



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

January 13, 2023

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

SUBJECT: SUMMARY REPORT – 701st MEETING OF THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS, NOVEMBER 29 - DECEMBER 2, 2022

Dear Chair Hanson:

During its 701st meeting, November 29 – December 2, 2022, 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 Reports to Christopher T. Hanson, Chair, U.S. Nuclear Regulatory Commission (NRC) from Joy L. Rempe, Chairman, ACRS:

- Report on the Safety Aspects of the SHINE Medical Technologies, LLC, Operating License Application Review, dated December 15, 2022, Agencywide Documents Access and Management System (ADAMS) Accession No. ML22342A144.

LETTERS

Letters to Daniel H. Dorman, Executive Director for Operations (EDO), NRC, from Joy L. Rempe, Chairman, ACRS:

- Safety Evaluation of the Kairos Topical Report, KP-TR-011, Revision 2, “Fuel Qualification Methodology for Kairos Power Fluoride Salt-Cooled High Temperature Reactor (KP-FHR),” dated December 20, 2022, ADAMS Accession No. ML22340A628; and
- Proposed Draft Regulatory Guide 1.152, Revision 4, “Criteria for Programmable Digital Devices in Safety-Related Systems of Nuclear Power Plants,” dated December 21, 2022, ADAMS Accession No. ML22342B268.

MEMORANDUM

Memorandum 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 December 2022, dated December 7, 2022, ADAMS Accession No. ML22340A588.

OTHER COMMITTEE CORRESPONDENCE APPROVED DURING THE PLANNING AND PROCEDURES PORTION OF THE FULL COMMITTEE MEETING (see discussion under item no. 4)

- White Paper on “The Enduring Legacy of ACRS: Contributing to Safety-Licensing Review of Reactor Facilities,” dated December 8, 2022, ADAMS Accession No. ML22342B269; and
- Response to NRC Staff Letter on ACRS Letter Report, “Draft SECY White Paper on Licensing and Regulating Fusion Energy Systems,” dated December 8, 2022, ADAMS Accession No. ML22340A140.

HIGHLIGHTS OF KEY ISSUES

1. Report on the Safety Aspects of the SHINE Medical Technologies, LLC, Operating License Application Review

The Committee heard from the NRC staff and issued its letter dated December 15, 2022, with the following conclusion and recommendations:

- a. The staff safety evaluation (SE) report provides a comprehensive review of important safety aspects of the design and operation of the SHINE facility.
 - b. The operating license for the SHINE Medical Isotope Production Facility should be issued.
2. Safety Evaluation of the Kairos Topical Report, KP-TR-011, Revision 2, “Fuel Qualification Methodology for Kairos Power Fluoride Salt-Cooled High Temperature Reactor (KP-FHR)”

The Committee heard from the NRC staff and issued its letter dated December 20, 2022, with the following recommendations:

- a. The topical report and the associated SE should acknowledge two concerns that affect assurance of Tri-structural Isotropic (TRISO) particle silicon carbide (SiC) layer integrity and radionuclide retention in the Kairos fluoride salt-cooled high temperature reactor (FHR) designs:
 1. Material compatibility between the Flibe (a eutectic mixture of LiF and Be₂F) molten salt with impurities (e.g., Fe, Cr, Ni) and the fuel pebble containing TRISO particles, and

2. Irradiation performance of the Kairos fuel pebbles fabricated at production-scale prior to Hermes operation.
 - b. The SE should explicitly consider the value of Hermes as a prototype. The results of Hermes operation and the associated fuel surveillance plans should be considered as a compensatory measure to address the above recommendation.
 - c. The SE should explicitly acknowledge how the flexibility provided by the Atomic Energy Act for test reactors factored into the finding for acceptability of the fuel qualification methodology for Hermes.
 - d. After these items are addressed, the SE should be issued.
3. Proposed Draft Regulatory Guide (RG) 1.152, Revision 4, "Criteria for Programmable Digital Devices in Safety-Related Systems of Nuclear Power Plants"

