April 22, 2021 Project No. 99902078

U.S. Nuclear Regulatory Commission
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Rockville, MD 20852-2738

SUBJECT: Proposed Four-Phase Review Process for NuScale SDA Application

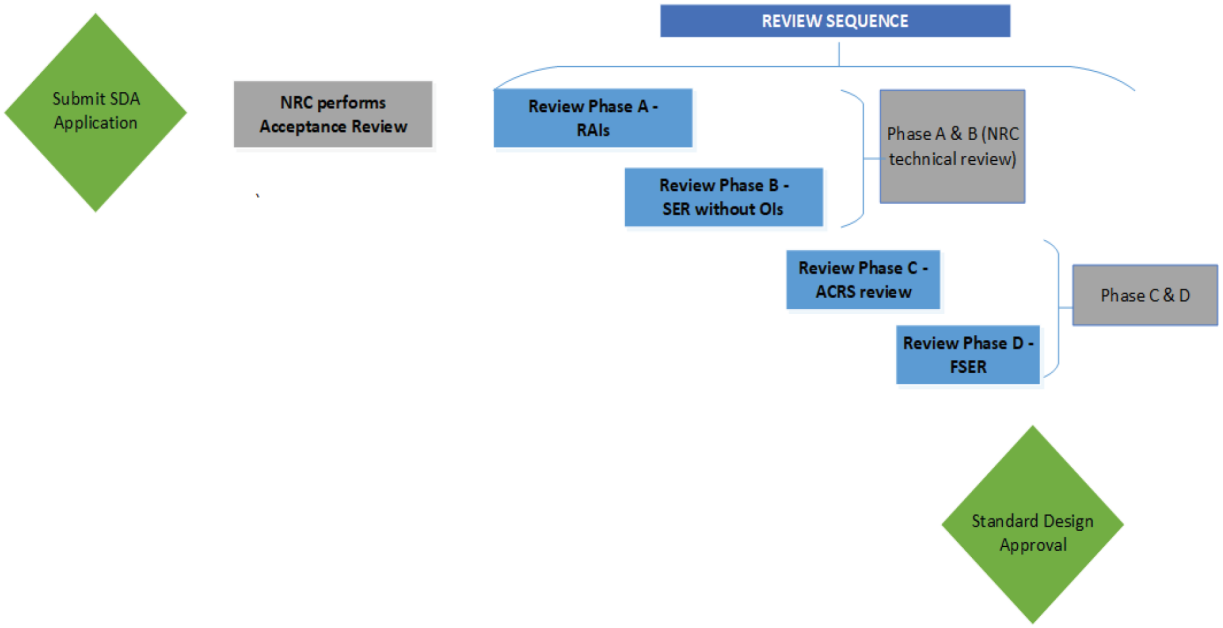
REFERENCES:

1. U.S. Nuclear Regulatory Commission, "Standard Design Approval for the NuScale Power Plant Based on the NuScale 600 Standard Plant Design Certification Application," September 11, 2020 (ADAMS Accession No. ML20247J564)
2. Letter from NuScale Power, LLC to NRC, "NuScale Power, LLC Submittal of 'NuScale 250 MWt Standard Design Approval Regulatory Engagement Plan,' PL-0002-66070, Revision 2," February 16, 2021 (ADAMS Accession No. ML21047A475)
3. U.S. Nuclear Regulatory Commission, NUREG-1793, "Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design," Initial Report, September 2004
4. U.S. Nuclear Regulatory Commission, "Advanced Safety Evaluation Report for the STP Nuclear Operating Company Amendment to the Advanced Boiling-Water Reactor (ABWR) Design Certification," July 19, 2010 (ADAMS Accession No. ML101440260)
5. U.S. Nuclear Regulatory Commission, "GE Hitachi Nuclear Energy – United States Advanced Boiling Water Reactor Design Certification Renewal Review Schedule," August 30, 2016 (ADAMS Accession No. ML16209A316)

NuScale Power, LLC (NuScale) is developing a Standard Design Approval (SDA) application in accordance with Subpart E of Title 10 of the Code of Federal Regulations, Part 52 (10 CFR 52). The SDA application will be the first instance of an SDA as a stand-alone application; the SDA for the NuScale 600 design (Reference 1) was based on NuScale's design certification application.

