted this design certification testing inspection to verify that NuScale Power, LLC, (hereafter referred to as NuScale), and Oregon State University (OSU) implemented an adequate quality assurance (QA) program in support of design certification testing, 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 also verified that NuScale and OSU implemented a program that meets the requirements of 10 CFR Part 21, "Reporting of Defects and Noncompliance." The NRC inspection team conducted the inspection at the OSU testing facility in Corvallis, Oregon, from August 24 to August 27, 2015.

In January 2008, NuScale notified the NRC of its intent to begin the pre-application review process for its advanced reactor design. NuScale is required to prepare its application for a certified design in accordance with the quality assurance program requirements of 10 CFR Part 50, Appendix B. Inspection Manual Chapter (IMC) 2508, "Construction Inspection Program: Design Certification," provides staff guidance on verifying quality processes used during the development of design certification applications, including inspection of design qualification testing. The NuScale design includes several unique features, including a natural circulation reactor coolant system (RCS) contained within the reactor vessel, and a high pressure containment vessel (CNV) submerged within a large pool that acts as the ultimate heat sink. NuScale is developing and testing computer code design analysis software to support the design certification of their advanced light water reactor (LWR) design. For evaluation of the thermal-hydraulic response to loss of coolant accidents, NuScale plans to use the NRELAP5 code, which was developed based on the Idaho National Engineering Laboratory RELAP5-3D computer code. The OSU facility includes the NuScale Power Integral System Test (NIST)-1 facility, which is a scaled integrated thermal hydraulic model of the NuScale reactor design. NuScale contracted the services of OSU to conduct testing on the NIST-1 facility in support of the NRELAP5 code verification and to validate some of the passive safety features. OSU has performed similar testing for other reactor vendors. NuScale plans to collect data of thermal hydraulic response for a selection of design basis small break loss of coolant accidents (LOCAs) and non-LOCAs to benchmark the computer code predictions against actual measurements.

This technically focused inspection evaluated portions of the implementation of NuScale's and OSU's QA programs associated with design certification testing being performed at the NIST-1 facility. There were 3 significant focus areas to this inspection:

- implementation of the scaling methodology to provide an accurate thermal hydraulic model (constructed as the NIST-1 facility)
- implementation of the validation methodology for the NRELAP5 code; and
- operation of the NIST-1 facility to perform quality testing.

The NRC inspection team observed in part the following testing-related activities:

- pretest valve lineup
- pretest personnel briefing
- test performance (up to the point of a seal failure that caused test termination)
- test termination activities

The NRC inspection team also performed a NIST-1 facility walkdown to verify, in part, that:

- NIST-1 facility was constructed in accordance with the drawings
- measuring and test equipment (M&TE) was properly identified, marked, calibrated and used within the calibration range; and
- a nonconforming orifice installed for the test was identified and tagged in the field and properly recorded and accepted by the design authority in test documentation

Appendix B to 10 CFR Part 50 and 10 CFR Part 21 served as the bases for the NRC inspection. The inspectors used Inspection Procedure (IP) 35034, "Design Certification Testing Inspection," dated January 27, 2010; IP 35017, "Quality Assurance Implementation Inspection," dated July 29, 2008; and IP 36100, "Inspection of 10 CFR Part 21 Programs for Reporting Defects and Nonconformance," dated February 13, 2012.

With the exception of one violation described below, the NRC inspection team concluded that NuScale's and OSU's QA policies and procedures complied with the applicable requirements in 10 CFR Part 21 and Appendix B to 10 CFR Part 50, and that both NuScale and OSU personnel were implementing these policies and procedures effectively. The results of this inspection are summarized below.

#### Scaling and NIST-1 Facility Design

The NRC inspection team determined that NuScale did not adequately implement the requirements of Criterion III, "Design Control," of Appendix B to 10 CFR Part 50. The NRC inspection team issued Notice of Violation 99901351/2015-201-01 for NuScale's failure to ensure that changes in configuration from an approved design were adequately documented, evaluated, and approved in accordance with procedural requirements prior to changing as-built conditions in the NIST-1 facility.

#### Test Specification and Test Control

The NRC inspection team concluded that the NuScale design requirements for the Chemical and Volume Control System (CVCS) line break test (HP-06) were appropriately incorporated into the test specifications in accordance with Criterion III, "Design Control" of Appendix B to 10 CFR Part 50. The NRC inspection team also concluded that the translation of NuScale's HP-06 test specification into a OSU test program and implementation of the OSU's test control program were consistent with the regulatory requirements of Criterion XI, "Test Control" of Appendix B to 10 CFR Part 50. No findings of significance were identified.

#### NRELAP5 Code Validation

The NRC inspection team concluded that the NuScale's process and procedures, for the NRELAP5 code development and validation, were consistent with the guidance of RG 1.203,

“Transient and Accident Analysis Methods.” Based on the limited sample of documents reviewed, the NRC inspection team determined that NuScale was implementing the process in accordance with their procedures. No findings of significance were identified.

#### Control of Measuring and Test Equipment

The NRC inspection team concluded that OSU established a 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 documents reviewed, the NRC inspection team determined that OSU was adequately implementing its M&TE program in support of NuScale’s NIST-1 testing activities. No findings of significance were identified.

#### Control of Purchased, Material, Equipment, and Services

The NRC inspection team concluded that NuScale established a procurement program consistent with the regulatory requirements of Criterion IV, “Procurement Document Control,” and VII, “Control of Purchased Material, Equipment, and Services,” of Appendix B to 10 CFR Part 50. Based on the limited of documents reviewed, the NRC inspection team determined that NuScale was adequately implementing its procurement program. No findings of significance were identified.

#### 10 CFR Part 21 Program

The NRC inspection team concluded that NuScale and OSU established programs consistent with the regulatory requirements of 10 CFR Part 21. Based on the limited sample of documents reviewed, the NRC inspection team determined that NuScale and OSU were adequately implementing their policies and procedures in support of NuScale’s NIST-1 testing activities. No findings of significance were identified.

