

July 22, 2015

Docket: PROJ0769

U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
One White Flint North  
11555 Rockville Pike  
Rockville, MD 20852-2738

**SUBJECT:** NuScale Power, LLC Key Issue Resolution Prior to Design Certification Application (NRC Project No. 0769).

**REFERENCE:** Letter to Dale Atkinson (NuScale Power, LLC) from Michael Mayfield (NRC), "Key Issue Resolution to Support the NuScale Design Certification Review," June 5, 2015 (ML15040A361)

On June 5, 2015, the NRC issued the referenced letter to NuScale Power, LLC (NuScale). That letter provided the staff's assessment of actions that need to be performed by NuScale before submittal of the design certification application (DCA) to ensure an efficient review schedule. In part, that letter requested:

- NuScale engage the NRC in the near-term to develop a common understanding on priorities and schedule for submittals on key issues, so that attention by NRC and NuScale could focus on important topics early and more efficiently to ensure effective use of resources.
- NuScale provide more specificity regarding requests for NRC positions on issues, differentiating between those topics that: 1) may be matters of policy needing Commission engagement; 2) warrant a formal NRC approval via a safety evaluation; 3) are significant and need office-level management approval; and 4) are of lower significance that can be addressed by the technical staff.

The purpose of this letter is to provide the information requested by the NRC in the June 5, 2015 letter.

Subsequent to the April 21, 2015 public meeting between the NRC and NuScale, there have been numerous discussions between the NRC and NuScale on the topics in that meeting, and in the June 5, 2015 letter. The purpose of these discussions was to reach a common understanding of expectations and goals for pre-application engagement topics, classification of topics which may be potential policy issues, and the scheduling of future meetings and submittals in accordance with mutually agreed priorities. All planned NRC engagements and submittals prior to DCA submittal will continue to follow this approach. As requested by the NRC, NuScale is prepared to discuss the topics addressed in Attachments 1 and 2 at a public meeting with the NRC.

Attachment 1 contains a summary of NuScale's assessment of potential policy issues related to the NuScale design, which resulted in the identification of four potential policy issues. These four issues affect significant portions of the content of the NuScale DCA. The earlier that agency positions can be obtained on these issues, the less potential impact there will be on the application and its submittal. NuScale is currently developing its final draft of the application, and expects the final draft to be complete in December 2015. NRC decisions after that date have the potential for creating more rework.

Attachment 2 provides the proposed list and schedule for the remaining pre-application engagement topics and topical reports, consistent with the discussions between the NRC and NuScale over the past two months. The NRC's normal review process for topical reports meets NuScale's needs. For other engagements, with one exception, no formal NuScale submittals or NRC positions are necessary. Assuming the amount of participation by the NRC in these engagements continues, feedback from the NRC during and after these engagements is sufficient. The one exception is NuScale's proposal submitted to the NRC on June 30, 2015 (ML15181A475) regarding the human factors engineering content for the DCA. Due to the large amount of work associated with that proposal, NuScale requested and looks forward to an official NRC position within 60 days.

NuScale will continue to engage with the NRC to address the topics that are addressed in this letter. Please feel free to contact me at 301-770-0472 or at [smirsky@nuscalepower.com](mailto:smirsky@nuscalepower.com) if the NRC has any questions.

This document and its attachments contain no regulatory commitments.

Sincerely,



Steven Mirsky  
NuScale Power, LLC  
Licensing Manager, Washington DC

Distribution: Greg Cranston, NRC, TWFN-6E7  
Michael Mayfield, NRC, TWFN-6E4  
Omid Tabatai, NRC, TWFN-6E7  
Mark Tonacci, NRC, TWFN-6E7

Attachment 1: "NuScale Assessment of Potential Policy Issues Related to the NuScale Design Certification Application"

Attachment 2: "NuScale-NRC Pre-Application Engagement Topics"

## Attachment 1

### **NuScale Assessment of Potential Policy Issues Related to the NuScale Design Certification Application**

In its letter of June 5, 2015, the NRC requested that NuScale identify potential policy issues associated with its design. This attachment provides a summary of the NuScale assessment, including the basis for suggesting that these issues may represent potential policy issues. The assessment resulted in the identification of four potential policy issues:

1. Are exemptions and departures necessary for regulations that are not technically relevant?
2. Is there a need to distinguish between multi-module and multi-unit issues?
3. Can an exemption to 10 CFR 50.54(m) be included in the design certification (DC)?
4. Can the design certification application (DCA) address regulations not yet in effect?

