

December 30, 2013

Docket: PROJ0769

U.S. Nuclear Regulatory Commission
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SUBJECT: NuScale Power Response to Regulatory Information Summary (RIS) 2013-18 (NRC Project No. 0769)

REFERENCES: NRC RIS 2013-18, "Licensing Submittal Information and Design Development Activities for Small Modular Reactor Designs," dated November 15, 2013

In Regulatory Issue Summary (RIS) 2013-18, the Nuclear Regulatory Commission (NRC) requests updated information regarding certain application submittals related to small modular reactor (SMR) designs. The response to RIS 2013-18 for the NuScale scalable SMR design is enclosed.

If you have any questions, please feel free to contact Michael Brasel at (541) 360-0702 or at mbrasel@nuscalepower.com.

Sincerely,



Edward G. Wallace
Vice President, Regulatory Affairs

Enclosure: NuScale Power Response to NRC RIS 2013-18

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NuScale Power Response to NRC RIS 2013-18

1. *When (month and year) are applications planned for design-related applications and what NRC action will be requested (i.e., a CP, DC, DA, or ML, or a COL that does not cite a DC or DA)?*

Response: NuScale is evaluating the effect on the design certification application (DCA) submittal date based on the impact of the recent announcement by the U.S. Department of Energy (DOE) that NuScale has been selected as an award recipient under its "Cost-Shared Industry Partnership Program for Small Modular Reactors." This information will be updated during periodic project review meetings with the NRC.

2. *Will the applicants be organized into DCWGs? If known, what is the membership of the DCWG, and which party is the primary point-of-contact designated for each DCWG?*

Response: NuScale has not yet organized a design-centered working group (DCWG). NuScale supports the design-centered review approach and would organize a DCWG in the future as warranted. As a precursor to a DCWG, NuScale organized and regularly confers with a customer advisory board to obtain owner-operator input and perspective on current design and licensing matters.

3. *Have protocols been developed to provide coordinated responses for requests for additional information with generic applicability to a design center?*

Response: Protocols will be developed consistent with establishing DCWGs.

4. *Which applicant that cites the design will be designated as the reference COL applicant, or, alternatively, how will various applications (e.g., CP, DC, or COL applications) be coordinated to achieve the desired design-centered licensing review approach?*

Response: The timetable for the submission of a reference COL (R-COL) has not been identified by a NuScale plant customer. NuScale intends to provide the necessary coordination with its clients to achieve the desired design-centered licensing review approach.

5. *When (month and year) will CP, COL, or ESP applications be submitted for review? In addition, what are the design, site location, and number of units at each site?*

Response: NuScale anticipates that a COL application from one or more utilities referencing the NuScale DCA will be made during the period of DC review. Specific dates, site locations, and the number of units are not yet known.

6. *Are vendors or consultants assisting in the preparation of the application(s)? If so, please describe their roles and responsibilities for the design and licensing activities.*

Response: Vendors and consultants are supporting NuScale's design and licensing activities. Organizations with significant involvement in these activities include Fluor Corporation (engineering services), Rolls-Royce (engineering, manufacturing and miscellaneous project support), Oregon State University (testing), ARES Corporation (structural design), MPR Associates (nuclear components), KEPSCO Nuclear Fuels (fuel design), SIET (steam generator testing), Curtiss-Wright (CRDM and valve design), Rock Creek Technologies (instrumentation and controls design), Konecranes (heavy lift

equipment design), GSE (simulator design), Dresser Rand (steam turbine design), and Precision Custom Components (reactor module design support). In addition, there are numerous specialty consultants and engineers supporting analysis and evaluation of the design.

7. *What is the current status of the development of the plant design (i.e., conceptual, preliminary, or finalizing)? Has the applicant established a schedule for completing the design? If so, please describe the schedule.*

Response: NuScale has established a detailed and comprehensive schedule for completing the work needed to support a high-quality DCA. As stated in Question 1, NuScale is evaluating the effect on the schedule based on the selection of NuScale as a DOE award recipient. NuScale has advanced plant design toward design finalization. The NuScale plant design is progressing into the detailed design phase with preliminary engineering completed on systems most important to NRC review. The detailed status has been presented at various meetings over the last year.