#### Training and Qualification of Personnel

The NRC inspection team concluded that OSU 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 OSU was adequately implementing their policies and procedures in support of NuScale’s NIST-1 testing activities. No findings of significance were identified.

#### Quality Assurance Records

The NRC inspection team concluded that NuScale’s and OSU’s established programs were consistent with the regulatory requirements of Criterion XVII, “Quality Assurance Records,” of Appendix B to 10 CFR Part 50. No findings of significance were identified.

#### Corrective Actions and Nonconformances

The NRC inspection team concluded that NuScale’s and OSU’s program requirements for nonconformance and corrective action were consistent with the requirements of Criterion XV “Nonconforming Material, Parts, or Components,” and Criterion XVI “Corrective Action,” of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the NRC inspection team also determined that NuScale and OSU were adequately implementing their

nonconformance and corrective action programs in support of NuScale's NIST-1 testing activities. No findings of significance were identified.

## **REPORT DETAILS**

### 1. Scaling and NIST-1 Facility Design

#### a. Inspection Scope

The NRC inspection team examined the implementation of NuScale design and test control programs in support of the scaling and code validation tests performed by OSU to verify the NRELAP5 code for transient and accident analysis in support of the NuScale design certification. The NRC inspectors reviewed the NuScale statement of work (SOW) and master service agreements used to contract OSU for the performance of testing to ensure they addressed the requirements of Criterion III, "Design Control," and Criterion XI, "Test Control" 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." The NRC inspectors also reviewed the NuScale quality assurance program description (QAPD) Section 2.3 "Design Control," and Section 2.11 "Test Control," for consistency with Criteria III and XI of Appendix B to 10 CFR 50. In addition, the NRC inspectors reviewed the test procedures developed by OSU to confirm that they were consistent with the NuScale QAPD requirements for controlling, revising, and communicating any changes in the test protocols, including test facility NIST-1 configuration changes. Elements of the test procedures evaluated for this inspection included the adequacy of test requirements and acceptance criteria in flowing down applicable design requirements, proper scaling of NIST-1, and technical guidance. The NRC inspection team reviewed OSU test records for adequacy of information recorded, including identification of test personnel, as-built test configurations, test procedures, documentation of results, and reviews for acceptability of results. The NRC inspectors also reviewed NuScale and OSU design control procedures to ensure that NuScale considered the effect of changing design on the NIST-1 facility, and that OSU required design authority review by NuScale for any changes to the NIST-1 facility.

The NRC inspection team reviewed portions of the scaling performed in support of design and construction of the NIST-1 facility. NuScale stated that they followed the Hierarchical 2-Tier Scaling (H2TS) methodology, addressed in NUREG/CR-5809, which was approved for use in previous NRC applications. The NRC inspection team confirmed that a sample of the actual scaling done for NIST-1, met the H2TS methodology, by reviewing the test facility geometry derivation and construction. The NRC inspectors reviewed the NuScale scaling analysis report and its associated calculation documents, scaling ratios and non-dimensional parameters documentation, for consistency with the H2TS methodology. The NRC inspection team reviewed how NuScale generated the NIST-1 components geometry dimension (length, area, volume and power) from the current design based on the derived scaling ratios. This derivation covers the reactor pressure vessel, CNV, cooling pool, emergency core cooling system (ECCS) piping, and the secondary network.

The NRC inspection team also performed two independent verifications of the scaling calculation; one for containment geometry (volume, area and length) and the other for the helical coil steam generator geometry (area and length). For containment, the NRC

inspectors hand calculated the length, volume, and area of the 8 zones (1, 2, 3a, 3b, 4, 5, 6a and 6b) included in the containment. The NRC inspection team compared the independent results to the numbers provided by NuScale to verify that the deviation between both calculations were within the 0.1% range for volume and length. The NRC inspectors performed a similar deviation analysis for the helical coil heat transfer area, to ensure it was scaled correctly for one NuScale steam generator.

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

b. Observations and Findings

The NRC inspection team evaluated NuScale test plans and the scaling of the NIST-1 test facility. As part of the evaluation, NuScale provided different drawings detailing the reactor design, the scaled down design, and the as-built NIST-1 test facility design. Discussions with the engineering staff identified that the drawings provided to the NRC for review did not reflect the current as-built configuration of the NIST-1 test facility. The official drawings identified sparger inserts on the nozzles in the ECCS line discharging in the NIST-1 CNV, which were removed in the as-built NIST-1 facility. OSU and NuScale engineering staff explained that OSU had requested approval from NuScale to remove the spargers, in order for the test to provide accurate data. NuScale provided the approval informally via email communication. The NRC inspection team reviewed the NuScale and OSU design and test control processes, specifically Section 2.3 of NuScale QAPD, "Design Control," Section 5.2(4), "Oversight and Preparation," of NuScale document No. EP-1103-2992, "Test Control," and Section 8.1, "Required Test Identification" and Section 9.0, "Facility Configuration Control" of Test Specification Document (TSD)-1014-9271, "Test Specification – NIST-1 Facility." The NRC inspection team concluded that the removal of the sparger required the use of the design control process. The consequence of not using the required process resulted in the as-built configuration of NIST-1 being different from the design and the controlled drawings. In addition, NuScale did not document the impact of the change on the flow characteristics and test parameters of the system due to the removal of the sparger. The NRC inspection team also noted a missed opportunity by NuScale and OSU to identify the discrepancy during the NuScale/OSU joint operational readiness review for the NIST-1 facility, which included verification of the as-built test facility configuration and the controlled drawings. The NRC inspectors determined that NuScale, which has the overall responsibility for design certification activities, failed to ensure that changes in configuration from an approved design were adequately documented, evaluated, and approved in accordance with procedural requirements prior to changing as-built conditions in the NIST-1 facility. This issue is identified as Notice of Violation (NOV) 99901351/2015-201-01.

c. Conclusions

The NRC inspection team determined that NuScale did not adequately implement the requirements of Criterion III, "Design Control," of Appendix B to 10 CFR Part 50. The NRC inspection team issued NOV 99901351/2015-201-01 for NuScale's failure to ensure that changes in configuration from an approved design were adequately documented, evaluated, and approved in accordance with procedural requirements prior to changing as-built conditions in the NIST-1 facility.



