

**U.S. NUCLEAR REGULATORY COMMISSION REGULATORY AUDIT  
OF SOFTWARE ACCEPTANCE TESTING REPORT  
FOR NUSCALE LICENSING TOPICAL REPORT**

**Audit Summary Report  
NuScale Power, LLC,  
Licensing Topical Report, TR-0118-58005, Revision 2,  
Improvements in Frequency Domain Soil-Structure-Fluid  
Interaction Analysis**

**Docket No. PROJ0769/99902043**

**BACKGROUND**

The U.S. Nuclear Regulatory Commission (NRC) staff conducted a regulatory audit of a software acceptance testing report to facilitate the review of NuScale Power, LLC (NuScale or the applicant), Licensing Topical Report (TR), TR-0118-58005, Revision 1, "Improvements in Frequency Domain Soil-Structure-Fluid Interaction Analysis" (ADAMS Accession Number ML19324E311). The TR references the proprietary report, "SDE-SASSI Version 2.1.1 Acceptance Testing Report," that is not docketed with the NRC but made available by the software's vendor (Carl J. Costantino and Associates, LLC) for NRC staff review in the vendor's electronic reading room. The software tested in the report is used by the applicant to evaluate the analysis methodology presented in the TR. The purpose of the audit was to evaluate the information provided in the testing report for its technical adequacy and to verify that the information in this non-docketed documentation is consistent with the information in the TR. Because the audit was limited in scope and straight-forward in nature, no audit plan was issued. The audit was conducted during the period of November 14, 2019 to December 20, 2019 in the software vendor's electronic reading room as arranged by the applicant.

**AUDIT TEAM**

- William Ward, Senior Project Manager, Office of Nuclear Reactor Regulation
- Sunwoo Park, Structural Engineer, Office of Nuclear Reactor Regulation
- Sujit Samaddar, Senior Structural Engineer, Office of Nuclear Reactor Regulation

**OBJECTIVES**

The audit was conducted to review the information in the non-docketed documentation regarding the acceptance testing of a computer code used in the TR with the following objectives:

- Evaluate the technical adequacy of the information presented in the documentation, CJC-SDE-V-012, Revision 0, SDE-SASSI v2.1.1 Software Acceptance Testing Report.
- Verify that the information presented in the non-docketed documentation (SDE-SASSI v2.1.1 Software Acceptance Testing Report) is consistent with the information presented in the docketed TR.
- Identify information that will require docketing to support the basis of the licensing decision.

## **OBSERVATIONS AND RESULTS**

1. The staff's initial review of SDE-SASSI v2.1.1 Software Acceptance Testing Report developed by the software's vendor (Carl J. Costantino and Associates, LLC) indicated that the report did not include enough information necessary for the staff to understand the problems tested and the acceptance criteria used in the report.
2. In response to staff's request, the vendor made two supplemental documentations available in its electronic reading room for staff review: (1) CJC-SDE-V-002, Revision 0, SDE-SASSI v2.1 Acceptance Testing Plan, and (2) CJC-SDE-V-013, Revision 0, SDE-SASSI v2.1.1 Acceptance Testing Plan.
3. The staff reviewed the supplemental documentations provided by the vendor and found that they provide detailed information about the problems tested including the range of input parameters considered and the acceptance criteria used in the report. The staff also noted that SDE-SASSI v2.1.1 Acceptance Testing Plan is built upon SDE-SASSI v2.1 Acceptance Testing Plan; therefore, the two documents combined present the acceptance testing plan for SDE-SASSI v2.1.1 computer code used in the TR.
4. The staff reviewed SDE-SASSI v.2.1.1 Software Acceptance Testing Report and found that the vendor's selection of test problems is acceptable because the range of input parameters considered in these test problems covers the range of input parameters expected in the application of the analysis methodology proposed in the TR. The staff also verified that the report includes test problems demonstrating the equivalency between the standard SASSI solutions and the new solutions proposed by the TR.
5. The staff found that the methods of modeling and analysis employed for the test problems conform to the guidance in NRC NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition," SRP Section 3.7.2, "Seismic System Analysis," Revision 4, and thus are acceptable. The staff confirmed that the results from SDE-SASSI compared well against the established benchmark solutions, demonstrating the technical adequacy of SDE-SASSI used in the TR.
6. However, the staff found that information summarizing key evaluation findings or conclusions in SDE-SASSI v2.1.1 Software Acceptance Testing Report, which is not docketed with the NRC, is not captured in the TR. Therefore, the staff will need to communicate this finding to the applicant so that relevant information in the testing report be included in Revision 2 of the TR to support the basis of staff's licensing decision.

## **CONCLUSION**

The NRC staff conducted a regulatory audit in the vendor's electronic reading room to review the information in a non-docketed proprietary documentation regarding acceptance testing for the SDE-SASSI computer code used in the subject TR. The staff concluded that the information in the vendor's software acceptance testing report conforms to the guidance in NUREG-0800, SRP Section 3.7.2 and thus is acceptable. The staff, however, identified a need that relevant information in the testing report be included in Revision 2 of the TR to support staff's licensing decision.

**APPENDIX - Documents Reviewed during the Audit**

1. **CJC-SDE-V-012, Revision 0, SDE-SASSI v2.1.1 Software Acceptance Testing Report**
2. **CJC-SDE-V-002, Revision 0, SDE-SASSI v2.1 Acceptance Testing Plan**
3. **CJC-SDE-V-013, Revision 0, SDE-SASSI v2.1.1 Acceptance Testing Plan**