In addition to these four potential policy issues, for completeness this attachment also summarizes NuScale's assessment of the three specific topics identified by the NRC in its June 5, 2015 letter.

#### **Are exemptions and departures necessary for regulations that are not technically relevant?**

NuScale submitted a gap analysis report to the NRC. That analysis identified 18 areas in which a regulatory gap exists between the design and the regulations. In the gap analysis, NuScale proposed an approach to disposition many of these gaps by demonstrating in the DCA that the related regulations were not technically relevant, and that this basis was sufficient and preferable to seeking exemptions and departures for all 18 gaps. As this approach deviates from prior practice for design certifications, NuScale believes implementing this approach may represent a potential policy issue.

As presented in the gap analysis, some regulations specifically state that an applicant shall demonstrate compliance with the technically relevant portions of the requirements in the regulation. An example is the TMI action items contained in 10 CFR 50.34(f). One such requirement is to provide one or more dedicated containment penetrations, equivalent in size to a single 3-foot diameter opening. This requirement was developed in the context of large light water reactors (LLWRs), that have containments about ten times the diameter of NuScale's, to accommodate potential future installation of systems to provide for the capability of containment venting. Such an opening exceeds what would be necessary for the NuScale design, if a venting system were needed. Further, as a defense-in-depth measure, it is possible to vent NuScale's containment using an existing system. Under the proposed approach, this requirement is not technically relevant to the NuScale design, and an exemption would be unnecessary.

Other regulations, while they do not use the term "technically relevant," have similar language and appear to be amenable to the same approach. For example, General Design Criteria (GDC) 41 states that systems to control fission products, etc, shall be provided as necessary. Due to the features of the NuScale design, such systems are unnecessary. Assuming NuScale can demonstrate that these systems are not necessary in its DCA, under the proposed approach, a departure or exemption to GDC 41 would be unnecessary.

Regardless of the NRC's decision on this potential policy issue, demonstration of design safety would be the same in the DCA. However, the NRC's decision would affect how the issues are presented, whether the specific criteria for granting exemptions needs to be included in the DCA, and the content of the Appendix that would certify the design.

NuScale believes the proposed approach offers the following benefits:

- It allows both NuScale and the NRC staff to focus on the safety aspects of the design, rather than expending effort on the procedural aspects that are part of exemption and departure requests.
- The number of exemptions and departures necessary for innovative designs, such as NuScale's, may mislead the public. Exemptions and departures are misinterpreted by some as a "relaxation" of requirements, even though, in the case of NuScale, the design features that create the need for exemptions and departures offer improved safety.

### **Is there a need to distinguish between multi-module and multi-unit issues?**

Through interactions with the NRC, it has become apparent that there may be a potential policy issue with respect to distinguishing between multi-module and multi-unit issues. This distinction is important because the NRC's regulations generally address issues on a per-unit (per-reactor) basis. In almost all cases, this approach is appropriate for NuScale. However, there are some issues that may justify evaluation of more than a single unit (module). Development of a policy to identify those issues that should be treated on a multi-module basis would reduce regulatory uncertainty and provide for consistent regulatory treatment.

Examples of issues that may warrant different treatment for NuScale than typical multi-unit sites include:

1. Control room operator workload for simultaneous off-normal events including design-basis and beyond-design-basis accidents because NuScale's design includes less than one operator per unit. This contrasts with current operating plants that normally have dedicated crews for each unit, even with a shared control room.
2. The number of modules to be considered in development of the source term for the emergency planning zone (EPZ). NRC EPZ regulations are not different for single and multi-unit sites. In most cases, the single-unit approach is appropriate for small modular reactors including NuScale. For some situations, consideration of more than a single module may be appropriate when evaluating the size of the EPZ. Examples 3 and 4 illustrate different circumstances for single or multiple modules issues.
3. Certain internal events, such as fire and flooding; as it is plausible that fires and floods could affect multiple modules. Conversely, it is not credible that an internal fire or flood would propagate to a second unit at a typical multi-unit site if they do not have shared structures.
4. Most external events should be treated on a per-unit basis just as they are for typical multi-unit sites, but there may be some exceptions. In most cases involving external hazards such as beyond-design-basis seismic events, external floods, external fires, or high winds, the impacts of these events do not require consideration of multiple units at a site. This approach should be applied to NuScale because the differences in spacing between the NuScale modules and between reactors at a typical multi-unit site are irrelevant given the geographic scale of these events, especially severe events. Possible exceptions would be localized beyond-design-basis external events, such as an aircraft impact or certain small-scale but severe weather events, such as a tornado, where more than one module could be affected because of their closer spacing compared to the reactors at a typical multi-unit site.

