



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

August 5, 2021

MEMORANDUM TO: Getachew Tesfaye, Acting Chief
New Reactor Licensing Branch
Division of New and Renewed Licenses
Office of Nuclear Reactor Regulation

FROM: Alina Schiller, Project Manager */RAI/*
New Reactor Licensing Branch
Division of New and Renewed Licenses
Office of Nuclear Reactor Regulation

SUBJECT: SUMMARY OF A PUBLIC MEETING WITH NUSCALE POWER,
LLC ON JULY 14, 2021

The U.S. Nuclear Regulatory Commission (NRC) staff conducted an observation public meeting/teleconference with NuScale Power, LLC (NuScale) on July 14, 2021. The purpose of the meeting was to discuss the following two topics regarding NuScale Topical Report-0915-17772, "Methodology for Establishing the Technical Basis for Plume Exposure Emergency Planning Zones," Revision 2 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML20217L422): (1) NRC staff presentation on radiation protection findings and (2) NRC staff observations on NuScale's proposed response to the staff request for additional information (RAI) 9828.

The meeting notice can be found in ADAMS under Accession No. ML21195A072. The meeting notice was also posted on the NRC public Web site.

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Enclosed are the meeting summary (Enclosure 1), meeting agenda (Enclosure 2), and list of attendees (Enclosure 3). The documents referenced during the discussion can be found under ADAMS accession nos. given below.

RAI 9828	ML21116A110
NRC presentation slides for the July 14, 2021, public meeting with NuScale	ML21195A032
NRC accident dose analysis	ML21183A091
June 15, 2021, meeting summary	ML21196A378

Docket No. 99902043

Enclosures:

1. Meeting Summary
2. Meeting Agenda
3. List of Attendees

cc w/encl.: DC NuScale Power, LLC Listserv

U.S. NUCLEAR REGULATORY COMMISSION
OBSERVATION PUBLIC TELECONFERENCE WITH NUSCALE POWER, LLC (NUSCALE)
ON NUSCALE'S TOPICAL REPORT-0915-17772, REVISION 2

July 14, 2021

Meeting Summary

On July 14, 2021, the Nuclear Regulatory Commission (NRC) staff conducted an observation public teleconference meeting with NuScale Power, LLC (NuScale). This meeting was a follow-up to the June 15, 2021, public meeting (Agencywide Documents Access and Management System (ADAMS) Accession No. ML21196A378) on the same subject, namely the staff observations on NuScale's proposed Request for Additional Information (RAI) 9828 response on NuScale Topical Report (TR)-0915-17772, "Methodology for Establishing the Technical Basis for Plume Exposure Emergency Planning Zones," Revision 2. In addition to the RAI 9828 response topic, the NRC staff first presented its findings on the radiation protection aspect of the TR.

The public meeting commenced with opening remarks and an introduction of participants.

NRC Staff Accident Dose Analysis

The NRC staff proceeded with a presentation of the accident dose analysis (ADAMS Accession No. ML21183A091), providing the following items for NuScale to consider:

- The US Environmental Protection Agency's Protective Action Guides Manual criterion is in terms of total effective dose (TED), while the NRC dose-related criteria are in terms of total effective dose equivalent (TEDE).
- The TR recommends the use of the "most recent" MACCS dose conversion factor (DCF) files but does not make a distinction for selecting different DCF files for different purposes.
- The staff will include a condition of applicability to bring awareness to use appropriate DCF files to meet specific regulatory requirements. The condition will point to which MACCS DCF files to use and how to use them.
- MACCS is not typically used for licensing, as such, the Office of Nuclear Regulatory Research (RES) will verify which MACCS DCF files are applicable to compute the TEDE for the purposes of emergency planning zones (EPZ) sizing analyses to be consistent with regulations. The RES staff will document findings with recommendations to be referenced in the staff safety evaluation report.

NuScale asked if the scope of the condition of applicability would be limited to just the TEDE coefficient itself or to an entire file that contains that TEDE coefficient. The NRC staff clarified the scope would not be limited to a particular file, it would point to the specific DCF file and how to use the file to compute the TEDE for United States applications.

Further, NuScale asked if the red bone marrow would be covered under the condition of applicability. The staff confirmed both red marrow and TEDE would be covered.

NRC Staff Observations on NuScale's Proposed RAI 9828 Response – Follow-up to the June 15, 2021, Discussion

The NRC staff began the discussion by presenting the revised presentation slides from the June 15, 2021, public meeting (ADAMS Accession No. ML21195A032).

With respect to the NRC's Background slide 3, the NRC staff highlighted the statement in the TR that the most likely mechanism for an applicant using this TR would be a Part 52 combined operating license (COL) application, however it is acknowledged in the TR that there could be other regulatory processes that may use this TR, such as a Part 50 application. The staff is considering to write a condition of use that the level of design detail in the probabilistic risk assessment (PRA) used for this TR should be commensurate with a Part 52 design certification (DC) application if the applicant is using a licensing approach other than Part 52.

