July 29, 2015

MEMORANDUM TO: Mark Tonacci, Chief
Licensing Branch 1
Division of New Reactor Licensing
Office of New Reactors

FROM: Omid Tabatabai, Senior Project Manager ***/RA/***
Licensing Branch 1
Division of New Reactor Licensing
Office of New Reactors

SUBJECT: SUMMARY OF JULY 8, 2015, CLOSED MEETING WITH NUSCALE POWER, LLC TO DISCUSS THE SAFETY BASIS FOR NUSCALE'S NON-CLASS 1E DESIGN

On July 8, 2015, a closed meeting was held at U.S. Nuclear Regulatory Commission (NRC) headquarters in Rockville, MD, between representatives of the NRC staff and NuScale Power, LLC. The purpose of this meeting was to discuss the classification of NuScale electrical systems and the design of NuScale's "Highly Reliable DC Power System" (EDSS) and how NuScale's electrical system design would meet NRC regulations.

NuScale stated that the NuScale electrical power systems, including the EDSS, do not fulfill functions that per the regulatory definitions of "safety-related" and "Class 1E" justify a Class 1E classification. NuScale stated that the term "Class 1E" used for NuScale is based on IEEE Std. 603-1991, "Criteria for Safety Systems for Nuclear Power Generating Stations," as specified in 10 CFR 50.55a, "Codes and Standards," and IEEE Std. 308-2001, "IEEE Standard Criteria for Class 1E Power Systems for Nuclear Power Generating Stations," as endorsed by Regulatory Guide (RG) 1.32, "Criteria for Power Systems for Nuclear Power Plants," Rev. 3.

NuScale stated that in their design, in response to a design-basis event, neither alternating current (AC) nor direct current (DC) electrical power is relied upon for safety systems to perform their safety functions. Additionally, in NuScale design, no design-basis event could result in a transient capable of causing damage to the fuel cladding; radiological shielding of the spent fuel assemblies or fuel assemblies in a power module in refueling process; or damaging the reactor coolant pressure boundary. NuScale stated that consistent with the process established in the regulatory framework for special treatment of certain important-to-safety nonsafety related systems, structures and components, augmented design, qualification, and quality assurance provisions will be applied to the EDSS that are intended to provide an EDSS reliability substantively similar to that of a Class 1E DC power system.

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NuScale stated that the augmented EDSS provisions and how they compare to those applied to a Class 1E DC electrical system will be described in a forthcoming topical report on the safety classification of NuScale electrical systems. Furthermore, this topical report will demonstrate that although other minor differences are noted, the substantive difference between the EDSS and a typical Class 1E DC electrical system is the type of battery used in the system design. NuScale stated that given that the EDSS does not serve functions that meet the regulatory definitions of a Class 1E classification, as such, to require a Class 1E designation would represent a significant cost impact on NuScale with no significant benefit to public health and safety. NuScale clarified that the primary cost impact would be associated with changing the battery type to that used traditionally in nuclear Class 1E applications.

NuScale described to the NRC staff how their power module and plant (passive) safety systems are designed to perform and maintain their functions of safe shutdown, core cooling, and containment and reactor pressure boundary integrity, without needing electrical power. NuScale also described how cooling to areas containing safety-related equipment as well as control room habitability functions is achieved without relying on any electrical power. NuScale also discussed that regulations do not explicitly require Class 1E power for emergency lighting and that regulations only require that “adequate” emergency lighting is provided in all areas. NuScale stated that in their design, operator actions are not relied upon following a design-basis event to achieve and maintain safe shutdown conditions and also NuScale’s defense-in-depth features ensure performance of emergency lighting function. NuScale then descrbied how the design of their highly reliable electrical systems would comply with applicable regulations and guidance documents such as NUREG-0800, “Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition,” Standard Review Plan (SRP) 9.5.3, and RG 1.189, “Fire Protection for Nuclear Power Plants,” to ensure emergency lighting is provided.

With respect to postaccident monitoring requirements, NuScale stated that IEEE 497-2002 standard, “Criteria for Accident Monitoring Instrumentation for Nuclear Power Generating Stations,” which is endorsed by RG 1.97, Rev 4, “Criteria for Accident Monitoring Instrumentation for Nuclear Power Plants”, specifies Class 1E electrical system to supply instrumentations that monitor Types A, B, and C variables. NuScale discussed that the requirements for postaccident monitoring and instrumentation have been developed for, and play a key role for traditional reactor designs for main control room operations. However, they do not serve the same role in NuScale operations where safety systems rely on passive means.

The second half of NuScale’s presentation focused on the NuScale plant design’s safety system response to a loss of power. NuScale stated that the plant safety systems are “fail-safe” and that decay heat is removed through passive safety systems. For beyond design-basis conditions, the NuScale probabilistic risk assessment analyses take into account the power availability and the reliability of the systems and design.