## 2. Test Specification and Test Control

### a. Inspection Scope

The NRC inspection team verified that the NuScale design requirements for the Chemical and Volume Control System (CVCS) line break test (HP-06) were appropriately incorporated into the test specifications in accordance with Criterion III, "Design Control" of Appendix B to 10 CFR Part 50. The NRC inspection team also verified that implementation of NuScale's and OSU's QA program for test control at the NIST-1 facility, was consistent with the regulatory requirements of Criterion XI, "Test Control" of Appendix B to 10 CFR Part 50. Specifically, the NRC inspection team reviewed: (1) the development of the NuScale's test specification for the HP-06, CVCS line break, (2) the adequacy of instrumentation placement to support data collection; (3) the translation of the NuScale HP-06 test specification into OSU's test plan and procedures; and (4) the HP-06 test preparation, performance, and data collection.

The NRC inspection team reviewed the HP-06 NuScale test specification which describes the NIST-1 plant configuration and initial conditions for the CVCS discharge pipe break test. The NRC inspection team reviewed the adequacy of the HP-06 test in representing a CVCS discharge break in the NuScale Power Module (NPM). The NIST-1 facility was limited in maximum RCS pressure relative to the NPM so some initial conditions such as representative CNV pressure, pressurizer level and decay heat correspond to conditions approximately 12 seconds into the NPM transient. The NRC inspectors reviewed the NuScale determination of the time shifted conditions, which were based on an analysis package that used NRELAP5, to determine the initial conditions when NPM RCS pressure corresponds to the maximum test NIST-1 pressure. The NRC inspection team reviewed the NREALP5 input deck and calculation for adequate engineering basis in setting the initial test conditions, in accordance with Criterion III, "Design Control" of Appendix B to 10 CFR Part 50.

The NRC inspection team reviewed the instrumentation placement for data gathering capability for the NRELAP5 validation during the HP-06 test. The NRELAP5 LOCA assessment plan lists the heat conduction between the CNV and Cooling Pool Vessel (CPV) as a high ranked phenomenon. The heat conduction is monitored by placement of thermocouples in the Heat Transfer Plate (HTP), which connects the CNV to the CPV. The NRC inspection team reviewed the NIST-1 CNV as-built drawings for the number and thermocouple placement to monitor the spatially temperature distribution allowing for the determination of the HTP heat conduction profile. The NRC inspection team reviewed the basis for thermocouple placement (engineering judgement and the lessons learned from the multi-application LWR testing), with OSU and NuScale personnel.

The NRC inspection team reviewed the translation of the NuScale HP-06 test specification, into OSU test procedure for HP-06 to verify that the test procedure was consistent with the test plan and OSU's procedures for Conduct of Operations, Conduct of Testing, and Procedures. The NRC inspection team observed performance of the HP-06 valve lineup, pre-test briefing, and test performance to verify that the test was implemented in accordance with the procedures, and OSU requirements for Conduct of Operations and Conduct of Testing. The NRC inspection team verified through

documentation review, that the data collection system, did not change the data collected. The NRC inspection team verified that the data collection system was started up in accordance with the OSU procedure "Data Acquisition and Control System Startup," for the HP-06 test observed. The NRC inspection team verified these activities met the requirements of Criterion XI, "Test Control" of Appendix B to 10 CFR Part 50.

The NRC inspection team interviewed OSU test personnel as to their training and qualifications for test performance, including prior experience, training, knowledge of valve position verification, and the use of the NIST-1 control and data acquisition system. 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 the NuScale design requirements for the CVCS line break test (HP-06) were appropriately incorporated into the test specifications in accordance with Criterion III, "Design Control" of Appendix B to 10 CFR Part 50. The NRC inspection team also concluded that the translation of NuScale's HP-06 test specification into a OSU test program and implementation of the OSU's test control program were consistent with the regulatory requirements of Criterion XI, "Test Control" of Appendix B to 10 CFR Part 50. No findings of significance were identified.

3. NRELAP5 Code Validation

a. Inspection Scope

NuScale was developing and testing the NRELAP5 code to evaluate the thermal-hydraulic response to loss of coolant accidents for the NuScale small modular reactor. The NRC inspection team reviewed (1) the overall code development plan and supporting documentation and compared the approach with Regulatory Guide (RG) 1.203, "Transient and Accident Analysis Methods," (2) the procedures controlling changes to NRELAP5, and (3) one code assessment calculation to verify that it was conducted in accordance with NuScale procedures. Specifically, the NRC inspection team reviewed the NRELAP5 Software Project Plan along with supporting documents including the NRELAP5 Software Test Plan, the NRELAP5 Software Configuration Management Plan, the NRELAP5 Software Requirements Specification, the Software Requirements Specification Procedure, the NRELAP5 Assessment Best Practices, and the NuScale Module Loss-of-Coolant Accident Phenomena Identification and Ranking Table (PIRT) for consistency with RG 1.203.

The NRC inspection team reviewed the NuScale procedures for requesting code changes in NRELAP5 and for implementing the code changes. The NRC inspectors also reviewed the implementation of this process in two examples, a NRELAP5 change request document, and a NRELAP5 change implementation document, to verify the

changes were performed in accordance with the procedure requirements. Additionally, NRC inspectors reviewed the calculation note EC-T080-3468, "NIST-1 NRELAP5 Base Input Model," and verified that the code inputs were traceable and consistent with the as-built drawings. The NRC inspectors reviewed the pre-production software anomaly procedure, which reviewed and classified software anomalies for pre-production codes. The NRC inspection team reviewed two anomaly reports to verify that the reports were classified and processed in accordance with the procedure requirements.