NuScale emphasized the method vs implementation, noting they would link the condition to a COL, not to a DC. NuScale stated that: an applicant would have to show it can use the method regardless of technology; for a light-water small modular reactor (SMR) in Part 50, such a construction permit, the applicant would not be able to show how they could meet the condition in the TR unless they are able to take huge amount of uncertainty; and NuScale does not object to such a condition, however they think it confuses methodology with implementation.

The NRC staff stated that the amount of design detail at the construction stage would be rather limited and agreed there would be a certain amount of uncertainty with the PRA and assumptions to build the PRA, and the treatment of uncertainty is not mentioned in the TR for the selection of accident sequences.

NuScale noted that the staff made a pre-determined finding that the level of detail required for a DC or COL is adequate. NuScale stated this is inherent and technically acceptable PRA which implies sufficient detail and it would be up to the applicant to decide, and they may not see this condition as essential because it is implied.

The staff stated they do not see this condition as implied and asked NuScale if they would update the TR under the new Section 2.5.1 Conditions of applicability, added as part of the proposed RAI response. NuScale responded they would not add all that type of detail, they would only add the technically acceptable PRA condition to use the TR and that is independent of any type of licensing process.

Finally, NuScale stated they would work to add clarity to this topic.

The following responses to RAI 9828 questions were discussed during the meeting.

Question 1.05-43: Qualitative Health Objectives

The NRC staff expects COL PRA used to support this risk-informed application to be more detailed than that used to support licensing under CFR 52.79 and to meet the large release frequency (LRF) Commission Goal for new reactors of less than 1E-6/year by aggregating the risk for the site with the initiators (external and internal events), ensuring

the qualitative health objectives (QHOs) are met. The staff may write a condition of use that the COL PRA used to support this TR, considering the aggregate risk including seismic risk, shall show that the LRF meets the Commission Goal for new reactors, or NuScale's response may specify that the PRA used to support this application meets the QHOs considering aggregate risk from all hazards. The staff wants to confirm the aggregate of CDFs and LRFs meets the Commission Goal for new reactors.

NuScale stated their position is any facility that is approved for construction and subsequently for operation would show to meet the QHOs and EP, and specifically the sizing EPZ has no bearing on meeting the QHOs. Further, NuScale noted past DC and COL applications demonstrated compliance with the safety goals without a full scope PRA; agreed their TR does not use an aggregate of risk, but overall safety goals are met; does not see a condition meeting the QHOs using that PRA as relevant to this methodology; has no reason to doubt that the aggregate risk would in fact show the design meets the QHOs, but it is irrelevant to this methodology; stated the expectation is that a seismic PRA would be part of the PRA used to implement this method, but that is separate from the issue of demonstrating meeting the QHOs; and noted the method would have zero impact on CDF and on LRF. NuScale confirmed the PRA used to support this TR would be submitted to NRC for review, would be part of the COL application, and would be conforming to this methodology.

The NRC stated they were under the impression that new advanced designs would limit risk and it would not be difficult to demonstrate that aggregating the risk would achieve acceptable results. NuScale agreed with that, however their concern with the condition of use is creating a link between EPZ sizing and the QHOs, because they think it is not a relevant issue.

The NRC staff stated there are two arguments that need to be separated: whether the QHOs apply to EPZ sizing determination and whether or not the seismic risk should be added to determine the total risk. The staff would explore the relationship between QHOs and EP and closely look at the policy safety statement.

Question 1.05-44: External Event Screening

The NRC staff provided the following items for NuScale to consider: NuScale did not provide objective evidence that supports the screening of external events with initiator event frequency less than 1E-5/year; screening external events with initiator frequencies less than 1E-5/year could create a risk gap where risk significant core damage sequences with frequency greater than 1E-7 could be screened; NUREG-2161, "Consequence Study of a Beyond-Design-Basis Earthquake Affecting the Spent Fuel Pool for a U.S. Mark I Boiling Water Reactor," does not support the 1E-5/year screening value; and per Regulatory Guide (RG) 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," if the hazard or mode is important to the decision, it must be evaluated.

NuScale reiterated: their method has no impact on CDF and LRF; they are looking for the most appropriate action sequences for generating a source term for determining the size of the EPZ and the method would generate a source term for these purposes; for EP purposes, severe catastrophic external hazards would be problematic, and to base the EP on a source term that is generated from these extreme catastrophic hazards is not appropriate; the screening does not screen out risk, it is a method for identifying what is the most appropriate source term for sizing the EPZ; the acceptance criteria in RG 1.174 is

primarily based on changes to CDF and large early release frequency (LERF), however in this TR there are no changes to these metrics; and NuScale call this a risk-informed process, but it is different from those NRC typically reviews.