8. *What is the applicant's current status (i.e., planning, in progress, or complete) for the qualification of fuel and other major systems and components? Has the applicant established a schedule for completing the qualification testing? If so, please describe the schedule.*

Response: NuScale has developed a comprehensive reactor qualification test plan that identifies and describes the test programs being planned and executed in support of the design and commercialization of the NuScale reactor. The test programs are in various stages of the technology maturation process. NuScale intends to present an update of the fuels testing program during a February 2014 pre-application meeting with the NRC. Other test program status will be continuously updated through the regular interactions between NuScale and the NRC.

9. *What is the applicant's status (i.e., planning, in progress, or complete) in developing computer codes and models to perform design and licensing analyses? Has the applicant defined principal design criteria, licensing-basis events, and other fundamental design and licensing relationships? Has the applicant established a schedule for completing the design and licensing analyses? If so, please describe the schedule.*

Response: The development of computer codes and models is in progress. Detailed plans to verify and validate codes for the NuScale operating and accident conditions with testing at the OSU integral facility and other large-scale component facilities are contained in our project schedule. Licensing basis events have been identified considering regulatory guidance with modifications that are appropriate for the NuScale design. A classification of transients and accidents for the NuScale SMR was submitted to the NRC in September 2013. NuScale has established a detailed and comprehensive schedule for completing the design and safety analyses to support the development and submittal of the DCA.

10. *What is the applicant's status in designing, constructing, and using thermal-fluidic testing facilities and in using such tests to validate computer models? Has the applicant established a schedule for the construction of testing facilities? If so, please describe the schedule. Has the applicant established a schedule for completing the thermal-fluidic testing? If so, please describe the schedule.*

Response: An operational thermal-fluidic prototype of the NuScale reactor has been testing since 2003. This facility is one piece of a comprehensive reactor qualification test plan that identifies and describes the test programs being planned and executed in support of the design and commercialization of the NuScale SMR. Data from the thermal-fluidic tests will be used to develop

and validate the NuScale computer codes and models used to conduct safety analyses. The test plans have been periodically presented to the NRC in pre-application meetings over the last several years and have been the subject of NRC visits and audits.

NuScale routinely updates the NRC during regularly planned interactions on the schedule for completing the thermal-fluidic testing program at these facilities.

11. *What is the applicant's status in defining system and component suppliers (including fuel suppliers), manufacturing processes, and other major factors that could influence design decisions? Has the applicant established a schedule for identifying suppliers and key contractors? If so, please describe the schedule.*

Response: As presented in response to Question 6, NuScale is working with component suppliers on the design of critical equipment such as the reactor module, steam generator, control rod drive mechanisms, steam turbines, heavy lifting equipment, critical valves, I&C safety equipment, reactor building, and nuclear fuel. In addition, NuScale has key suppliers developing design-specific modular construction and manufacturing strategies providing valuable input to the design process in areas such as manufacturability and inspectability. The schedule for establishing suppliers and other factors that could impact component design decisions is consistent with the schedule for the design in support of the DCA.

12. *What is the applicant's status in the development and implementation of a quality-assurance program?*

Response: NuScale has developed a quality assurance program (QAP) for design certification of the NuScale reactor. The final safety evaluation (SE) approving the NuScale QAPD was issued by the NRC in May 2012, and NuScale published the accepted version in August 2012. The QMP was revised February 2013 changing the format to mirror that of the QAPD.

13. *What is the applicant's status in the development of probabilistic risk assessment (PRA) models needed to support applications (e.g., needed for Chapter 19 of safety analysis reports or needed to support risk-informed licensing approaches)? Does the applicant plan to use the PRA for any risk-informed applications (i.e., risk-informed technical specifications, risk-informed inservice inspection, risk-informed categorization and treatment, risk-informed inservice testing, etc.)? What are the applicant's plans for using the PRA models in the development of the design? At what level will the PRA be prepared, and when will it be submitted in the application process?*

Response: NuScale currently maintains a PRA that comprises internal events during full-power operations. This model has been used by NuScale over the past two years to risk-inform various design decisions as well as to support a number of programs that are in development. It is NuScale's intention to further utilize risk information in the design of the NuScale reactor. NuScale will continue to update the NRC on the status of the PRA at scheduled meetings during the pre-application period.