The NRC inspection team interviewed NuScale personnel to assess their understanding of the code validation process and how they were implementing the requirements. 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 the NuScale's process and procedures for the NRELAP5 code development and validation were consistent with the guidance of RG 1.203. Based on the limited sample of documents reviewed, the NRC inspection team determined that NuScale was implementing the process in accordance with their procedures. No findings of significance were identified.

4. Control of Measuring and Test Equipment

a. Inspection Scope

The NRC inspection team reviewed OSU's QAPD, policies and procedures for control of M&TE to verify compliance with Criterion XII, "Control of Measuring and Test Equipment," of Appendix B to 10 CFR Part 50. Specifically, the NRC inspection team reviewed OSU's NIST-1 QAPD and M&TE control plan, which describes the requirements for control and calibration of test equipment. The NRC inspection team reviewed nine different instruments associated with the NIST-1 facility and reviewed the associated documentation of M&TE calibration to verify that the M&TE was calibrated to a nationally recognized standard, the calibration was current, and that the instrumentation range, accuracy and uncertainty was adequate for the testing performed. The NRC inspection team reviewed four OSU nonconformance reports (NCRs) and one OSU corrective action report (CAR) associated with M&TE equipment out of calibration or broken to ensure M&TE program requirements were being met and previous usage of the equipment was addressed.

The NRC inspection team interviewed OSU's personnel to verify the implementation of OSU's M&TE control plan on the NIST-1 facility. 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 OSU established a 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 documents reviewed, the NRC inspection team determined that OSU was adequately implementing its M&TE program in support of NuScale's NIST-1 testing activities. No findings of significance were identified.

5. Control of Purchased, Material, Equipment, and Services

a. Inspection Scope

The NRC inspection team reviewed NuScale's policies and implementing procedures that govern the implementation of NuScale oversight of OSU contracted activities to verify compliance with Criterion IV, "Procurement Document Control," and Criterion VII, "Control of Purchased Material, Equipment, and Services," of Appendix B to 10 CFR Part 50. Specifically, the NRC inspection team verified that applicable quality requirements, including technical, regulatory, and reporting requirements, were specified in the procurement documents reviewed and extended to OSU when necessary. Additionally, the NRC inspection team reviewed the procedures and implementation for selection and qualification of vendors supplying basic components and services, through a sample of certificates of calibrations, audits, surveys, and receiving inspections.

The NRC inspection team verified the requirements imposed on OSU by NuScale in SOWs SW-1214-9965 and SW-0814-7996 to verify that the testing and operation of the NIST-1 test facility produced quality data for NuScale. The NRC inspection team reviewed the methods for obtaining data for adequacy to ensure test data produced by the facility was appropriate for validation of NuScale codes and models. The NRC inspectors also reviewed the technical evaluations and the commercial grade dedication plans developed by NuScale to ensure the proper critical characteristics of the NIST-1 facility were dedicated for the work contracted to OSU.

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 established a procurement program consistent with the regulatory requirements of Criterion IV, "Procurement

Document Control,” and VII, “Control of Purchased Material, Equipment, and Services,” of Appendix B to 10 CFR Part 50. Based on the sample of documents reviewed, the NRC inspection team determined that NuScale is adequately implementing its procurement program. No findings of significance were identified.

6. 10 CFR Part 21 Program

a. Inspection Scope

The NRC inspection team reviewed NuScale’s and OSU’s QA manuals, policies, and procedures that govern the evaluation program to determine compliance with 10 CFR Part 21. The NRC inspectors also reviewed NuScale’s procedures, Control of Nonconforming Items and Services, Corrective Action Program, and 10 CFR Part 21 program to verify adequate requirements for 10 CFR Part 21 compliance. The NRC inspection team reviewed OSU’s procedures, NIST-1 Nonconforming Item Control, and NIST-1 Corrective Action Reporting, to verify an adequate identification of conditions that could require 10 CFR Part 21 evaluation and to ensure the transfer of the responsibility for evaluation to NuScale. The NRC inspection team reviewed eleven NuScale corrective action reports (CARs), twenty OSU CARs, and sixteen OSU nonconformance reports (NCRs) to verify that NuScale and OSU were adequately screening issues for 10 CFR Part 21.

The NRC inspection team also review the purchase orders issued by NuScale to OSU related to the NIST-1 testing to verify that procurement documents included the applicability of 10 CFR Part 21, and Appendix B to 10 CFR Part 50.

The NRC inspection team discussed the Part 21 process with OSU management personnel to assess their understanding of Part 21, and how they would identify conditions that could require 10 CFR Part 21 evaluation. 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 and OSU established programs consistent with the regulatory requirements of 10 CFR Part 21. Based on the limited sample of documents reviewed, the NRC inspection team determined that NuScale and OSU were adequately implementing their policies and procedures in support of NuScale’s NIST-1 testing activities. No findings of significance were identified.

## 7. Training and Qualification of Personnel

### a. Inspection Scope

The NRC inspection team reviewed OSU's procedures to verify that OSU was implementing training activities in a manner consistent with regulatory requirements and industry standards. The NRC inspection team reviewed the training and qualification process for OSU's test personnel to verify conformance with the requirements in Criterion II, "Quality Assurance Program," of Appendix B to 10 CFR Part 50. Specifically the NRC inspection team reviewed the OSU NIST-1 Training Procedure, and quality training records for four of the OSU's NIST-1 facility operators.

The NRC inspection team discussed the personnel training and qualification process with OSU's management and interviewed four of qualified test personnel. 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 OSU 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 OSU was adequately implementing their policies and procedures in support of NuScale's NIST-1 testing activities. No findings of significance were identified.