NuScale recommends that the NRC distinguish between issues that affect multiple modules and issues that affect multiple units, as described above. NuScale also recommends that the policy distinguish between issues that can be evaluated deterministically, and those that are amenable to a risk-informed approach. For the issues amenable to risk-informed treatment, NuScale believes that the recent November 2014 draft Revision 3 to SRP 19.0 provides an appropriate framework for such an approach.

NuScale developed a preliminary approach for PRA that was presented to the NRC demonstrating how the SRP 19.0 guidance could be implemented.

**Can an exemption to 10 CFR 50.54(m) be included in the design certification?**

In SECY 11-0098, “Operator Staffing For Small Or Multi-Module Nuclear Power Plant Facilities,” the NRC stated its expectation that SMR DC applicants would request exemptions to the number of control room operators as defined in 10 CFR 50.54(m). The applicability statement in that regulation suggests that it only applies to licensees and applicants for licenses, but not applicants for design certification. While NuScale prefers an approach that includes an exemption to 50.54(m) in the DC because that would provide regulatory certainty to future license applicants that reference the NuScale design, it is unclear exactly how and to what extent NuScale may seek an exemption to this regulation.

In light of the importance of this topic, NuScale and the NRC have had extensive and productive interactions during pre-application that resulted in a better understanding of the technical issues, NRC staff’s safety concerns, and NRC expectations for content of the DCA. On June 30, 2015, NuScale submitted a letter to the NRC entitled “NuScale Power, LLC Submittal of Proposed Scope of Human Factors Engineering Information in Design Certification Application” (ML15181A475), proposing the specific HFE documents that would be submitted for NRC review as part of the DCA. NuScale believes the proposed submittals will provide sufficient information for the NRC to make the safety findings associated with the design certification review. Conversely, NuScale does not believe that sufficient information can be provided as part of the DCA to meet the NRC staff’s expectations to grant a complete exemption to 50.54(m), principally because of the technical work involved in developing the final verification and validation element (i.e., integrated system validation as identified and addressed in NUREG-0711). NuScale does expect to complete the work associated with this element prior to issuance of the final safety evaluation report (FSER) for design certification.

Based on the aforementioned information, clarity from the NRC on this topic would be important to the timely development of the DCA. A possible path forward would be to include an exemption to 10 CFR 50.54(m) in the certification, coupled with conditions for licensees referencing the certified design to ensure the final verification and validation element was acceptable to the NRC. As NuScale will likely provide the final verification and validation element as a future topical report for use by licensees referencing the NuScale design, such an approach would provide standardization for the design.

**Can the DCA address regulations not yet in effect?**

A potential policy issue is the extent to which NuScale can address prospective regulations in its DCA. NuScale plans to submit its application by the end of 2016. NuScale is aware of two potential rulemakings that may become final shortly after submittal of the DCA and are relevant to the design: (1) mitigating beyond design basis events (MBDBE), and (2) performance-based emergency core cooling systems cladding acceptance criteria. This timing provides two apparent approaches for NuScale in its DCA: 1) address only the regulations in effect at the time of application; or 2) include in the application how NuScale would meet these two prospective rules. NuScale prefers the latter approach.

The first approach appears consistent with past practice; however, it has disadvantages. At a minimum, NuScale would likely need to revise its DCA shortly after submittal. This introduces inefficiencies both for NuScale and the NRC in terms of rewriting and rereviewing portions of the application, despite there being high confidence in the contents of the final rules prior to submittal of the DCA. In addition, if either of the rulemakings were finished unexpectedly early and shortly prior to NuScale submitting its DCA, NuScale may be required to revise its application prior to submittal, potentially delaying the application.

