UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, DC 20555 - 0001

November 26, 2019

MEMORANDUM TO: Peter Riccardella, Chairman
Advisory Committee on Reactor Safeguards

FROM: David Petti, Member **/RA/**
NuScale Subcommittee
Advisory Committee on Reactor Safeguards

SUBJECT: PROPOSED RECOMMENDATION FOR ACRS REVIEW OF NUSCALE POWER, LLC, DESIGN CERTIFICATION APPLICATION – SAFETY EVALUATION WITH NO OPEN ITEMS FOR CHAPTER 11, "RADIOACTIVE WASTE MANAGEMENT"

In response to the Committee's request, I have reviewed the NRC staff's safety evaluation with no open items for Chapter 11, "Radioactive Waste Management," dated August 29, 2019 (ML19240A442). The following is my recommended course of action concerning further review of this chapter of the design certification application and the staff's associated safety evaluation.

SER Phase 4 Summary

The NuScale radioactive waste management systems include the liquid radioactive waste system, gaseous radioactive waste system, solid radioactive waste system, and process and effluent radiation monitoring instrumentation and sampling system. These systems are designed for normal operations, including refueling outages, routine maintenance, and anticipated operational occurrences.

The staff's review of these systems found that the designs meet all regulatory requirements. Source term calculations for these systems were performed by the staff to confirm the applicant's results. A number of site-specific combined license (COL) items were identified for these systems.

Applicable Concerns from ACRS Phase 3 Letter Report

The major open item identified by the staff concerned the technical basis associated with the selection of a realistic fuel failure fraction (RFFF) and the design basis fuel failure fraction for all source term calculations. The ACRS in their letter report agreed with this open item and the staff conclusions that the radioactive waste management systems comply with the regulatory requirements.

NRC Staff Response to ACRS Letter Report

Two fuel fractions are used by NuScale in their analysis: a realistic fuel failure fraction and a design basis fuel failure fraction. The design basis fuel failure fraction is ten times the realistic fuel failure fraction.

In their Phase 4 SER, the staff stated:

> "The applicant proposed the use of a new fuel failure rate for determining the amount of fission products in the reactor coolant for normal operations. NuScale's TR-1116-52065-P, discusses the selection of the 0.006 percent RFFF in determining the amount of fission products in the realistic coolant source terms. The staff's review of the NuScale TR finds that the RFFF information was determined based on a review of an EPRI data base of fuel failure rates seen in the operating fleet. During the audit with NuScale, the NRC staff contacted EPRI for questions on industry fuel failure data that the applicant used in NuScale TR-1116-52065-P. Based on information provided by EPRI, the NRC staff found that the source of compiled fuel failure data for U.S. nuclear power plants is from the EPRI Fuel Reliability Database (FRED). Although NuScale TR-1116-52065-P presents data and statistical analyses using historical fuel failure data (e.g., early 1970s through 1999), the EPRI source of validated data from FRED only dates back to year 2000. Using ERPI FRED data obtained during the audit, the applicant presented the NRC staff with an updated maximum RFFF value of 0.0066 percent or 66 ppm (from years 2007 through 2016 for U.S. pressurized water reactors [PWRs]).
>
> The NRC staff and applicant discussed an acceptable approach to determine a conservative RFFF for the NuScale design, and the applicant agreed to use EPRI FRED data from years 2007 through 2016 (10 years) for U.S. PWRs, and the maximum fuel failure value determined from those 10 years. The NRC staff finds that the proposed RFFF is acceptable given the history of fuel failure events, and the selection of the highest fuel failure rate in the agreed upon 2007 to 2016 timeframe. The NRC staff documented the results of this audit, including the staff's review of the FRED database, in an audit report dated April 30, 2018 (ADAMS Accession No. ML18103A198)."

The staff found that the NuScale alternate method for developing normal liquid and gaseous effluent source terms is acceptable and meets the regulatory requirements.

Open Items from Phase 3 Requiring Further ACRS Review

The staff has addressed all open items from the Phase 3 review. We agreed with the staff's conclusions that the radioactive waste management systems comply with the regulatory requirements. However, because information in this Chapter relates to NuScale source term assumptions, I recommend that this topic be discussed by the Committee in the cross-cutting focus area review. There are no additional unresolved items related to NuScale DCA Chapter 11.

Recommendation

As lead ACRS reviewer for NuScale Chapter 11, I recommend that a briefing on one specific item be given by the staff to support the Committee's Phase 5 review as it pertains to

Chapter 11 of the NuScale design certification application. I recommend a review of the staff's evaluation of the acceptability of NuScale's realistic and design basis failed fuel fraction as part of the "Source Term" area of focus review.

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