## 8. Quality Assurance Records

### a. Inspection Scope

The NRC inspection team reviewed OSU's and NuScale's QAPD, QA processes and procedures to verify that OSU and NuScale were implementing adequate measures to review, accept and store QA records. Specifically the NRC inspection team reviewed OSU procedures for Document Control, and Records Control and Retention, and NuScale's procedure for NuScale Record Retention and Disposal Schedule to verify conformance with the requirements in Criterion XVII, "Quality Assurance Records," of Appendix B to 10 CFR Part 50.

The NRC inspection team interview key personnel from NuScale and OSU regarding the implementation of QA Records process and procedures and their understanding of Appendix B requirements for records. 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's and OSU's established programs are consistent with the regulatory requirements of Criterion XVII, "Quality Assurance Records," of Appendix B to 10 CFR Part 50. No findings of significance were identified.

9. Corrective Actions and Nonconformances

a. Inspection Scope

The NRC inspection team reviewed NuScale's QA manual, policies, and procedures that govern the implementation of corrective action and nonconformance programs, to ensure compliance with the requirements of Criterion XV and Criterion XVI of Appendix B to 10 CFR Part 50. The NRC inspection team reviewed OSU's QA manual, policies, and procedures that govern the implementation of corrective action and nonconformance programs, to ensure compliance with the requirements of Criterion XV and Criterion XVI of Appendix B to 10 CFR Part 50. The NRC inspection team reviewed ten NuScale CARs (NuScale did not have applicable NCRs) associated with the NIST-1 facility and test program to assess the effectiveness of the corrective action program. The NRC inspection team reviewed twenty OSU CARs and sixteen NCRs associated with the NIST-1 facility and test program to assess the effectiveness of the corrective action and nonconformance programs.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The NRC inspection team concluded that NuScale's and OSU's program requirements for nonconformance and corrective action were consistent with the requirements of Criterion XV "Nonconforming Material, Parts, or Components," and Criterion XVI "Corrective Action," of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the NRC inspection team also determined that NuScale and OSU were adequately implementing their nonconformance and corrective action programs in support of NuScale's NIST-1 testing activities. No findings of significance were identified.

10. Exit Meeting

On August 27, 2015, the NRC inspection team presented the inspection results during an exit meeting with Dale Atkinson, NuScale Chief Nuclear Officer, and NuScale and OSU personnel.

## ATTACHMENT

### 1. PERSONS CONTACTED

Name	Title	Affiliation	Entrance	Exit	Interviewed
Kerri Kavanagh	Branch Chief, Quality Assurance Vendor Inspection Branch	NRC		X	
Thomas Kendzia	Inspection Team Leader, Reactor Operations Engineer	NRC	X	X	
Jose Jimenez	Inspector, Reactor Operations Engineer	NRC	X	X	
Annie Ramirez	Inspector, Reactor Operations Engineer	NRC	X	X	
Timothy Drzewiecki	Technical Expert, General Engineer	NRC	X	X	
Peter Lien	Technical Expert, Senior Reactor Systems Engineer	NRC	X	X	
Jeffery Schmidt	Technical Expert, Senior Reactor Systems Engineer	NRC	X	X	
Dale Atkinson	Chief Nuclear Officer	NuScale	X	X	
Jose Reyes	Chief Technology Officer	NuScale	X	X	X
Thomas Bergman	Vice President Regulatory Affairs	NuScale	X		
Robert Houser	Manager, Testing & Code Development	NuScale	X	X	X
Adam Rasmussen	Testing Supervisor	NuScale	X	X	X
Joseph Marsden	QA Director	NuScale	X	X	X
Zachry Rad	Manager Licensing	NuScale	X	X	X
Laird Kayler	QA Manager	OSU	X	X	X
Kevin Stovall	Deputy Project Manager	OSU	X	X	X
Brian Wolf	Code Development Engineer	NuScale		X	X
Eric Young	Test Engineer	NuScale		X	X
Dustin Greenwood	Facility Manager	OSU	X		X



Matt Kizerian	NIST-1 Program Manager	NuScale	X	X	X
John Hardy	Test Engineer	OSU	X	X	X
Jeff Kosky	Licensing Engineer	NuScale		X	X
Jeffrey Lutijens	Code Development Engineer	NuScale		X	X
Claudio Deflino	Supervisor, Testing & Code Development	NuScale		X	X
Kelly Wheeler	DCRM	OSU	X	X	
Kym Brown	DCRM	OSU			X
Chelsea Donnithorne	DCRM Administrative Assistant	OSU		X	
Eric Coryell	Manager Code Validation	NuScale		X	X
Brandyn Wuth	Test Engineer	NuScale		X	X
Bruce Foster	Manager QA Audits	NuScale	X	X	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

Inspection Procedure 36100, "Inspection of 10 CFR Part 21 Programs for Reporting Defects and Nonconformance," dated February 13, 2012

3. LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

<u>Item Number</u>	<u>Status</u>	<u>Type</u>	<u>Description</u>
99901351/2015-201-01	Open	NOV	Criterion III

4. LIST OF ACRONYMS USED

ADAMS	Agencywide Documents Access and Management System
CA	Corrective Action
CFR	<i>Code of Federal Regulations</i>
CNV	Containment Vessel
CPV	Cooling Pool Vessel
CVCS	Chemical and Volume Control System
DCIP	Division of Construction Inspection and Operational Programs
ECCS	Emergency Core Cooling System
HTP	Heat Transfer Plate
H2TS	Hierarchical 2-Tier Scaling
IP	Inspection Procedure
LOCA	Loss of Coolant Accident
LWR	Light Water Reactor
M&TE	Measuring and Test Equipment
NIST	NuScale Power Integral System Test
NOV	Notice of Violation
NPM	NuScale Power Module
NRC	(U.S.) Nuclear Regulatory Commission
NRO	Office of New Reactors
OSU	Oregon State University
PIRT	Phenomena Identification and Ranking Table
PO	Purchase Order
QA	Quality Assurance
QAPD	Quality Assurance Program Description
QVIB	Quality Assurance and Vendor Inspection Branch
RES	Office of Nuclear Research
RCS	Reactor Coolant System
SOW	Statement of Work
U.S.	United States (of America)