Under the second approach, NuScale would address the rules on the basis of the best information as to the final requirements in the regulations. Depending on the status of the rulemaking, this approach entails some risk to NuScale in that its application could be inconsistent with the final rules, and NuScale may need to revise its application to reflect any differences if they were to occur. Another risk is if the rules became extensively delayed or failed to be approved after the DCA is submitted. Such an event could



create inefficiencies similar to the first approach. While the second approach is preferable to NuScale, it is not clear that this approach is acceptable to the NRC, or how the staff would conduct its acceptance review of the portions of the application affected by the potential rules, as the rules would not yet be in effect.

A similar issue exists with any standard review plan guidance associated with these rules, because that guidance is unlikely to have been in effect six months prior to DCA submittal even if the rulemakings were completed prior to DCA submittal. The best approach for NuScale and the NRC to address 10 CFR 52.47(a)(9) for these rules is unclear.

Therefore, there may be a potential policy issue as to the extent to which NuScale may include prospective requirements and regulatory guidance in the application. NuScale recommends that the NRC consider a policy that would allow NuScale to decide, on a case basis and at NuScale's risk, whether to address prospective rules and regulatory guidance in the DCA. Under this approach, the staff would conduct the acceptance review and the application review using the same prospective regulations and regulatory guidance used by NuScale in the DCA. Upon completion of the rulemakings and guidance that were prospective at the time of application, NuScale would assess whether there were differences that require modification of the application. If so, NuScale would inform the NRC of the need for revision and the schedule for submittal of the revised application.

#### **Example potential policy issues in NRC's June 5, 2015 letter**

The NRC included three topics in its June 5, 2015 letter that were examples of potential policy issues: 1) classification of the electric power system; 2) a proposed topical report on risk-informed decision-making; and 3) control room staff. NuScale assessed these three examples, and does not believe that the first two issues raise new policy issues. A summary of NuScale's evaluation is provided below. The third issue on control room staffing is believed to be a potential policy issue, and is discussed earlier in this attachment.

#### Classification of the electric power system

NuScale and the NRC recently met on July 8, 2015 to discuss the classification and the design of NuScale's Highly Reliable DC Power System (EDSS). As discussed at that meeting, NuScale believes the classification approach is warranted on the basis of the advanced passive design wherein neither electrical power, nor operator action, is relied upon to ensure power module safety-related functions in response to a design-basis event. Specifically, electrical power (whether AC or DC) is not needed to achieve and maintain power module safe shutdown, core cooling, containment vessel isolation and integrity, and reactor coolant pressure boundary integrity for an indefinite duration. Operator actions are not relied upon to ensure safety-related functions for any postulated design-basis event. As discussed at the meeting, NuScale will apply augmented design, qualification, and quality assurance provisions to the EDSS appropriate for its role in defense-in-depth and risk significance. These provisions will be applied consistent with the well-established regulatory framework that already exists for establishing the appropriate treatment for systems such as the EDSS. For these reasons, NuScale believes that the classification of the EDSS is a technical issue and does not warrant new policy development.

#### Proposed topical report on risk-informed decision-making

At the April 21, 2015 meeting, NuScale included in its pre-application plans a proposed topical report titled, "Risk-Informed Decision-Making." Since then, as a result of discussions and meetings between the NRC and NuScale, it was agreed that this topical report is unnecessary. As described by NuScale, the methodology in this proposed topical report has not been used in any design decisions. Therefore, there are no potential policy issues associated with that topical report.

## Attachment 2

### NuScale-NRC Pre-Application Engagement Topics

The purpose of Attachment 2 is to provide NuScale's input on the remaining topics for pre-application engagement, and NuScale's planned submittals, for which NuScale needs a formal NRC position.

#### NuScale-NRC Pre-application Engagement Topics

NuScale and NRC staff have continued to discuss the list of potential pre-engagement topics presented at the April 21, 2015 meeting with the NRC. These discussions resulted in the elimination of many of the proposed topics, so that both organizations could focus resources on the most important that would benefit from dialog prior to submittal of the design certification application (DCA). In addition, engagements on some of the topics delineated at the April 21, 2015 meeting have been completed.

