May 26, 2015

MEMORANDUM FOR: Michael Mayfield, Director
Division of Advanced Reactors and Rulemaking
Office of New Reactors

FROM: Greg Cranston, Senior Project Manager **/RA/**
Small Modular Reactor Licensing Branch
Division of Advanced Reactors and Rulemaking
Office of New Reactors

SUBJECT: SUMMARY OF APRIL 21, 2015, PUBLIC MEETING TO DISCUSS NUSCALE DESIGN CERTIFICATION APPLICATION SUBMITTAL PREPARATIONS

On April 21, 2015, a public meeting was held in Rockville, MD between representatives of the Nuclear Regulatory Commission (NRC) staff and NuScale Power. The purpose of this meeting was to discuss NuScale's preparations and schedule for submittal of their design certification application. The NRC staff has been concerned with the number of outstanding issues that still require engagement prior to submittal of the application.

NuScale prepared slides to describe their preparation of the design certification application. Presentation materials used by NuScale can be found in the Agencywide Documents Access and Management System (ADAMS) at Accession Number ML15111A203. The agenda is included in Enclosure 1 and the list of meeting attendees is included in Enclosure 2. The presentation by NuScale covered a number of topics; the highlights are described below.

Design Certification Review Schedule

At the meeting NuScale refined the submittal date for the design certification application from the second half of 2016, to between October 31 and December 31, 2016. NuScale provided a baseline design certification application review schedule illustrating a 40 month timeline of activities leading up a certification in mid-2020. This is one month longer than the NRC optimum 39 month design certification schedule which includes rulemaking. The NRC optimum 39 month schedule has six underlying assumptions. Both Nuscale and the NRC staff recognized that the schedule provided was draft and that further review and refinement would be needed. NuScale reviewed the six underlying assumptions as part of their presentation.

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1. Complete and Technically Sufficient Application

NuScale discussed (1) the testing that has been completed for NuScale to date, (2) pre-application history as it relates to interactions with the NRC associated with meetings, audits, technical reports, white papers, topical reports (TRs), and (3) their participation in small modular reactor activities with non-NRC organizations such as the Nuclear Energy Institute, the Electric Power Research Institute, the American Society of Mechanical Engineers and the American Nuclear Society. They also described upcoming tests at test facilities in Italy, at AREVA, and at their test facility in Corvallis, OR, where they will be running thermo-hydraulic tests to confirm proper plant operation, conducting fuel and control rod assembly tests, and conducting human factors evaluations at their control room test facility. The results would also be used to verify and validate the operations of the control room simulator. The NRC staff asked if the significant design changes made in the last year have been included in the testing facilities. NuScale stated that the design changes are included in the testing facilities and that the majority of the changes should be done now. The NRC staff said that maximizing the use of standard computer codes would facilitate the NRC review and help stay on schedule. The NRC also asked about the impact of the upcoming testing on the thermal hydraulic modelling of the accident safety analysis. NuScale stated that the field testing is confirmatory and significant changes are not anticipated and that there is a rigorous configuration control process.

NuScale stated that to assure a complete and technically sufficient design certification application is submitted to the NRC staff, they have independent reviews being conducted by the NuScale Technical Advisory Board and the NuScale Advisory Board. The NRC staff advised NuScale to not only benchmark their application with previously submitted new reactor applications, but to also consider what issues require unique or different information given NuScale's design. NuScale stated that their staff is utilizing their extensive experience to analyze the information so that the past problems are not repeated. The NuScale presentation described the application readiness reviews they are doing internally and the NRC readiness review to be conducted about six months before design certification application submittal. This will give the NRC staff an opportunity to determine the status of NuScale's readiness to submit their design certification application. The NRC staff stated that they are receptive to a date earlier than six months if NuScale feels they are ready.

The NRC staff pointed out that submittal dates continue to be a concern based on the review time that may be needed. The previous date for the design certification application submittal covered a six-month period which makes it difficult to schedule resources. NuScale did provide a more refined date as described above. This NRC concern regarding submittal dates also applies to other submittals such as TRs. TR submittal dates are such that many of the TR reviews will be done in parallel with the design certification application review. Submitting TRs as early as possible is encouraged to identify issues and facilitate timely NRC staff review of NuScale methodologies. However, if there are significant issues identified in the TRs that could require policy changes or lengthy reviews, the schedule could be impacted. NuScale did provide a schedule identifying 18 TRs (and one TR revision) that would provide the NRC with NuScale's position on several key topics for review and acceptance. The submittal dates ranged from May 2015 to July 2016.