## 5. DOCUMENTS REVIEWED

### Quality Manuals

NuScale Quality Management Plan, Revision 1, February 13, 2013  
OSU-NIST-1-15006, Quality Assurance Program Document, Revision 1, July 30, 2015

### Procedures

NuScale Power, NP-EP-1103-2992, Test Control, Revision 1, August 13, 2015

NuScale Power, NP-EP-1102-267, Testing and Code Development, Revision 2, October 2013

NuScale Power, NP-EP-0303-324 R0, Engineering Procedure 3.24 – Engineering Change Control, March 26, 2010

NuScale Power, QP-0303-1827 R1, Design Verification/Review/Approval, June 30, 2015

NuScale Power, EP-0303-1827 R0, Independent Design Verification Checklist, June 30, 2015

NuScale Power, EP-0303-303 Preparation and Approval of Engineering Calculations, Rev 12, June 23, 2015

NuScale Power, PL-1214-9983, NRELAP5 LOCA Assessment Plan, Revision 0, (undated)

NuScale Power, EP-0303-322 Use of Software Design Analysis, Rev 2, (undated)

NuScale Power, CP-0002-3566, Software Requirements Specification Procedure, June 30, 2015

NuScale Power, NP-SW-0911-019, NuScale Task Order Revision, Revision 8, July 2013

NuScale Power, NP-QP-1802-272, Audit Process, Revision 2, July 17, 2013

NuScale Power, NP-QP-0703, Supplier Evaluation and Qualification, Revision 2, November 5, 2013

NuScale Power, NP-CP-0003-4671, Pre-production Software Anomaly Procedure, Rev. 0, November 7, 2013

NuScale Power, 7150-DI-7253, NRELAP5 Change Request, July 20, 2014

NuScale Power, 7150-DI-7254, NRELAP5 Change Implementation, July 20, 2014

NuScale Power, SC-1703-00, Record Retention and Disposition Schedule, Revision 4, June 3, 2015

NuScale Power, SwMP-0304016112, NRELAP5 Software Project Plan, August 14, 2015

NuScale Power, SwTP-0304-14487, NRELAP5 Software Test Plan, June 5, 2015

NuScale Power, SwCMP-0304-15338, NRELAP5 Software Configuration Management Plan, June 19, 2015

NuScale Power, SwRS-0304014662, NRELAP5 Software Requirements Specification, May 27, 2015

NuScale Power, DI-303-11198, NRELAP5 Assessment Best Practices, July 8, 2015

OSU-NQP-1.1, OSU NIST-1 Organization and Interface Control, Revision 3, August 4, 2015

OSU-NQP-5.0, Instructions, Procedures, and Drawings, Revision 0, August 5, 2015

OSU-NQP-6.0, Document Control, Revision 6, August 5, 2015

OSU-NQP-7.0, Procurement Document Control & Purchasing, Revision 8, July 27, 2015

OSU-NQP-11.0, Test and Configuration Control, Revision 6, August 10, 2015

OSU-NQP-11.2, Test Readiness Review, Revision 4, August 11, 2015

OSU-NQP-11.3, Test Plan Sequence, Revision 0, June 11, 2015

OSU-NQP-12.0, Measurement and Test Equipment Control Plan, Revision, 4 August 4, 2015

OSU-NQP-15.0, Nonconforming Items Control, Revision 4, April 14, 2015

OSU-NQP-16.0, Corrective Action Reporting, Revision 5, August 4, 2015

OSU-NQP-17.0, Records Control and Retention, Rev 5, August 11, 2015

OSU-NIST-1 Facility Commercial Grade Dedication Plan Report CGDR-15003 dated August 14, 2015.

OSU-NIST-1, Training Procedure, Revision 3, July 14, 2015

OSU-NIST-1-15016, Preoperational Testing, Revision 2, July 10, 2015

OSU-NIST-1-15017, Operational Shakedown Testing, Revision 0, July 10, 2015

OSU-NIST-1-15039, Data Acquisition and Control System Commissioning, Revision 0, June 3, 2015

OSU-NIST-1-15024, Pre-Startup Valve and Switch Lineup, Revision 3, August 11, 2015

OSU-NIST-1-15026, Startup to Hot Standby, Revision 2, August 7, 2015

OSU-NIST-1-15018, Data Acquisition and Control System Startup, Revision 2, July 23, 2015

OSU-NIST-1-15023, DACS Software Changes Installation and Configuration Management, Revision 0, July 29, 2015

OSU-NIST-1-15060, Conduct of Operations, Revision 0, July 23, 2015

OSU-NIST-1-15065, Conduct of Testing, Revision 0, July 23, 2015

OSU-NIST-1-15045, HP-06 CVCS Discharge Pipe Break (w/oDHRS) Test Procedure, Revision 2, August 13, 2015

#### NuScale Audit Report Documents

NA-A2-0614-7379, NIST-1 OSU Audit Report, Revision 0, October 10, 2014

S2-1014-9207, Supplier Surveillance QA Record Package, Revision 0, January 9, 2015

S2-0715-15981, OSU NIST-1 Surveillance, Revision 0, August 3, 2015

#### Miscellaneous Documents

NuScale Module Loss-of-Coolant Accident Phenomena Identification and Ranking Table Rev. 0, dated March 27, 2015

Volumes, Lengths, Heat Transfer Areas, and Orifice Sizes for the NIST-1 Facility Rev. 0, dated June 29, 2015

Determination of Volumes, Elevations, and Surface Areas of Revision C NuScale Power Module Re. 0, dated June 29, 2015

NuScale Integral System Test (NIST-1) Facility Scaling Analysis Rev. 2, dated July 08, 2015

ER-0000-3095, NuScale Module Loss of Coolant Accident PIRT, dated July 27, 2015

PL-0514-7050, NIST Hardware Upgrade Commercial Grade Dedication Plan Rev.1, dated December 18, 2014

CD-0415-13805, NIST-1 Upgrade Hardware Commercial Grade Dedication Report Rev.0, dated July 2, 2015

SW-0714-7542, Tearout and Installation for NIST Facility Upgrades Rev.2, dated May 7, 2015

SW-0414-6777 Fabrication of NIST Upgrade Hardware Rev.3, dated May 7, 2015

SW-0713-4161 Detailed Engineering Design for Modifications to NIST Facility Rev.5, dated June 15, 2015

SW-1014-8801 Measurement and Verification of OSU NIST-1 Facility Dimensions (Post-Modification), dated May 19, 2015.