Some of the meetings have established dates. NRC and NuScale staff continue to establish dates for the remaining topics, largely on the basis of priority, resource availability, and association with a specific activity (audit or topical report submittal). For all of these remaining topics, NuScale believes that feedback from the meetings is sufficient; none are currently believed to warrant a formal NRC position. It is possible that changes to the topic list may occur, and new topics added or potentially deleted, as a result of engagement with the NRC staff during pre-application.

With the exception of the as of yet unscheduled summer 2015 audit related to NIST facility documentation, audits are not included on the list. NuScale requests that the NRC provide a plan for audits during preapplication, so that NuScale can more efficiently plan its resources and ensure the material is provided in a timely manner to make the audits more efficient and effective. NuScale suggests that audit planning be part of the requested public meeting to discuss this attachment.

### Pre-Application Engagement Topics

No.	Pre-application Engagement Topic	Date
1	Technical Specifications <sup>1</sup>	7/2015
2	EPZ Sizing Methodology <sup>1</sup>	8/2015
3	Normal Effluent Release Methodology <sup>1</sup>	8/2015
4	I&C Design Platform/Software QA/Development Process <sup>1</sup>	8/2015
5	QA inspection of NIST Facility <sup>1</sup>	8/2015
6	Piping DAC, Pipe Rupture HA, LBB Methodology, and Jet Impingement Methodology	9/2015
7	ITAAC <sup>1</sup>	9/2015
8	VIPRE Steady State Core T-H Subchannel Methodology	9/2015
9	Advanced Sensor Qualification Method	9/2015
10	Fuel and Control Rod Assembly Design	9/2015
11	NuScale Multi-Module Initial Test Program (ITP)	10/2015
12	Physical Security	10/2015
13	NRELAP5 Code and LOCA Evaluation Model, and LOCA Methodology	10/2015
14	Accident Source Term Methodology	10/2015
15	Non-LOCA Methodologies	10/2015
16	Multi-Module Risk Methodology	10/2015
17	Nuclear Analysis Codes and Methodology	11/2015
18	Probabilistic Risk Assessment (PRA)	11/2015

19	Operator Staffing, HFE	11/2015
20	Containment Integrated Leak Rate Test (CILRT)	11/2015
21	NIST Facility Documentation Audit in Rockville Office	TBD <sup>2</sup>

<sup>1</sup> Pre-application meetings on these subjects have been scheduled in July-September, 2015.

<sup>2</sup> Date to be set by NRC

### Pre-application submittals requiring formal NRC positions

The NRC's June 5, 2015 letter requested that NuScale identify the topics for which NuScale believes it needs a formal NRC position. At the April 21, 2015 meeting, NuScale identified that it would be submitting a proposal on the scope of human factors engineering (HFE) information to be included in the DCA. NuScale submitted that letter on June 30, 2015 and requested an NRC position within 60 days. Other than that proposal, all of the remaining submittals planned by NuScale in advance of the DCA will be topical reports. The submittal dates listed below are unchanged from those provided for the April 21, 2015 meeting. NuScale believes the NRC's normal process for reviewing topical reports meets NuScale's needs, and none of the topical reports need formal NRC approval in advance of the DCA.

## Topical Reports

No.	Licensing Topical Report (LTR) Title	Date
1	Risk Significance Determination	7/2015
2	On-site DC Electrical Systems - Safety Classification, Design, and Licensing Basis	10/2015
3	Effluent Release Methodology	10/2015
4	Accident Source Term Methodology	12/2015
5	Protection System	12/2015
6	EPZ Sizing Methodology and Application (COLA topic)	12/2015
7	Critical Heat Flux Correlation	1/2016
8	NRELAP5 Code Description	1/2016
9	Steady State Core Thermal-Hydraulics and Primary System Stability	2/2016
10	VIPRE Steady State Subchannel Methodology	2/2016
11	AREVA Fuel and Control Rod Assembly Topical Report Applicability to NuScale Design	3/2016
12	Containment Integrated Leak Rate Test	3/2016
13	Advanced Sensor Qualification Method	4/2016
14	Nuclear Analysis Codes and Methodologies	5/2016
15	EMDAP/LOCA methodology	6/2016
16	Non-LOCA Methodologies	7/2016
17	Transient Subchannel Analysis	7/2016