2. Timely Request for Information Responses

NuScale restated that their plans are to support a 40 month design certification application review schedule, extended one month from the NRC's optimal 39 month review schedule. This

extra month is to allow 60 days for NuScale responses to NRC staff requests for additional information (RAI) instead of 30 days assumed in the NRC optimum schedule. The NRC pointed out that to streamline the RAI process and eliminate unnecessary requests; an important step is to have more pre-engagement dialogue between the NRC and NuScale prior to sending RAIs to ensure that the RAI is understood. This step ensures that both sides understand the issue to ensure that the question is completely answered to reduce the potential for a second round of RAIs. The NRC staff also pointed out that of the optimum 39 month schedule, only approximately16 months are associated with the initial preparation of the staff's safety evaluation so, again, frequent and ongoing dialogue is very important.

3. Design Specific Review Standard

A draft NuScale design specific review standard is being prepared by the NRC staff for issuance in July 2015; this is approximately 18 months prior to the date of the application submittal. NuScale management stated that this date was fully supportive of their needs and is consistent with the underlying schedule assumptions. Both NuScale and the NRC staff recognized that the design specific review standard, while as comprehensive as possible, does not contain details on every aspect of the revew given the current stage of the design. The NRC staff stated that the design specific review standard would be completed prior to NuScale submitting their design certification application for docketing. NuScale also stated that no additional significant design changes are anticipated that would cause the NRC to revisit the design specific review standard.

4. Positions on Key Topics

An underlying assumption for the 39 month optimum NRC staff review schedule is development of NRC positions on all key topics to support schedule stability. NuScale discussed their perspectives on a number of key topics described below.

In the NuScale "Gap Analysis Summary Report," NP-RP-0612-023, Revision 1, dated July 2014, NuScale identified issues or regulations they felt, for example, were not technically relevant and did not require an exemption, or that their interpretation of the regulation did not require an exemption, or that compliance was not required based on the NuScale design and did not require an exemption. The NRC staff has stated that in general, either the regulation is met or it is an exemption or a policy change. The NRC staff stated that a meeting will be held later this year with the NRC and NuScale to discuss when exemptions may be required.

In discussing these key topics, NuScale indicated that in some cases they needed the NRC staff's position on the issue. In other cases, NuScale commented that the NRC staff's position was understood. The NRC staff stated that they were not clear as to what NuScale expected regarding seeking a position from the NRC. Also, the NRC staff stated they did not understand the basis for NuScale saying that a NRC position was understood and thereby implying that the issue is resolved. The NRC staff stated that there is a significant difference between a position being understood and an issue being resolved. The NRC staff stated that there are regulatory positions and policy statements that currently exist that provide NRC positions, and that there is NRC feedback provided at meetings that may inform NuScale's preparation of their application. The NRC staff pointed out that NRC positions can also be provided in TRs and associated safety evaluation reports. NuScale requested that NRC staff communicate in identifying topics

that may become policy issues so that NuScale can work on those topics sooner rather than later.

The NuScale presentation discussed seven key issues that have been identified by the NRC staff as currently having a high importance. The NRC staff pointed out that the NRC key topics NuScale identified in their presentation are from a list of over thirty topics that the NRC staff had previously identified and provided to NuScale. These topics are ones that the NRC considered a significant schedule risk depending on how they are resolved, how quickly they are resolved and whether or not they involve exemption requests or policy issues.

On the control room staffing topic, NuScale has indicated for some time that they would have fewer reactor operators in the control room than the number stated in the regulations (10 CFR 50.54(m), "Conditions of License"), but had not previously provided a specific number on the record. At the meeting NuScale was asked if they had finalized the number of control room operators for a 12 module plan. NuScale stated that the control room staffing level would be identified in the design certification application and that it would consist of three licensed senior reactor operators and three licensed reactor operators to cover all 12 modules. NuScale also indicated that the associated human factors engineering studies supporting their position would be completed before submittal of their design certification application and that associated implementation plans and results summary reports specified in NUREG-0711, "Human Factors Engineering Program Review Model," would be submitted later this year. Additionally, NuScale stated that they would provide a written proposal of the scope of information that will be in the design certification application by June 30, 2015 for NRC staff approval. The NRC staff asked if the number might change when human factors engineering testing is complete. NuScale stated it is possible but they have a high degree of confidence that the number will remain at a total of six operators.

