



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

June 20, 2023

The Honorable Christopher T. Hanson
Chair
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

SUBJECT: SUMMARY REPORT – 705th MEETING OF THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS, MAY 3-5, 2023

Dear Chair Hanson:

During its 705th meeting, May 3-5, 2023, which was conducted in person and virtually, the Advisory Committee on Reactor Safeguards (ACRS) discussed several matters. The ACRS completed the following correspondence:

LETTER REPORT

Letter Report to Christopher T. Hanson, Chair, U.S. Nuclear Regulatory Commission (NRC) from Joy L. Rempe, Chairman, ACRS:

- Kairos Non-Power Reactor Hermes Construction Permit Application, dated May 16, 2023, Agencywide Documents Access and Management System (ADAMS) Accession No. ML23130A183.

MEMORANDA

Memoranda to Daniel H. Dorman, Executive Director for Operations (EDO), NRC, from Scott W. Moore, Executive Director, ACRS:

- Documentation of Receipt of Applicable Official NRC Notices to the Advisory Committee on Reactor Safeguards for May, dated May 12, 2023, ADAMS Accession No. ML23129A018; and
- Regulatory Guides dated May 16, 2023, ADAMS Accession No. ML23129A026.

HIGHLIGHTS OF KEY ISSUES

1. Kairos Non-Power Reactor Hermes Construction Permit Application

The Committee heard from the NRC staff and Kairos representatives and issued its letter dated May 16, 2023, with the following conclusions and recommendations:

- a. Key attributes of the Hermes design include low thermal power of the reactor, use of TRISO fuel and Flibe coolant as an effective functional containment, and passive heat removal capability. The overall design results in projected dose consequences with large margins to regulatory siting criteria, allowing a unique approach to safety classification.
- b. Because of the first-of-a-kind nature of the Fluoride High-Temperature Reactor technology, there are performance uncertainties that can most directly be addressed during Hermes operation.
 - A scaled demonstration plant like Hermes will be valuable to test key technical elements, design features, safety functions, and equipment performance for this technology.
 - A key concern is the management of airborne beryllium and tritium in the facility to stay below relevant regulatory limits and protect the safety of workers.
- c. As noted by the staff in their safety evaluation, there is confidence that the facility can be constructed in accordance with relevant regulations and the design bases outlined in the Preliminary Safety Analysis Report. Detailed design, analysis, and technology qualification will be completed prior to the Operating License review. Combustible gas generation, associated with graphite oxidation, should be included in these evaluations.
- d. The construction permit for Hermes should be approved.

2. NRC's Office of Nuclear Regulatory Research (RES) and the Code Investment Plan

The staff heard from representatives of RES about the NRC's scientific computer code investment plan, "NRC Scientific Computer Code Investment Plan," Version 2, dated May 3, 2023 (ADAMS Accession No. ML 23122A306). RES developed this plan to manage, in a holistic manner, the maintenance and development of NRC scientific computer codes which are needed to meet current and future regulatory decision-making.

3. X-energy Design Overview Presentation

X-energy representatives provided an overview presentation for their advanced reactor design.

4. Discussions at the Planning and Procedures (P&P) Session

- a. The Committee discussed the Full Committee and Subcommittee schedules through September 2023 as well as the planned agenda items for Full Committee meetings.
- b. The ACRS Executive Director led a discussion of significant notices issued by the Agency since the last Full Committee meeting in April 2023 (this activity is documented in the memorandum dated May 12, 2023).
- c. The ACRS Executive Director led a discussion of two regulatory guides that the Committee was asked about regarding interest in review. The Executive Director documented the Committee's decision in the memorandum dated May 16, 2023.
- d. Chairman Rempe led a discussion on the status of the revised final scheduling note and highlighted one change from the previous version that was approved by the Committee. The topics and presenters in the final scheduling note include:
 - Overview: Chairman Rempe
 - SHINE Operating License Application Review: Member Ballinger
 - NuScale Emergency Planning Zone Sizing Topical Report: Vice Chairman Kirchner
 - 10 CFR Part 53 and Kairos Hermes Construction Permit Application: Member-at-Large Petti

In this meeting, the presenters conducted a run-through of their draft slides for these topics.

- e. Member Halnon led a discussion about the planned visit to Region IV in July 2023. Activities will include a visit to the Abilene Christian University (ACU) NEXT Lab (Tuesday, July 25, 2023); Comanche Peak Nuclear Power Plant (Wednesday, July 26, 2023); and Region IV offices including a Plant Operations Subcommittee meeting (Thursday, July 27, 2023). Although the Committee will not be reviewing the ACU molten salt research reactor application, the ACU trip is included to provide members an introduction to this technology. ACU researchers will provide presentations and laboratory tours to provide members information about various coolants, hazards, support equipment and instrumentation associated with molten salt technologies using solid and liquid fuels. This information will assist members in their review of molten salt reactor applications scheduled for submittal in the latter part of 2023 and during 2024. Member Halnon and ACRS staff are continuing to work with the Committee members and Region IV staff to arrange logistics for the visit.
- f. The Committee approved Member-at-Large Petti's attendance to the American Nuclear Society (ANS) Winter Meeting in November 2023. The Committee also approved efforts for Member-at-Large Petti to provide a presentation at this meeting. This presentation, which will focus on considerations related to first-of-a-kind reactors with little or no operating experience, will draw upon a presentation he made during the international meeting with representatives of advisory committees supporting nuclear regulatory agencies [see Item (i) below].

- g. Member Bier led a discussion on the proposed next steps on the safety goals topic and stated that the next meeting will be on August 24, 2023, as a Regulatory Policies and Practices Subcommittee meeting. Member Bier will invite former Commissioner George Apostolakis to provide perspectives on this topic (it is expected that his participation will be virtual in this hybrid Subcommittee meeting).
- h. Chairman Rempe led a discussion about the Committee's work on issues undertaken by the Office of Nuclear Material Safety and Safeguards (NMSS) to include front end and back end of the fuel cycle issues. It was decided that Member Sunseri with ACRS staff support will lead an effort to reach out to NMSS and request a briefing on major activities being undertaken in the office.
- i. Chairman Rempe led a discussion of follow-up items from the international activity effort. A final report is being prepared that summarizes key discussion topics and insights gained from the event and will include meeting presentation materials. When completed, the report will be publicly available. Chairman Rempe requested Committee Member comments on the draft report.
- j. There was a closed session of the P&P to discuss administrative and personnel issues.

5. Scheduled Topics for the 706th ACRS Meeting

The following topic is on the agenda for the 706th ACRS meeting scheduled for June 7-9, 2023:

- General Atomics Fast Modular Reactor Principal Design Criteria Topical Report

Sincerely,



Signed by Rempe, Joy
on 06/20/23

Joy L. Rempe
Chairman

June 20, 2023

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Accession No: ML23151A124 Publicly Available (Y/N): Y Sensitive (Y/N): N
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