NuScale proposes that NRC use a four-phase process to review the SDA application. As detailed below, NuScale believes a four-phase review is feasible and appropriate because (1) similarities with the NuScale 600 design should substantially reduce the scope of Staff's review, (2) tools and processes NuScale is implementing will help streamline that review, and (3) targeted and timely Advisory Committee on Reactor Safeguards (ACRS) meetings will enable a single phase of ACRS review. The four phases of the proposed approach, as depicted in the figure that follows, would be:

- Phase A (NRC technical review) – NRC develops requests for additional information (RAIs) and NuScale responds
- Phase B (NRC technical review) – NRC issues Advanced Final Safety Evaluation Report (FSER) without open items
- Phase C – ACRS review of Advanced Safety Evaluation Report (SER) without open items
- Phase D – NRC issues SDA



A four-phase review will reduce the review effort of the Staff and ACRS, which will assist NRC in managing its review of potentially numerous concurrent applications from other advanced reactor vendors in the coming years. Further, while a specific review schedule is not discussed in or requested by this letter, NuScale believes the four-phase approach will support a condensed SDA review schedule.

The four-phase review omits the development of a draft SER with open items and the ACRS's review of it. Instead, Staff would proceed directly to developing the advanced FSER with no open items and the ACRS review will need to be completed in one phase. To support this approach, NuScale will develop a high-quality application based on the previously accepted Design Certification Application (DCA) design and work to ensure potentially challenging issues are identified and addressed early.

The NuScale SDA application design will maintain the key safety principles and features that NRC Staff previously reviewed and approved for the NuScale 600 design. As with the earlier design, the new design will feature multiple power modules, each comprising an integral pressurized water reactor housed in a high-strength steel containment, immersed in a shared reactor pool, with passive safety systems and comprehensive digital instrumentation and control, operated from a single control room. As with the NuScale 600 design, it will not

require electric power, additional water, or operator actions during or following design basis events.

The NuScale 600 application and review addressed the applicability of regulatory criteria to the novel small modular reactor design. With the NuScale 600 FSER complete, NRC has an established a framework for review of the next NuScale design, including the basis for acceptability of new safety features and methodologies. NuScale's SDA application will be developed in light of that framework, and exemptions necessary for the new design will remain largely unchanged from those previously approved.

While the SDA application will build upon the approved NuScale 600 design, the improved design will include some differences. The SDA application will reflect changes to power output, include modifications to improve operations and constructability, modifications for cost optimization, address unresolved issues from the DCA review, and complete some combined license (COL) items. Thus, NuScale will also use the following tools and processes to support a streamlined review.

1. ***Pre-application engagement***

   The Advanced Reactor Policy Statement (73 FR 26349) recommends and discusses the benefits of pre-application engagement with Staff, including a streamlined review. The Regulatory Engagement Plan (REP; Reference 2) describes a plan for pre-application engagement to align on application scope, content, and key aspects of the review. During pre-application engagements, NuScale will seek alignment and Staff familiarity with significant new or modified FSAR content, such as planned changes to address unresolved issues and COL items, and with protocols for and treatment of risk-informed and optimized application content.

   This pre-application engagement will help Staff know what to expect in the SDA application and assist their development of a plan for the review. Based on Staff feedback, NuScale can ensure the application is responsive to Staff questions and concerns, thereby reducing the number of RAIs and avoiding open items in the SER. Additionally, Staff can support discussions with ACRS on the intended scope of review (see below).

2. ***Significance Review Process***

   NuScale's significance review process, described in the REP (Reference 2), will identify significant differences between the SDA and DCA. The significance review process uses established criteria in use for other regulatory purposes, and aims to identify changes that could impact nuclear safety.