NuScale described their perspective that their design does not need Class 1E safety related alternating current or direct current electrical power. The NRC staff questioned how NuScale would monitor the core subsequent to a design basis accident. NuScale indicated that their position was that having a highly reliable non-Class 1E power supply was a viable alternative based on their analysis of the overall plant safety and existing regulations. The NRC staff pointed out that the electrical system design specific review standard for NuScale is written to review both Class 1E and non-Class 1E power since, even though NuScale has stated they do not need Class 1E power, the NRC staff has not been provided the documented basis for review and approval. The NRC staff stated that there are meetings scheduled between NuScale and the NRC in May 2015 to further discuss this and that pre-application interactions are critical for the NRC staff's review. The NRC staff stated that until the NRC is presented with the safety analyses and other documentation that provides the basis that none of the NuScale safety related systems and components need safety related Class 1E power during normal or post-accident operation, that NuScale's position regarding Class 1E power is still open.

NuScale stated that they would be submitting a TR on "Risk Significance Determination" and a TR on "Onsite Electrical Systems – Safety Classification and GDC Applicability," later this year. The NRC staff stated that they need to expand the discussion on this subject so that they can decide if this is something that will rise to a policy matter.

Regarding the leak before break piping issue, NuScale indicated at the meeting that they had reduced the scope of piping to which they would apply the leak before break methodology and

would only apply leak before break to the main steam and feedwater piping. A meeting is scheduled in April 2015 to discuss the reduced leak before break scope.

With respect to seismic analysis and the fuel storage rack, the NRC staff indicated that they had experienced some challenges with applicants in the past meeting all design criteria associated with fuel storage rack seismic design. The NRC staff noted a concern that in a seismic event, the NuScale reactor building pool water could be sloshing, potentially adding additional loads to the pool and spent fuel rack. NuScale stated that they understand how NRC regulations and guidance applies to the NuScale design and that the design would meet all applicable NRC regulations.

Regarding containment Type A integrated leakage rate testing, as specified in 10 CFR Part 50 Appendix J, "Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors," NuScale had previously indicated that they would seek an exemption to not do Type A testing based on the classification of the vessel and use alternate methods to verify leak tight integrity. At the meeting NuScale indicated they would submit a TR in 2016 proposing how they would conduct the Type A test.

NuScale indicated that concerns were resolved for severe accident mitigation design alternatives/environmental report (SAMDA/ER) responses, as related to pre-application activities. To clarify NuScale's statement that SAMDA/ER is resolved, NRC and NuScale staff have discussed the topics of SAMDA/ER from an "accident consequence" perspective and the NRC staff is satisfied that NuScale understands the depth and breadth of the information that needs to be included in an environmental report with the design certification application. However, the NRC staff is still waiting for NuScale to provide a probabilistic risk assessment for multi-module interactions that would support the adequacy of NuScale's SAMDA assessment from a probabilistic risk assessment standpoint.

Regarding multi-module issues, NuScale indicated that they understand the NRC position on the regulations and guidance as they apply to NuScale design. However, additional engagements have been identified regarding this issue.

The NRC staff also pointed out that for the seven key NRC issues described above, the importance of those subjects could become less significant as the issue is better understood by the NRC. The NRC pointed out that there are several additional topics beyond the seven key issues discussed that involve complex technical issues or potential policy issues. As such, other issues previously identified to NuScale beyond these seven could rise in level of importance and also involve policy issues as more information is provided to the NRC in the form of TRs, technical reports, meeting presentations, etc.

The NRC staff noted that NuScale should not focus on a portion of an issue but encapsulate the entire issue. For example, the discussion of staffing was focused on control room staffing. NuScale provided the number of licensed control room senior reactor operators and reactors they propose to use. But other complementary staff that will be needed for refueling, fire brigades, security, etc., was not discussed or determined. Also, NuScale stated that their design does not need Class 1E power. The NRC reiterated that not needing Class 1E power can only be determined once the requirements for normal and post-accident system operation have been determined and accepted showing that no electrical power is needed to maintain and monitor the plant in a safe condition. And as another example, the NRC stated that regarding

accident source term, there are some issues that require NRC decisions that can potentially impact other decisions like the establishment of the emergency planning zone. These issues will require more time to resolve, and the actual design is needed to determine what is acceptable.