14. *What is the applicant's status in the development, construction, and use of a control room simulator?*

Response: In 2010, NuScale developed and began operating a single module engineering simulator to support system design. Subsequently, the simulator was expanded to a multi-module (12-reactor) control room to support human factors and human-machine interface development. Initial operation of the multi-module control room simulator began in May 2012 and will continue in support of both DCA and COLA development. In 2013, the underlying thermal-hydraulic model was updated to reflect the current NuScale module design, and a software package was developed to speed prototyping HSI

(Human System Interface) screens. The control room simulator is used extensively in support of the plant staffing and human factors engineering analysis programs. Ultimately, the simulator will provide the foundation for developing station operating procedures, automation concepts, alarm management techniques, HSI designs, multi-module operating strategies, scenario simulations, and operator training programs.

15. *What are the applicant's current staffing levels (e.g., full-time equivalent staff) for the design and testing of the reactor design? Does the applicant have plans to increase staffing? If so, please describe future staffing plans.*

Response: NuScale currently employs 150 full-time staff, as well as up to 80 full-time equivalent staff working on the project as contractors and within our suppliers' organizations. These levels vary as a function of integrated schedule requirements. NuScale is reassessing the schedule and staffing levels in light of the recent announcement of the U.S. DOE in connection with its SMR-related second cooperative agreement funding opportunity award to NuScale.

16. *What are the applicant's plans on the submittal of white papers or technical and topical reports related to the features of its design or the resolution of policy or technical issues?*

Response: NuScale has submitted over 30 white papers or technical and topical reports to the NRC for review as part of the pre-application project. NuScale currently plans to submit additional reports and white papers during the pre-application phase for feedback from the NRC or to facilitate pre-application discussions on NuScale-unique features. NuScale has held over 40 pre-application meetings or workshops and intends to request additional pre-application meetings or workshops with the NRC staff on various subjects. Detailed submittal and meeting schedules will be established during regular discussions with NRC project management.

NuScale intends to continue significant engagement with the NRC to provide information relative to the NRC's preparation of the design-specific review standard (DSRS) for the NuScale design. Information has and will continue to be provided in the form of technical reports. Other information requested has been and will be provided for audit or inspection as requested. NuScale intends to work with the NRC project manager to determine the schedule for providing required data.

17. *Has the applicant established a schedule for submitting such reports? If so, please describe the schedule.*

Response: NuScale has maintained an active pre-application program with the NRC since 2008. Ongoing pre-application planning is a product of NuScale's regular meetings and project planning discussions with the NRC. These discussions reflect the latest priority information required for the NRC and NuScale to produce a high quality NuScale DSRS, leading to an appropriate, high quality DCA.

18. *Will ESP applicants seek approval of either proposed major features of the emergency plans in accordance with 10 CFR 52.17(b)(2)(i) or proposed complete and integrated emergency plans in accordance with 10 CFR 52.17(b)(2)(ii)?*

Response: As a DC applicant, this question is not applicable to NuScale.

19. *Describe possible interest in the use of the provisions in Subpart F, "Manufacturing Licenses," of 10 CFR Part 52, instead of, or in combination with, other licensing approaches (e.g., DC or DA).*

Response: NuScale does not plan to seek a Manufacturing License.

20. *Describe the desired scope of a possible ML and what design or licensing process would address the remainder of the proposed nuclear power plant. For example, would the ML address an essentially complete plant or would it be limited to the primary coolant system that basically comprises the integral reactor vessel and internals?*

Response: NuScale does not plan to seek a Manufacturing License.

21. *Describe the expected combination of manufacturing, fabrication, and site construction that results in a completed operational nuclear power plant. For example, what systems, structures, and components are being fabricated and delivered? Which of these are being assembled onsite? Which of these are being constructed onsite?*

Response: NuScale maintains a construction planning program that will integrate manufacturing, fabrication, and site construction to support COL applicant project planning. Based on conceptual studies, NuScale expects that module subassemblies for the reactor and containment will be manufactured and delivered to the site for final assembly. These reactor module subassemblies will be installed after reactor building construction is completed. The exact plan by which equipment will be fabricated and delivered and which will be assembled on-site is under development. Plant buildings and structures will be constructed on-site using a combination of in situ and prefabricated component construction.