NuScale stated that their “On-site DC Electrical Systems - Safety Classification, Design, and Licensing Basis” Topical Report (TR) will provide a “function-by-function” evaluation, assuming that no electrical power is available, as part of the safety classification assessment of electrical systems. NuScale stated that the current draft topical report scope does not include detailed safety analysis event analysis descriptions as would be contained in Chapter 15 of the Final Safety Analysis Report (i.e., Design Control Document [DCD]). NuScale stated that key assumptions will be captured in the topical report, and preservation of these assumptions in the

final design ensures that the report conclusions remain valid. NuScale believes that, using this approach, the topical report assumptions and conclusions will be confirmed by the final safety analyses event results in DCD Chapter 15, which will comply with the relevant guidance of Chapter 15 of the Standard Review Plan or Design-Specific Review Standard, as appropriate, and Regulatory Guide 1.206.

At the end of the meeting the staff thanked NuScale for the detailed presentation. The staff's understanding of the purpose of the topical report is that the NRC will be asked to review and approve the electrical system design in relation to the electrical system's functions as described in the proprietary portion of the presentation. In that light, NuScale work on the details of the design basis accidents is not yet complete. The staff noted that the need for power, or not needing power, is an outcome of the design basis accident analysis. Some members of the staff questioned whether the NRC can review a topical report on electrical power without first reviewing the design basis accidents.

The agenda and list of meeting attendees are included in Enclosure 1. The closed meeting notice is available in the NRC Agencywide Documents Access and Management System (ADAMS) with accession number ML15161A456. The proprietary presentation slides are available in ADAMS with accession number ML15183A029. A non-proprietary version of the NuScale presentations can be found in ADAMS with accession number ML15183A027. Please direct any inquiries to Omid Tabatabai at (301) 415-6616, or email at omid.tabatabai@nrc.gov. ADAMS is the system that provides text and image files of NRC's public documents and can be accessed at the NRC's Electronic Reading Room at http://www.nrc.gov/reading-rm/adams.html. If you do not have access to ADAMS or have problems accessing the documents located in ADAMS, contact the NRC Public Document Room staff at (800) 397-4209, (301) 415-4737, or pdr@nrc.gov.

Project No.: PROJ0769

Enclosures:
1. Meeting Agenda
2. Attendee List

Distribution:
NuScale ListServ

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2. Attendee List

ADAMS ACCESSION No.: ML15204A779 NRC-001

OFFICE	PM:NRO/DNRL/LB1	PM:NRO/DNRL/LB1
NAME	OTabatabai	Greg Cranston
DATE	07/27/2015	07/29/2015

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Closed Meeting with NuScale Power, LLC (NuScale) on Non-Class 1E Design

US Nuclear Regulatory Commission
One White Flint North
11555 Rockville Pike
Room 7-B4
Rockville, MD 20852

July 8, 2015, 08:30 AM to 3:00 PM

Time	Topic	Speaker
8:30 – 8:45 am	Introductions	NuScale/NRC
8:45 – 9:00 am	Meeting Purpose and Background	NuScale
9:00 – 10:30 am	Classification of NuScale Electrical Systems	NuScale
10:30 – 10:45 am	Break	All
10:45 – 11:45 am	Plant Safety System Response to the Loss of Power	NuScale
11:45 – 12:45 pm	Lunch	All
12:45 – 2:30 pm	Design Basis Safety Analysis and Regulatory Implications	NuScale
2:30 – 3:00 pm	Meeting Conclusion	All

Attendees
NuScale Power, LLC and NRC on Class 1E Power
July 8, 2015

Name	Affiliation
Kent Welter	NuScale
Albert Gharakhanian	NuScale
Meghan McCloskey	NuScale
Wendell Wagner	NuScale
Steve Mirsky	NuScale
Ted Hough	NuScale
Tom Bergman	NuScale
John Monninger	NRC
Sheila Ray	NRC
Mark Caruso	NRC
Steven Pope	NuScale
Lily Ramadan	NuScale
Dinesh Taneja	NRC
Joe Ashcraft	NRC
Jake Zimmerman	NRC
Bob Fitzpatrick	NRC
Terry Jackson	NRC
John Tappert	NRC
Rocky Foster	NRC
Demetrius Murray	NRC
Savannah Johnson	NRC
Prosanta Chowdry	NRC
Jeff Schmidt	NRC
Marie Pohida	NRC
Mark Tonacci	NRC
Francis Akstulewicz	NRC
Matt Featherson	NuScale
Mark Peres	NuScale
Cyrus Afshar	NuScale
Jason Pottorf	NuScale
Rufino Ayala	NuScale
Yeon-Jong Yoo	NuScale
Hughes Wike	NuScale
Jeff Kosky	NuScale
John Price	NuScale
Stephanie Sealy	NuScale
Scott Lucas	NuScale
Akira Tokuhiro	NuScale
Mark Manderbach	NuScale