Potential policy issues, such as control room operator staffing, overall plant staffing and Class 1E electrical power, need to be addressed sooner than later since policy issues can take time to get resolved and may involve Commission approval. The NRC staff stated, for example, that design acceptance criteria is still supported by the NRC, however it has consistently been one of the most complicated and problematic issues with design certification applications. So how design acceptance criteria will be used needs to be resolved sooner than later.

A substantial number of issues are being discussed but still need resolution. There are still ongoing interactions between NuScale and the NRC in order for the NRC to better understand these issues and how NuScale will address them. Additionally, the NRC staff reiterated a general caution that exemption requests may raise policy matters needing Commission approval. The NRC staff stated that weighing what and when something is a policy issue is complex and takes time and that deviations from regulations need to be decided sooner rather than later so that a decision can be made as to whether a policy change or an exemption is needed.

5. Advisory Committee on Reactor Safeguards Review

NuScale is engaging the Advisory Committee on Reactor Safeguards beginning with a June presentation to the Committee, as well as a trip by the Committee in July to the NuScale facility in Oregon.

6. Minimize Use of Design Acceptance Criteria and Design Certification Application Supplements

NuScale plans to minimize their use of design acceptance criteria in the design certification application. There have been meetings with the NRC staff on this in the past and more are planned. However, no formal submittals on this topic are planned. NuScale also plans to freeze the design in advance of application submittal and supplements to the application should be limited to addressing NRC open items.

Integrated Pre-Application Schedule

NuScale presented an integrated schedule for addressing all outstanding issues, topics, and planned TRs. The NuScale integrated schedule that was presented cites nearly 60 engagements on key issues and TRs from the NuScale presentation that still require resolution due to their potential schedule risk. The NRC noted that it is not the number of engagements that is important, rather it is the quality of the interactions, which is dependent upon the level of design information that is presented. The NRC staff reiterated that, from a schedule risk perspective, core design issues and accident safety analysis issues should not be left until late in the process because they can be challenging reviews, particularly for NuScale with its innovative design. These issues may also become long term policy issues and warrant engagement with NRC sooner rather than later. Resolving these types of issues early will result in a predictable review schedule that remains stable with the underlying six schedule assumptions identified above.

Summary

NuScale summarized that they have been engaged with the NRC since 2008 and have taken a leadership position in the industry on initiatives. NuScale stated that of the 40 topics NuScale identified for pre-application interactions, two, plant and control room staffing and no Class 1E electrical power, would benefit from an NRC position while the remainder are design-specific technical subjects. Also, specific plans and a schedule are in place to obtain NRC positions on critical topics and to inform the NRC staff on other unique design features prior to the application submittal. NuScale will provide a revised integrated plan for all pre-applcation activities based on the outcome of this meeting.

The meeting concluded with several key perspectives from the NRC:

- The number of issues that require NRC staff decision and policy making is larger than what was discussed in the presentation. As one issue is explored it can expose additional concerns that need resolution. All issues will need to be addressed from both a safety and schedule perspective.

- There needs to be clarity from NuScale as to what is meant when they refer to the need for a NRC position. Some of these issues may be addressed at the NRC staff level, some at the office level, and policy issues may need to go to the Commission. More clarity is needed on what actions are required on the part of the NRC staff versus NuScale in order to resolve open issues. This underscores the importance of the underlying schedule assumption of having NRC staff positions on all key issues prior to submittal of the application in order to achieve schedule predictability. NuScale needs to determine actions they will take to trigger the appropriate NRC actions in these areas. Meetings are valuable to exchange information, discuss policy issues, and gain a better understanding of the overall plant design, methodologies, and systems operation. However, meetings are not the platform for making decisions or providing official NRC positions.

- For the Class 1E issue, additional discussion is needed on this subject so that the NRC staff can decide if this will rise to a policy matter for a Commission decision. It is understood that both the existing electrical design and reactor building design is based on the NuScale position that Class 1E power is not required. More NRC staff and management team engagement is needed in this area.

- NuScale and the NRC need to ensure appropriate focus on addressing the entire list of issues and bringing them to closure. Additional clarity is needed on realistic expectations to resolve all the issues NuScale presented.