RP-0614-7138, Parameter List for the OSU NIST Facility (Post-Modifications) Rev.2, dated February 26, 2015

SDR-0215-11245, "14" Reactor Pressure Vessel (RPV) Modifications As-Built Drawings Rev.3, dated June 26, 2015

SDR-0315-12164, "RPV Dimensional Reconciliation Report, RPV Hand Notes" Rev. 1, dated March 25, 2015

SDR-0415-13274, "CNV Dimensional Reconciliation Report, CNV Hand Notes" Rev.0, dated April 9, 2015

TSD-1014-9271, Test Specification –NIST-1 Facility Rev.1, dated June 15, 2015

TSD-T080-10666, Volume and Elevation Characterization Rev.1, dated April 14, 2015

TSD-T080-10678, CVCS Spray Break NIST-1 HP-06 Test Specification, dated July 2, 2015

TSD-T080-15235, ECCS Vent Break Rev.1 NIST-1 HP-09 Test Specification, dated July 2, 2015

TSD-T080-10675, Discharge Pipe Break Rev.1 NIST-1 HP-09 Test Specification, dated July 2, 2015

S2-0514-7055, "Commercial Grade Survey Report – Harris Thermal Transfer Products QA Program Applied to NIST Modification Project Dimensional Inspection", dated November 11, 2014

PL-0514-7050 R1, "Surveillance Report – Harris Thermal Transfer Products (HTTP) QA Program Applied to NIST Hardware Upgrade Commercial Grade Dedication (CGD) Plan", dated May 29, 2015

OSU NIST-1 Test Facility Work Authorization Form, OSU-NIST-1-FM-11.1a-R2, TF-150X Depth Measurement

OSU NIST-1 Test Facility Work Authorization Form, OSU-NIST-1-FM-11.1a-R2, Verify Pressure and Flow Instrumentation Installation

OSU Request for Information, NIST-1-FM-01.1-R2, 15022, 8/6/15

NuScale memo, Response to RFI-15022, 8/10/15

#### Design Change Requests

DCR#15011 "Update OP-1 for Missing Valves, dated August 7, 2015

DCR#15006 "Drain Configuration Change", dated July 30, 2015

DCR#15007 "Correct ICRs and DACS ranges range for PX319-1KGI PTs", dated August 7, 2015

Procurement Documents

Statement of Work (SW)-1214-9965 Rev.2, dated July 9, 2015

SW-0814-7996 Rev.3, dated July 9, 2015

Master Service Agreement CO-0215-10975, dated February 26, 2015

NuScale Corrective Action Request Documents

CR-0514-6936, CR-0615-15274, CR-0625-15274, CR-0714-7499, CR-0814-8087, CR-1014-9061-R1, CR-1014-9178, CR-1014-9245, CR-0115-10232, CR-0315-11906, CR-0315-12709, CR-0415-13782, CR-0615-15274, CR-0715-16220

OSU Corrective Action Request (CAR) Documents

CAR# 14021, 14022, 14025, 14026, 14027, 14030, 15001, 15002, 15003, 15004, 15005, 15006, 15007, 15008, 15010, 15011, 15012, 15013, 15014, 15015

OSU NonConformance Documents (OSU- NIST-1-FM-15.0a-R1)

NCR# 14019, 14020, 14021, 14022, 15002, 15003, 15004, 15005, 15006, 15007, 15008, 15009, 15010, 15011, 15012, 15013, 15013 Rev. 1  
Supplier Deviation Notice Form -SDN-0715-16294 dated 7/28/2015.  
NCR-0914-8624, Rev. 0, 09/26/2014  
NCR-1214-9804, Rev. 0, 05/15/2015

Training and Qualification Records

OSU NIST-1 Certificates of qualification per OSU-NIST-1 FM-02.0d  
COQ# 15019 Date 8/13/2015, NIST-1 Qualification- Facility Operator Test Technician,  
Person Being Qualified: Jack Stewart, Effective Date 8/4/2015, Expiration date 8/4/2016

COQ# 15020 Date 8/13/2015, NIST-1 Qualification- Facility Operator, Test Technician,  
Person: Bob Wright, Effective Date: 8/4/2015; Expiration Date 8/4/2016

COQ# 15018 Date 8/13/2015, NIST-1 Qualification- Facility Operator, Test Technician,  
Person: Raymond Spornhauer, Effective Date: 8/4/2015; Expiration Date 8/4/2016

COQ# 15017 Date 8/13/2015, NIST-1 Qualification- Facility Operator, Test Technician,  
Person: Samuel Russ, Effective Date: 8/4/2015; Expiration Date 8/4/2016

Measurement and Test Equipment

OSU NIST-1-CP-2 Thermocouple Verification; OSU NIST-1-15035, revision 5, 8/12/2015.  
TF6021  
Date: 4/16/2015, Due date 4/16/2015

