July 5, 2016

MEMORANDUM TO: Mark Tonacci, Chief
Licensing Branch 1
Division of New Reactor Licensing
Office of New Reactors

FROM: Gregory Cranston, Senior Project Manager ***/RA/***
Licensing Branch 1
Division of New Reactor Licensing
Office of New Reactors

SUBJECT: SUMMARY OF APRIL 26, 2016, PUBLIC MEETING WITH NUSCALE POWER, LLC TO DISCUSS COMBINED REACTIVITY CONTROL SYSTEMS CAPABILITY (PROJ0769)

On April 26, 2016, a Category 1, Public meeting was held at the U.S. Nuclear Regulatory Commission (NRC) Headquarters, Two White Flint North, T-7C02, 11545 Rockville Pike, Rockville, Maryland, 20852, between representatives of the NRC staff and NuScale Power, LLC (NuScale), to discuss topics related to NuScale's position on how they comply with Title 10 of the *Code of Federal Regulations* (CFR) Part 50, Appendix A, "General Design Criteria," (GDC) 27, "Combined reactivity control systems capability," and GDC 26, "Reactivity control system redundancy and capability."

The GDC 26, "states,

> *"two independent reactivity control systems of different design principles shall be provided. One of the systems shall use control rods, preferably including a positive means for inserting the rods, and shall be capable of reliably controlling reactivity changes to assure that under conditions of normal operation, including anticipated operational occurrences, and with appropriate margin for malfunctions such as stuck rods, specified acceptable fuel design limits are not exceeded. The second reactivity control system shall be capable of reliably controlling the rate of reactivity changes resulting from planned, normal power changes (including xenon burnout) to assure acceptable fuel design limits are not exceeded. One of the systems shall be capable of holding the reactor core subcritical under cold conditions."*

NuScale does not interpret GDC 26 as requiring two safety related means of reactivity control. The primary non-safety related independent reactivity control system that can be used to provide poison addition to meet the requirements of GDC 26 in the NuScale design is the chemical and volume control system (CVCS). NuScale also stated that the non-safety containment flood and drain system could be used. The safety related system is the control rod system.

CONTACT: Gregory Cranston, NRO/DNRL
(301) 415-0546

The GDC 27 states,

> *"Combined reactivity control systems capability*. *The reactivity control systems shall be designed to have a combined capability, in conjunction with poison addition by the emergency core cooling system, of reliably controlling reactivity changes to assure that under postulated accident conditions and with appropriate margin for stuck rods the capability to cool the core is maintained."*

NuScale's position is that its ECCS does not perform, or need to perform, a poison addition safety function or provide any makeup function. NuScale interprets GDC 27 as allowing ECCS poison addition to be credited within the combined reactivity control capability, but not requiring it.

NuScale states that the reactivity control systems associated with the NuScale design meet the requirements of GDC 27 with regard to reliably controlling reactivity changes and maintaining the capability of cooling the core without poison addition by the ECCS. Therefore, NuScale does not believe an exemption is needed regarding GDC 27.

Based on the NRC staff's current understanding of the NuScale design, the NRC staff is considering whether the NuScale design meets GDC 26 for reactivity control during normal operation and during anticipated operational occurrences using the safety related control rod system assuming the reactor achieves and maintains cold shutdown conditions while accounting for the worst stuck rod and non-safety related CVCS is able to reliably control reactivity during planned, normal power changes to assure the specified allowable fuel design limits (SAFDL) are not violated. NuScale indicated that the plant could shut down on control rods alone. NuScale also stated that if, due to cooldown and/or xenon decay, there was a re-criticality that the associated power level would be very low and the heat generated was within the capability of the NuScale safety related decay heat removal system to remove heat from the core.

The GDC 27 states that the combined capability of the reactivity control systems are designed to operate in conjunction with poison addition by the ECCS. The NuScale design may meet the intent of GDC 27 assuming the safety related control rods, including allowance for the worst stuck rod, achieve and maintain cold shutdown conditions, thus ensuring core cooling.

Also discussed was the applicability of: GDC 19, "Control room," regarding actions that can be taken to operate the nuclear power unit safely under normal conditions and to maintain it in a safe condition under accident conditions, including loss-of-coolant accidents; GDC 34, "Residual heat removal," regarding the system safety function to transfer fission product decay heat and other residual heat from the reactor core at a rate such that specified acceptable fuel design limits and the design conditions of the reactor coolant pressure boundary are not exceeded; and 10 CFR 50.2, "Definitions," regarding the capability to shut down the reactor and maintain it in a safe shutdown condition.

The NRC staff did not reach any conclusions regarding NuScale's position or if an exemption to GDC 27 would be required. A decision will have to wait until additional technical justification and design detail is formally submitted.

It was decided that a follow-up closed meeting would be scheduled in May 2016 at which time NuScale will present additional information regarding this regulatory issue.

The meeting was then open to the public for comments and questions of which there were none. The agenda and list of meeting attendees are included in Enclosures 1 and 2, respectively. The meeting notice is available in Agencywide Document Access and Management System (ADAMS) with Accession No. ML16105A294. There were no presentation materials for the meeting. Please direct any inquiries to Gregory Cranston at (301) 415-0546, or email at gregory.cranston@nrc.gov.

ADAMS is the system that provides text and image files of NRC public documents and can be accessed at the NRC 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.

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Enclosures:
As stated

cc: DC NuScale Power LLC Listserv

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Enclosures:
1. Meeting Agenda
2. Meeting Attendees

cc: DC NuScale Power LLC Listserv

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MEETING AGENDA

April 26, 2016

COMBINED REACTIVITY CONTROL SYSTEMS CAPABILITY

TIME	TOPIC	LEAD
3:00 p.m. – 3:10 p.m.	Introductions	All
3:10 p.m. – 3:50 p.m.	Combined Reactivity Control Systems Capability	NRC/NuScale
3:50 p.m. – 4:00 p.m.	Public Comments/Questions	All

Enclosure 1

MEETING ATTENDEES

NAME	AFFILIATION
Gregory Cranston	U.S. Nuclerar Regulatory Commission(NRC)
Mark Tonacci	NRC
Rebecca Karas	NRC
Brad Harvey	NRC
Jeff Schmidt	NRC
Tim Drzewiecki	NRC
Brent Clarke	NRC
Steven Mirsky	NuScale Power, LLC (NuScale)
Steven Pope	NuScale
Derick Botha	NuScale (Corvallis)
Tom Bergman	NuScale (Corvallis)
Akira Tokuhiro	NuScale (Corvallis)
Steven Unikewicz	NuScale (Phone)
Kent Welter	NuScale (Corvallis)
Jennie Wike	NuScale (Corvallis)
Gary Becker	NuScale (Phone)
Sarah Fields	Uranium Watch
Randy Newton	Boils and Newton
Paul Coleman	EPM