The meeting was concluded by the NRC thanking NuScale for coming and presenting their preparations. The NRC emphasized the preeminent role of safety in licensing reviews. Although much of the presentation addressed schedule, early resolution of the key safety issues will allow the appropriate schedule to fall into place.

Please direct any inquiries on this meeting summary to Greg Cranston at (301) 415-0546, or email at Gregory.Cranston@nrc.gov. As referenced above, 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

Enclosure:
1. Agenda
2. Meeting Attendees

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Project No.: PROJ0769

Enclosures:
1. Agenda
2. Attendees List

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NAME	GCranston	MTonacci
DATE	05/26/2015	05/26/2015

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PUBLIC MEETING AGENDA

NuScale Design Certification Application Submittal Preparations

April 21, 2015, 01:00 PM to 04:00 PM

NRC Two White Flint North, T2B3
11545 Rockville Pike
Rockville, MD

Time	***Topic***	***Speaker***
1:00-1:15 pm	Introduction of Attendees and Opening Remarks	NRC and NuScale
1:15-1:30 pm	Safety Message	NuScale
1:30-1:45 pm	Discussion of NuScale's Readiness to Submit Expected Application Review Schedule Duration Interactions Going Forward	NRC
1:45-3:15 pm	Resolution for All Key Issues and Topical Reports Integrated Schedule for All Issues, Reports, Pre-submittal Review	NuScale
3:15-3:30 pm	Public Comments	NRC
3:30-4:00 pm	Closed Session if needed	NRC/NuScale

Enclosure 1

ATTENDANCE LIST

NuScale - NRC Public Meeting on the Status of NuScale Design Certification Application

NRC Headquarters,
TWFN-2B3,
Rockville, MD 20850
April 21, 2015

NAME	AFFILIATION
Steven Pope	NuScale Power, LLC
Michael S. MsGousa	NuScale Power, LLC
Richard Rosano	Talisman
Bob Evans	Enercon
Peter Hastings	TVA
Rebecca Smith-Kevern	DOE
Tom Bergman	NuScale
Joe Williams	NRC/NRO
Dan Chalk	DOE
Jana Bergman	Curtiss-Wright-Scientech
Caleb Ward	US NIC
Vince Gilbert	US Nuclear Infrastructure Council (NIC)
Michelle Hayes	NRC
Dan Barss	NSIR/DPR/NRLB
Mike Cheok	NRC/NRO/DCIP
Matt Bandyh	SNL Financial
Frances Hilderman	Saks Power (Phone)
Nils Breckenridge	NuScale (Phone)
Richard Rennie	EPM Inc. (Phone)
Tom Miller	DOE (Phone)
Nan Gilles	NRC (Phone)
John Price	NuScale (Phone)
Bob Caldwell	US NRC
Patrick Moulding	US NRC - OGC
Joe Colaccino	NRC - NRO
Arlon Costa	NRC – NRO
John Price	Corvallis (Phone)
Jennie Wike	Corvallis (Phone)
Steve Shapiro	Corvallis (Phone)
Gary Becker	Corvallis (Phone)
Derick Botha	Corvallis (Phone)
Russell Goff	Corvallis (Phone)
Darrell Gardner	Corvallis (Phone)
Kathy Warnock	Corvallis (Phone)
Ted Hough	Corvallis (Phone)

Mark Peres	Corvallis (Phone)
Dustin Greenwood	Corvallis (Phone)
Mark Manderbach	Corvallis (Phone)
Mike VanCleave	Corvallis (Phone)
Wendell Wagner	Corvallis (Phone)
Tracey Brown	Corvallis (Phone)
Chris Vitello	Corvallis (Phone)
Heidi Glunz	Corvallis (Phone)
Mike Brasel	Corvallis (Phone)
Scott Bailey	Corvallis (Phone)
Bill Galyean	Corvallis (Phone)
Jason Pottorf	Corvallis (Phone)
Zack Rad	Charlotte (Phone)
Paul Schmugge (Flour)	Charlotte (Phone)
Mark Tonacci	NRC/NRO
Glenn Tracy	NRC/NRO
John Tappert	NRC/NRO
Michael Mayfield	NRC/NRO
John Monninger	NRC/NRO
Kimberly Hawkins	NRC/NRO
Andrea Valentin	NRC/NRO
Deborah Jackson	NRC/NRO