



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

May 17, 2019

The Honorable Kristine L. Svinicki
Chairman
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

**SUBJECT: SUMMARY REPORT – 662nd MEETING OF THE ADVISORY
COMMITTEE ON REACTOR SAFEGUARDS, APRIL 4-5, 2019**

Dear Chairman:

During its 662nd meeting, April 4-5, 2019, the Advisory Committee on Reactor Safeguards (ACRS) discussed several matters and completed the following correspondence:

LETTERS

Letters to Margaret M. Doane, Executive Director for Operations (EDO), NRC, from Peter C. Riccardella, Chairman, ACRS:

- “Interim Letter: Chapters 9, 10, 11, 12 and 16 of the NRC Staff’s Safety Evaluation Report with Open Items Related to the Design Certification Application Review of the NuScale Small Modular Reactor,” dated April 17, 2019, Agencywide Documents Access and Management System (ADAMS) Accession No. ML19107A174.
- “ACRS Review of Applications for Operation in the Expanded Power to Flow Domain,” dated April 17, 2019, ADAMS Accession No. ML19107A233.

MEMORANDA

Memorandum to Margaret M. Doane, Executive Director for Operations, NRC, from Andrea D. Veil, Executive Director, ACRS:

- “Documentation of Receipt of Applicable Official NRC Notices to the Advisory Committee on Reactor Safeguards for April 2019,” dated April 19, 2019, ADAMS Accession No. ML19109A227
- “Regulatory Guide,” dated April 19, 2019, ADAMS Accession No. ML19109A232, as summarized below.

- DG-1327, “Pressurized-Water Reactor Control Rod Ejection and Boiling-Water Reactor Control Rod Drop Accidents” (no review at this time, but opportunity to review after the second public comment period)
- DG-7010, “Leakage Tests on Packages for Shipment of Radioactive Material” (no review at this time, but opportunity to review after the public comment period)
- DG-1337, “Pre-Earthquake Planning, Shutdown, and Restart of a Nuclear Power Plant Following an Earthquake” (no review at this time, but opportunity to review after the public comment period)
- RG 1.97, Revision 5, “Criteria for Accident Monitoring Instrumentation for Nuclear Power Plants” (no review)

HIGHLIGHTS OF KEY ISSUES

1. Interim Letter: Chapters 9, 10, 11, 12 and 16 of the NRC Staff’s Safety Evaluation Report with Open Items Related to the Design Certification Application Review of the NuScale Small Modular Reactor

The Committee met with representatives of the NRC staff and NuScale to review Chapter 9, “Auxiliary Systems,” Chapter 10, “Steam and Power Conversion Systems,” Chapter 11, “Radioactive Waste Management,” Chapter 12, “Radiation Protection,” and Chapter 16, “Technical Specifications,” of the safety evaluation report (SER) with open items associated with the NuScale design certification application (DCA).

Chapter 9 of the DCA describes NuScale auxiliary systems including the fuel storage and handling systems; water systems; process auxiliaries; heating, ventilation and air conditioning systems; and systems required for fire protection, communications and lighting. Of special interest is the Overhead Heavy Load Handling System (OHLHS) which consists of all equipment required for moving heavy loads, e.g., NuScale Power Modules (NPM) as part of a module refueling. The NuScale design also has several unique features and processes where additional design information and requirements should be provided in the DCA for the eventual combined license (COL) applicant. The chemical and volume control system provides several critical functions for the NuScale reactor design. These include inventory control, chemical control, and boric acid addition. The significance of these functions will be evaluated in the SER of Chapters 15, “Transient and Accident Analyses,” and 19, “Probabilistic Risk Assessment and Severe Accident Evaluation.” ACRS will await completion of these DCA chapter reviews before evaluating the risk significance of these systems.