In response to an earlier statement that could imply that EP could be eliminated based on risk, the NRC staff clarified that the EP is commensurate with the risk of the facility and the EP for a licensed facility is never eliminated. The staff stated NUREG-2161, which NuScale points to in Section 3.4.2, External events screening, does not adequately support the 1E-5/year frequency, nor does NUREG-1738, "Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants," and nor does ISG-028, "Interim Staff Guidance on Assessing the Technical Adequacy of the Advanced Light-Water Reactor Probabilistic Risk Assessment for the Design Certification Application and Combined License Application."

NuScale agreed the consequences of the accidents are dependent on the scenario (in NUREG-2161) of the spent fuel pool and the source term that is present in that pool, however that is not a part used as the basis in this TR. NuScale does not consider pointing to NUREG-2161 as a deficiency of the TR and found NUREG-2161 as the most insightful source that would inform their methodology. NuScale reiterated this methodology does not change the design or design bases, it is evaluating the design as it is already designed.

The NRC staff understood NuScale's position was they selected a number less than 1E-5/year and 1.7E-5/year used in NUREG-2161, and expressed that, from the EP position, NUREG-2161 is a limited scope consequence assessment for a single plant, that used probabilistic insights to get estimates of a hypothetical spent fuel accident, but it was not a PRA and was not written with the intent of establishing screening criteria. Further, the staff stated that there appears to be a logic gap where external events, including seismic events, could be screened out based on the proposed 1E-5 criteria even though they could represent the dominant risk to event sequences such that could be screened out even though such sequences could lead to a core damage sequence that is above the screening threshold.

The staff reiterated the potential resolutions for this Question 1.05-44, namely for some risk-informed applications, the NRC staff has approved a bounding or conservative approach for screening external hazards and the response may include screening criteria that is equivalent for internal and external events or specify a conservative or bounding quantitative approach to demonstrate that screening at the 1E-7/year threshold does not impact the decision.

The NRC staff will explore the link between QHOs and EP and look into it further.

Question 1.05-45: PRA Uncertainty

The NRC staff stated the TR has a numerical screening threshold for which accidents with CDF less than the screening threshold are screened from further analysis and any type of dose consequence assessment and the proposed response did not address uncertainty against these screening thresholds which is inconsistent with the 1995 PRA policy statement, DG 1350, EP for SMRs, and nonlight-water reactors on the proposed rule. NRC believes NuScale should assess parameters and model uncertainties and perform sensitivity cases for the key PRA model uncertainties and, where the sensitivity cases challenge the screening thresholds, additional potential compensatory measures should be identified.

NuScale noted an error on slide 7 of the NRC's presentation material in that they had not agreed to a limitation for appropriate consideration of uncertainties against the numerical thresholds during public meetings for Revision 1 of the TR. NuScale stated they did discuss uncertainty during the review of Revision 1, and, as a refresher, at that time the methodology had a consideration of uncertainty as part of the method and, during the review, they were asked to remove it from the method because of the evaluation of the defense-in-depth (DID). NuScale reiterated they are addressing uncertainty qualitatively through deterministic aspects of the method; qualitative DID; PRA acceptability; and requiring the design bases source term evaluation. NuScale proposed to add the evaluation removed from Revision 1, back to the TR.

The NRC staff stated this is a risk-informed application and NuScale is generating accident frequency sequences to compare against a screening threshold. The staff understands that in the dose part of the assessment for sequences that are screened in, uncertainty is addressed, however there is no part of the TR explaining how uncertainty is addressed against the screening thresholds, which is different than having a technically acceptable PRA. The staff stated that Revision 1 was only for NuScale COLs, while the scope for Revision 2 was increased and this TR has to be reviewed in context that any SMR may be using it.

The NRC staff concluded that, if NuScale is proposing to add the evaluation removed from Revision 1 back to the TR, another public meeting should be conducted, where NuScale would present material which NRC would review.

Question 1.05-46: PRA Acceptability

The NRC staff mentioned that the new section added to the condition of applicability for a technically "adequate" PRA should be changed to technically "acceptable" PRA in order to be consistent with the terminology used in RG 1.200, Revision 3, "Acceptability of Probabilistic Risk Assessment Results for Risk-Informed Activities. The NRC stated that the RAI addressed: the need for the PRA to be peer reviewed; the need for the user of this TR to address hazards/modes not covered by the standards; and the need for the PRA to be Capability Category (CC) II with any exceptions identified and justified for. With respect to the new Section 2.5.1, Condition of applicability, which NuScale added after the June 15, 2021, public meeting, it does not include information on the peer review and any reference to the standards, while the "conformance with technical elements" wording is not terminology used in PRA standards, therefore the NRC's concern that the PRA would not meet the standards; also, the footnote pointing to good practice for all applications does not define what good practice is.