   Highlighting significant changes will facilitate the Staff in focusing review on those portions of the application that materially differ from sections previously reviewed for the DCA. As a result, Staff can readily identify potential impacts to their previous findings in the DCA FSER. With that focused review, NuScale expects Staff can issue all needed RAIs during Phase A, yielding—with successful closure of those RAIs—an SER with no open items in Phase B.

3. *Early submittal of topical reports*

A lesson learned from the DCA review is that early topical report submittal is crucial to efficient application review. NuScale expects to submit many topical reports well in advance of the SDA application. For reports that cannot be submitted well in advance of the SDA, NuScale will engage Staff in pre-application to familiarize Staff with the report contents.

Early submittal of topical reports facilitates Staff's development of RAIs and an SER on the topical report, and ACRS's review, separate from and in advance of the SDA review. Since many open items in the DCA draft SER were due to ongoing topical report reviews, NuScale expects the early review of topical reports will facilitate an efficient SDA application review and development of an advanced SER with no open items. For those topical reports submitted closer to the SDA applications submission, Staff's familiarity with the topical report content should likewise facilitate expeditious topical report review and in turn an SDA advanced FSER with no open items.

4. *ACRS engagement*

NuScale plans to engage the ACRS during the pre-application period and early in the SDA application review period. Meetings on topical reports and related discussions will provide an opportunity to familiarize ACRS with the updated design and application contents.

Following initial engagements with ACRS, NuScale expects that the ACRS can narrow and identify the areas where they intend to focus their review, and develop a plan to complete that review. For example, ACRS can identify during initial meetings those cross-cutting issues for subsequent review, which can then be accomplished during a single review phase. As noted below, it appears a similar approach was successful in achieving a targeted and efficient review of the AP1000 application by primarily relying on ACRS conclusions from the AP600 review.

Previous NRC standard design reviews indicate the proposed four-phase approach is achievable and appropriate. In 2002, Westinghouse submitted its initial DCA for the AP1000 design. While based on the AP600 design, the newer design included an approximately 75 percent increase in core power and corresponding changes to plant systems. While NRC conducted a traditional six-phase review, the ACRS portion of the review was significantly condensed. Following pre-application briefings with the ACRS, only 12 ACRS meetings were needed during the formal review, with the ACRS concluding that "most of the previous AP600 review findings were applicable to the AP1000 design" (Reference 3, Appendix G). This experience indicates that a single ACRS review phase is feasible for the NuScale SDA application.

In some cases, NRC has used a four-phase approach to a standard design review. For example, the NRC completed reviews of both the ABWR amendment application submitted by South Texas Project Nuclear Operating Company in 2009 and the ABWR renewal application submitted by GE-Hitachi Nuclear Energy in 2010 using a four-phase review (References 4 and 5). While both applications were narrower than NuScale's forthcoming application in the scope of new and modified application content, they included material

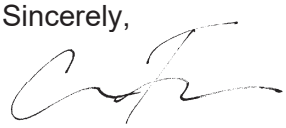
changes to the previously-reviewed design addressing safety-significant issues (aircraft impact analysis). NRC was able to successfully and expeditiously develop an Advanced FSER with no open items in Phase 2 of the review and complete the ACRS review.

Therefore, based on the similarity of the SDA application design with the NuScale 600, previously resolved technical and regulatory issues, pre-application engagement with Staff and ACRS, and the other enhancements described above, NuScale believes a four-phase review is feasible and appropriate for the SDA application review. This approach will result in reduced effort for the NRC Staff, facilitating NRC's concurrent review of potentially several advanced reactor applications, and will support NuScale's goals for commercial deployment of this new design. NuScale respectfully requests the NRC's concurrence.

This letter makes no regulatory commitments and no revisions to any existing regulatory commitments.

If you have any questions, please contact Mark Shaver, Manager, Licensing, at (541) 360-0630 or at mshaver@nuscalepower.com.

Sincerely,



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