The Committee heard from the NRC staff and issued its letter dated December 21, 2022, with the following recommendations:

- a. Proposed draft RG 1.152, Revision 4, should be issued for public comment after incorporation of our recommendations below.
 - b. The RG introduction should include a brief discussion highlighting that a robust safety-related system architecture and its fundamental design principles are key elements for developing sound safety-related protection and safeguards systems.
 - c. To comply with Commission direction, the RG should be revised to provide an example of use of RG 5.71 guidance during the design phase by noting the use of hardware-based, uni-directional communication is an approach the staff considers acceptable.
 - d. The RG should incorporate a new Clarification that strongly discourages the use of any active virus detection features that interact with and can prevent the normal execution of safety-related system software.
4. Discussions at the Planning and Procedures (P&P) Session
 - a. The Committee discussed the Full Committee and Subcommittee schedules through April 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 November 2022 (this activity is documented in the memorandum dated December 7, 2022).
 - c. The ACRS Executive Director noted that there were no draft regulatory guide and regulatory guide reviews for this Full Committee meeting.
 - d. Member-at-large Petti led a discussion of potential future interactions with the staff on draft guidance documents that will be used to support 10 CFR Part 53 rulemaking activities.

- e. Member-at-large Petti led a discussion of upcoming activities on the Kairos (HERMES) construction permit application review and highlighted that the Committee anticipates receiving the staff's safety evaluation reports in the near future, likely in the next calendar year.
- f. Chairman Rempe led a discussion on the status of outreach efforts to international counterparts regarding the planned multinational event to be held in March 2023. A planning session with representatives from the other international regulatory advisory committees will be held via teleconference on December 5, 2022
- g. The Committee discussed the proposed 2024 meeting calendar that was sent to all Members by the staff. The Committee approved the meeting calendar as proposed with the change of identifying the January 2025 Subcommittee meeting to be during the week of January 13, 2025 rather than January 20, 2025 (to avoid the Martin Luther King/Inauguration Day holiday).
- h. Vice Chair Kirchner led a discussion about future interactions on the updated NuScale standard design approval (SDA) application review. The staff issued their preapplication readiness assessment report of the NuScale SDA draft application. The report has been posted to the ACRS SharePoint site. NuScale is planning to submit the SDA application by the end of the calendar year 2022. The NuScale Subcommittee is planning to have an information briefing with NuScale on February 15, 2023, to discuss the application contents and potential future interactions with ACRS to address challenging issues. Member Kirchner provided a proposal for chapter leads as a starting point for discussions.
- i. Chairman Rempe led a discussion on the document entitled, "The Enduring Legacy of ACRS: Contributing to Safety-licensing Review of Reactor Facilities." The Committee approved a transmittal letter that would forward the document to the NRC Chair and other Commissioners. The transmittal letter is dated December 8, 2022 (and may be found with the document under ADAMS Accession No. ML22342B269).
- j. Executive Director Moore led a discussion about the reconciliation on the topic of the Draft SECY White Paper on Licensing and Regulating Fusion Energy Systems. In response to the staff's letter, the Committee approved issuance of an ACRS letter dated December 8, 2022, ADAMS Accession No. ML22340A140.
- k. Executive Director Moore led the ACRS leadership elections in accordance with the ACRS bylaws. The Committee carried out the elections with the following results:

Chairman: Joy Rempe
Vice Chairman: Walter Kirchner
Member-at-large: David Petti

The elected officials currently are serving in the same positions and will continue in these positions until December 31, 2023.

- l. There was a closed portion of the planning and procedures session to discuss personnel matters.

5. Scheduled Topics for the 702nd ACRS Meeting

The following topics are on the agenda for the 702nd ACRS meeting scheduled for February 1-3, 2023:

- Kairos topical report on graphite materials,
- Kairos topical report on metallic materials, and
- Oconee subsequent license renewal application presentations.

Sincerely,



Signed by Rempe, Joy
on 01/13/23

Joy L. Rempe
Chairman

January 13, 2023

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DATE	1/11/23	1/11/23	1/11/23	1/13/23

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