

August 19, 2016

MEMORANDUM FOR: 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 27, 2016, CLOSED MEETING WITH  
NUSCALE POWER, LLC, TO DISCUSS INTEGRAL JET  
IMPINGEMENT SHIELD AND PIPE WHIP RESTRAINT, AND  
CONTAINEMNT EVACUATION SYSTEM (PROJ0769)

On July 27, 2016, a closed meeting between representatives of the U.S. Nuclear Regulatory Commission (NRC) staff and NuScale Power, LLC, (NuScale) was held at the NuScale office located at 11333 Woodglen Drive, Suite 205, Rockville, Maryland, 20852. During the first portion of the meeting, NuScale personnel discussed the design and performance of NuScale's integral jet impingement shield and pipe whip restraint (ISR). In the second part of the meeting, NuScale described the containment evacuation system (CES) design in detail. The agenda and list of meeting attendees are included in Enclosures 1 and 2, respectively. The meeting notice is available in the Agencywide Documents Access and Management System (ADAMS) with Accession No. ML16195A445. NuScale submitted its presentation slides via a July 14, 2016, letter (ADAMS Accession No. ML16200A396). The proprietary and non-proprietary versions of the presentation slides are available in ADAMS with Accession Nos. ML16200A393 and ML16200A392, respectively.

The purpose of the first portion of this meeting was for NuScale personnel to update NRC staff on their proposed use of ISR device to mitigate the dynamic effects resulting from a postulated high-energy line break (HELB) event. The focus of the discussion was on the NuScale's approach to the design and application of the ISR to allow NRC staff to better understand the ISR design and application to the NuScale plant.

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During the meeting, NuScale presented an overview of NuScale American Society of Mechanical Engineers (ASME) III piping layout. NuScale also presented the locations and the number of ISRs that were being considered for certain high-energy piping systems. NuScale noted that the precise ISR locations are subjected to change prior to fabrication. In addition, NuScale indicated that the use of leak-before-break (LBB) analysis and break exclusion methodology will be applied to the extent practical in their HELB analyses to preclude the need for postulating high-energy pipe breaks. With respect to the break exclusion criteria, NuScale stated that the NRC staff's guideline as described in Branch Technical Position 3-4 (BTP 3-4) will be followed.

NuScale then described the general design concepts and additional proprietary detail on the preliminary design of an ISR including the extent to which it would preclude the dynamic jet effects and limit pipe whip motion resulting from postulated high-energy pipe breaks. NuScale discussed a general idea of how pressure would be dissipated from a postulated high-energy pipe break. NuScale also showed a figure of pressure dissipation inside an ISR chamber resulting from postulated break in one of the high-energy piping systems. In addition, NuScale informed the NRC staff about a patent of another similar type of pipe rupture restraint and jet shield diffuser assembly and noted that they had no plans at this time to subject the design to testing.

At the close of the first portion of this meeting, the NRC staff indicated to NuScale that the NRC staff deemed the NuScale proposed HELB approach, as discussed in the meeting and in accompanying slides, to be reasonable. The NRC staff also noted that the details of NuScale's HELB methodologies and the design and application of ISR devices to preclude the dynamic jet effects and limit the pipe whip movement will be subject to NRC staff review to determine their compliance with regulations and conformance to NRC guidance after the submittal of the design certification (DC) application. The DC application is to include information regarding how the provisions for break exclusion in BTP 3-4, Part B, Subsection A (ii)(1) through A(ii)(7) are considered and applied to the NuScale design, a list of potential ISR locations (e.g., terminal ends and intermediate locations) and their associated ISR design configurations, description of how the effect of the installed ISR device are considered in the respective piping analysis, and information related to the detailed analysis and assumptions used to demonstrate that the ISR design is capable of precluding the dynamic jet load and limiting pipe whip movement resulting from postulated high-energy pipe breaks.

Moreover, the NRC staff re-emphasized the importance of proof-of-concept testing to qualify the ISR device for precluding the dynamic effects resulting from postulated high-energy pipe break as well as operational experience or other information to validate the proprietary ISR device design performance. The NRC staff also stated that if NuScale refers to literature, experimental data, or operational experience to demonstrate the adequacy and acceptability of the proprietary NuScale ISR device design and its application to mitigate the dynamic effects of postulated HELB, they should clarify which data is used, where the experimental data or operational experience came from, and the applicability of the information to the NuScale plant specific ISR design and application.

M. Tonacci

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During the second portion of the meeting, NuScale presented detailed information regarding their CES design, function, leak detection methodology, piping and instrumentation diagram/drawing as well as set points. NuScale stated that if both of the non-safety vacuum pumps in the CES fail, per their technical specifications, the module will be shut down.

Project No.: PROJ0769

Enclosure:

1. Meeting Agenda
2. Attendees

cc: NuScale DC Listserv

During the second portion of the meeting, NuScale presented detailed information regarding their CES design, function, leak detection methodology, piping and instrumentation diagram/drawing as well as set points. NuScale stated that if both of the non-safety vacuum pumps in the CES fail, per their technical specifications, the module will be shut down.

Project No.: PROJ0769

Enclosure:

- 1. Meeting Agenda
- 2. Attendees

cc: NuScale DC Listserv

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**ADAMS ACCESSION No.: ML16222A390      \*via email      NRC-001**

<b>OFFICE</b>	NRO/DNRL/LB1:PM*	NRO/DNRL/LB1:LA*	NRO/DE/MEB:BC*
<b>NAME</b>	Otabatabai	MBrown	TLupold
<b>DATE</b>	8/08/2016	8/09/2016	8/19/2016

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## **Meeting Agenda**

**Wednesday, July 27, 2016**

<b>Time</b>	<b>Topic</b>
9:30 am–9:40 am	Meeting Introductions
9:40 am–10:45 am	Integral Jet Impingement Shield and Pipe Whip Restraint (ISR) Design
10:45 am–11:00 am	ISR Testing, Qualification Plans, and Schedule
11:00 am–11:10 am	Break
11:10 am–12:30 pm	Containment Evacuation System Design and Operating Experience

**List of Attendees**

U.S. Nuclear Regulatory Commission, Office of New Reactors

Omid Tabatabai  
Yueh-Li (Renee) Li  
Chang Li  
Eric Reichelt  
Tim Lupold  
Nan Chien  
Ronald LaVera  
Nicholas McMurray  
Jason Huang  
Mark Tonacci  
Greg Cranston

NuScale Power, LLC

Steve Pope  
Steve Unikewicz  
Zack Houghton  
Wayne Massey  
Scott Harris  
Archie Manoharan  
Steve Mirsky  
JJ Arthur  
Dick Bense  
Cyrus Afshar

U.S. Department of Energy

Tim Beville