Model TJ36-CASS-18U-16-CC-SB-SMPW-M  
Serial Number 15-0289  
TF6121

Date: 4/30/2015, Due date: 4/30/2016

Model TJ36-CASS-18U-16-CC-SB-SMPW-M  
Serial Number 15-0290  
TF-3111

Date: 5/15/2015, Due Date: 5/15/2016

AFGK0FA100U403H

S/N 15-0758

TS002

Date 4/27/2016, Due 4/27/2016

TJ36-CASS-116U-6-CC-SB-SMPW-M

S/N 15-0473

OSU- NIST-1 CP-1: Rosemount Pressure Transmitter; OSU-NIST-1-15034 Revision 3,  
8/12/2015

PT-1701

Date 4/16/15, due date 4/16/16

3051CG5A02A1AH2DFM

S/N 1186887

DP-7091

Date: 4/10/15, Due date 4/10/2016

Model: 3051S1CD4A2F12A1AB2

S/N-0768156

DP-7101

Date: 4/10/2015, Due date 4/10/2016

Model: 3051S1CD4A2F12A1AB2

S/N 0768158

LPD-7241

Date: 6/16/15, Due date: 6/16/16

Model: 305181CD2A2F12A1AB2

S/N 0767895

LPD-7111

Date 6/15/2015, due date 6/15/16

Model: 3051S1CD2A2F12A1AB2

S/N 0777734

PO # 0098983 FIT Flow Technology dated 5/15/2015. Calibration of 9 flow meters.

Piping and Instrumentation Diagram

NIST-1-P-CNV-002 Rev 1, 8/11/2015

OSU NIST-1-CP-7: DACS Loop Calibration Rev 0, 7/24/2015.

(Work Authorization Form)WAF # 15031 Sensing line configuration change, dated  
7/28/2015.

(Design Change Request) DCR# 15006 Drain Configuration Change, dated 7/30/2015.

OSU NIST-1-CP-2 Thermocouple Verification; OSU NIST-1-15035, revision 5, 8/12/2015.

TF6021

Date: 4/16/2015, Due date 4/16/2015

Model TJ36-CASS-18U-16-CC-SB-SMPW-M

Serial Number 15-0289



TF6121

Date: 4/30/2015, Due date: 4/30/2016  
Model TJ36-CASS-18U-16-CC-SB-SMPW-M  
Serial Number 15-0290

TF-3111

Date: 5/15/2015, Due Date: 5/15/2016  
AFGK0FA100U403H  
S/N 15-0758

TS002

Date 4/27/2016, Due 4/27/2016  
TJ36-CASS-116U-6-CC-SB-SMPW-M  
S/N 15-0473

OSU- NIST-1 CP-1: Rosemount Pressure Transmitter; OSU-NIST-1-15034 Revision 3,  
8/12/2015

PT-1701

Date 4/16/15, due date 4/16/16  
3051CG5A02A1AH2DFM  
S/N 1186887

DP-7091

Date: 4/10/15, Due date 4/10/2016  
Model: 3051S1CD4A2F12A1AB2  
S/N-0768156

DP-7101

Date: 4/10/2015, Due date 4/10/2016  
Model: 3051S1CD4A2F12A1AB2  
S/N 0768158

LPD-7241

Date: 6/16/15, Due date: 6/16/16  
Model: 305181CD2A2F12A1AB2  
S/N 0767895

LPD-7111

Date 6/15/2015, due date 6/15/16  
Model: 3051S1CD2A2F12A1AB2  
S/N 0777734

Nonconformance and Corrective Action Reports submitted during Inspection

OSU NIST-1 Nonconformance Report# 15031, Instrument Configuration Record Problems,  
August 24, 2015

OSU NIST-1 Nonconformance Report# 15032, Implementation of Instrument Range  
Change DCRs, August 24, 2015

OSU NIST-1 Nonconformance Report# 15033, HP-05 Data Anomalies, August 19, 2015

OSU NIST-1 Nonconformance Report# 15034, HP-05 Mass and Energy Balance  
Anomalies, August 24, 2015

OSU NIST-1 Nonconformance Report# 15035, HP-06 RVV Orifice Size, August 24, 2015

OSU NIST-1 Nonconformance Report# 15036, Items encountered during operations of HP-06, August 24, 2016

OSU NIST-1 Nonconformance Report# 15037, HP-05 Flow Meter and Humidity Probe Channels, August 25, 2015

OSU NIST-1 Nonconformance Report# 15039, HP-06 Terminated due to CPV Seal Leak, August 25, 2015

OSU NIST-1 Nonconformance Report# 15040, HP-06 TF-2331, August 25, 2015

OSU NIST-1 Nonconformance Report# 15041, Complete verification of NCR 15012, August 26, 2015

OSU NIST-1 Nonconformance Report# 15042, DP-8122 calibration, August 26, 2015

OSU NIST-1 Nonconformance Report# 15043, Omega Thermocouples, August 27, 2015

OSU NIST-1 Nonconformance Report# 15044, Watlow model AFGK0FA100UL403H Thermocouple, August 27, 2015

OSU NIST-1 Corrective Action Request# 15021, The process to assure required sections of SP-1 and SP-2 are complete prior to initiating applicable quality tests may be deficient, August 25, 2015

OSU NIST-1 Corrective Action Request# 15022, Unike CP-2, CP-1 does not properly specify to initiate an NCR if an instrument is found out of tolerance, August 25, 2015

OSU NIST-1 Corrective Action Request# 15023, Serial Numbers on DAS-2 and DAS2A modules do not match the numbers recorded on the Instrumentation Configuration Report, August 26, 2015

OSU NIST-1 Corrective Action Request# 15024, CAR form needs definition on 10CFR21 Reporting, August 26, 2015

OSU NIST-1 Corrective Action Request# 15025, RFI-15022 was used and referenced for work without being controlled through OSU Records Management, August 26, 2015

OSU NIST-1 Corrective Action Request# 15026, Inadequate communication and documentation of design change authorization for sparger nozzle removal, August 27, 2015

OSU NIST-1 Corrective Action Request# 15027, OSU guidance for OSHA requirements is lacking, August 27, 2015

NuScale Corrective Action Report# CR-0815-17047, RFIs not closed out in timely manner, August 25, 2015