Chapter 10 contains descriptions of the steam and power conversion systems which remove thermal energy from the reactor coolant system and transfers it to the main turbine generator. The main elements of the steam and power conversion system include the main steam, turbine generator, turbine bypass, main condensers, circulating water, condensate polishing, feedwater treatment, condensate and feedwater, and auxiliary boiler systems. As described in the letter report the Committee will review information in Chapter 3, “Design of Structures,

Chapter 11 contains descriptions of radioactive waste management systems and process and effluent radiation monitoring instrumentation and sampling system. Chapter 12 discusses four aspects of radiation protection: 1) assuring that occupational radiation exposures are as low as reasonably achievable; 2) determining projected radiation sources during normal operations, anticipated operational occurrences, and accident conditions; 3) establishing radiation protection design features (shielding, ventilation, radioactivity monitoring systems, and contamination controls); and 4) providing the basis for the dose assessment for normal operation and post-accident sampling and analysis. Operational considerations on the implementation of a radiation protection program are outside the scope of the DCA review and will be addressed by a COL applicant.

The staff and NuScale representatives discussed the realistic failed fuel fraction and design basis failed fuel fraction that will be considered as part of the radiation protection design features. The staff is awaiting further documentation on source terms for wastes and effluents as described in our letter report.

Chapter 16 describes the NuScale Generic Technical Specifications (GTS) which set forth the safety limits, limiting safety system settings, limiting conditions for operation, and other limitations on facility operation that are necessary for adequate protection of public health and safety. The GTS are based on current light water reactor technical specifications, where differences are a result of unique design differences from standard light water reactor designs. Staff's review of these GTS was conducted resulting in open items such as instrumentation surveillance requirements, response time testing, application of limiting conditions for operation selection criteria and COL action items.

Committee Action

The Committee issued a report to the EDO on these Chapters and associated safety evaluation with open items, dated April 17, 2019, with the following conclusions and recommendations: there are potentially risk-significant items in the NuScale design that are not yet fully developed. For these items, requirements should be included in the DCA to ensure that the licensed NuScale plant will perform as credited. We have not identified any additional major issues at this time for Chapters 9, 10, 11, 12 and 16.

2. ACRS Review of Applications for Operation in the Expanded Power to Flow Domain

The ACRS evaluated its involvement in reviews of the License Amendment Requests (LAR) in the expanded power to flow domain, such as the Maximum Extended Load Limit Analysis Plus (MELLLA+) operating domain. The ACRS discussion was informed by materials presented at the March 19, 2019, meeting of the ACRS Power Uprates Subcommittee in which representatives from the staff and their consultants reported their progress on a review of the license amendment request (LAR) by Tennessee Valley Authority (TVA) for Units 1, 2, and 3 of the Browns Ferry Power Plant (Browns Ferry) and on other activities affecting operation in the expanded power to flow domain.

The staff has established a mature process for completing reviews on this topic and applied this process to a range of BWR designs. In more complex cases, such as ones in which a licensee

combines methods developed by multiple vendors, the staff completes TRACE confirmatory calculations to increase confidence that appropriate uncertainties are considered by the licensee.

Committee Action

The Committee issued a report to the EDO on this matter, dated April 17, 2019, with the following conclusion and recommendation: 1) No additional ACRS review of the TVA MELLLA+ LAR for Browns Ferry is required unless there are substantive changes in the status that the staff provided on March 19, 2019 and 2) ACRS participation in future reviews of this topic is not required unless a new LAR involves substantive differences from the plant designs and conditions that have been approved.

RECONCILIATION OF ACRS COMMENTS AND RECOMMENDATIONS

- The Committee considered the letter from the Director of the Office of New Reactors dated February 4, 2019, "Early Site Permit – Clinch River Nuclear Site," ADAMS Accession No. ML19022A306. The Committee was satisfied with the response.
- The Committee considered the letter from the Director of the Office of Nuclear Reactor Regulation dated March 27, 2019, "Non-power Production or Utilization Facility License Renewal," ADAMS Accession No. ML19072A010. The Committee was satisfied with the response.

SCHEDULED TOPICS FOR THE 663rd ACRS MEETING

The following topics are scheduled for the 663rd ACRS meeting scheduled for May 2 -3, 2019:

- NuScale DCA Safety Evaluation with Open Items for Chapters 4 and 5

Sincerely,

/RA/

Peter C. Riccardella, Chairman

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OFFICE	ACRS	SUNSI Review	ACRS	ACRS
NAME	LBurkhart	LBurkhart	AVeil (LBurkhart for)	PRiccardella (LBurkhart for)
DATE	05/ 16 /19	05/ 16 /19	05/ 17 /19	05/ 17 /19

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