NuScale stated they put a stipulation in Section 2.5.1 and they do not think it is appropriate to define what a technically acceptable PRA is in the methodology, because it can be different depending on the specific application and stage of the design. NuScale believes that the way good practice is defined in RG 1.200 is the CC II.

At the conclusion of the discussion, there was an opportunity for the public to provide comments and ask questions.

Sarah Fields of Uranium Watch had a few comments: NRC should look at how the EPZ size affects local state and federal emergency response planning and look at why NuScale wants to reduce the EPZ; NuScale design model is based on various computer models, assumptions, computer codes, technical specifications, construction requirements, etc. and all these would

have to be verified before the reactor commences operation. Ms. Fields considers it is premature to reduce the EPZ and is concerned with the proposal that emergency responses should be handled by local law enforcement.

Edwin Lyman of Union of Concerned Scientists commented: what NuScale is proposing is very dangerous, because there are methodological problems, there is no logical process for event selection; on the issue of LRF and the safety goals vis-à-vis EP, the whole discussion made no sense to him, because it is clear the LRF is only a surrogate for the QHOs and the link between those is the average exposure of individuals with a 1-mile radius. Mr. Lyman asked how NRC would ensure PRA quality under Part 50, where there is no regulatory requirement for PRA. The NRC responded whatever condition the NRC would put on the use of this TR, the applicant would have to demonstrate it can use the TR. NRC noted that, in 2015-2016, the Commission said there should be requirements under Part 50 for a PRA and maintaining the PRA and the NRC is including that in the Parts 50/52 Lessons Learned Rulemaking, which the NRC is conducting right now. Referring to the first topic of the meeting, Mr. Lyman asked if there is a time when NRC updates the dosimetry model and the NRC staff responded that the current system of radiation protection and dosimetry models themselves are most adequate.

At the end of the public meeting, the NRC and NuScale agreed to have a follow-up public meeting and to discuss the action items from this meeting in a clarification call.

The public meeting ended with closing remarks.

AGENDA FOR PUBLIC MEETING
U.S. NUCLEAR REGULATORY COMMISSION
OBSERVATION PUBLIC TELECONFERENCE WITH NUSCALE POWER, LLC (NUSCALE)
ON NUSCALE’S TOPICAL REPORT-0915-17772, REVISION 2

July 14, 2021
2:00 p.m. – 4:00 p.m. EST

<u>OPEN</u>		
<u>Time</u>	<u>Topic</u>	<u>Led By</u>
2:00 p.m. EST	Opening Remarks	NRC
2:10 pm. EST	Discussion of Identified Topics	NRC/NuScale
	Opportunity for Public Comment	NRC/Public
	Open Portion Concludes	
<u>CLOSED</u>	(If needed)	NRC/NuScale
4:00 p.m. EST	Adjourn	

PUBLIC MEETING
U.S. NUCLEAR REGULATORY COMMISSION (NRC)
OBSERVATION PUBLIC TELECONFERENCE WITH NUSCALE POWER, LLC (NUSCALE)
ON NUSCALE'S TOPICAL REPORT TR-0915-17772, REVISION 2

July 14, 2021
List of Attendees

Name	Organization
Getachew Tesfaye	NRC
Anna Bradford	
Robert Caldwell	
Michael Dudek	
Mike Franovich	
Marie Pohida	
Stacey Rosenberg	
Elijah Dickson	
Raymond Hoffman	
Keith Tetter	
Mike Snodderly	
Alina Schiller	
Prosanta Chowdhury	
Mike Dudek	
Milton Valentin	
Michelle Hart	
Alfred Hathaway	
Bruce Baval	
Jessie Quichocho	
Todd Smith	
Sunwoo Park	
Anne-Marie Grady	
Greg Cranston	
Eric Schrader	
Carrie Fosaaen	NuScale
Tom Bergman	
Liz English	
Gary Becker	
Deb Luchsinger	
Steve Mirsky	
Jeremiah Doyle	
Sarah Bristol	

<u>Name</u>	<u>Organization</u>
Scott Weber	NuScale
Mark Shaver	
Kevin Deyette	
Ross Snuggerud	
Bill Galyean	
Robert Gamble	
Cindy Williams	
Jim Curry	
Sarah Fields	Uranium Watch
Edwin Lyman	Union of Concerned Scientists
Adam Stein	Xcel Energy
Jan Boudart	Nuclear Energy Information Service
Mark Dietrich	Idaho DEQ
James Purvis	
Joseph Suders	
Tom Elicson	
Bruce Foreman	
Michael Wilt	
Jeremy Jones	

Note: All participated via teleconference.