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

March 20, 2023

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

SUBJECT: SUMMARY REPORT – 702nd MEETING OF THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS, FEBRUARY 1 - 3, 2023

Dear Chair Hanson:

During its 702nd meeting, February 1 - 3, 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 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 Subsequent License Renewal Application Review of Oconee Nuclear Station, Units 1, 2, and 3, dated February 25, 2023, Agencywide Documents Access and Management System (ADAMS) Accession No. ML23046A172.

LETTERS

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

- Draft Safety Evaluation of Kairos Topical Report, KP-TR-013, “Metallic Materials Qualification for the Kairos Power Fluoride Salt-Cooled High-Temperature Reactor,” dated February 15, 2023, ADAMS Accession No. ML23037A951, and

- Draft Safety Evaluation of the Kairos Topical Report, KP-TR-014, Revision 4, “Graphite Material Qualification for the Kairos Power Fluoride Salt-Cooled High-Temperature Reactor,” dated February 13, 2023, ADAMS Accession No. ML23038A168.

MEMORANDA

Memoranda to Daniel H. Dorman, 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 February 2023, dated February 15, 2023, ADAMS Accession No. ML23046A259.

- Regulatory Guide/Interim Staff Guidance, dated February 16, 2022, ADAMS Accession No. ML23046A285.

HIGHLIGHTS OF KEY ISSUES

1. Report on the Safety Aspects of the Subsequent License Renewal Application Review of Oconee Nuclear Station, Units 1, 2, and 3

The Committee heard from the NRC staff and Duke Energy Carolinas, LLC (Duke) and issued its letter dated February 25, 2023, with the following conclusion and recommendation:

a. The established programs and the commitments made by Duke to manage age-related degradation provide confidence that Oconee can be operated in accordance with its current licensing basis for the subsequent period of extended operation (SPEO) without undue risk to the health and safety of the public.

b. The application for the subsequent license renewal of the operating licenses for Oconee should be approved.

2. Draft Safety Evaluation of Kairos Topical Report, KP-TR-013, “Metallic Materials Qualification for the Kairos Power Fluoride Salt-Cooled High-Temperature Reactor”

The Committee heard from the NRC staff and Kairos Power LLC (Kairos) and issued its letter dated February 15, 2023, with the following conclusions and recommendation:

a. The Kairos methodology to qualify structural alloys used in safety-related systems is technically sound.

b. The topical report methodology with the limitations and conditions imposed by the staff will ensure that high temperature metallic materials will be code-qualified and able to perform their safety function.

c. The staff safety evaluation (SE) should be issued.

3. Draft Safety Evaluation of the Kairos Topical Report, KP-TR-014, Revision 4, “Graphite Material Qualification for the Kairos Power Fluoride Salt-Cooled High-Temperature Reactor”

The Committee heard from the NRC staff and Kairos and issued its letter dated February 13, 2023, with the following conclusion and recommendation:

a. The Kairos methodology to qualify safety-related graphite is technically sound. Its applicability should be governed by the limitations and conditions in the staff SE.

b. The staff SE should be issued.

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

a. The Committee discussed the Full Committee and Subcommittee schedules through June 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 December 2022 (this activity is documented in the memorandum dated February 15, 2023).

c. The ACRS Executive Director led a discussion of the lead Members' reviews of a draft regulatory guide and interim staff guidance (this activity is documented in the memorandum dated February 16, 2023).

d. Member-at-large Petti led a discussion of the status of topics related to the 10 CFR Part 53 rulemaking activities:

I. Part 53 Rulemaking package is going through concurrence in Program Offices; the package is due to the EDO on February 6th.

II. ARCAP/TICAP guidance document is delayed. The Subcommittee and Full Committee meetings for this document were moved from May and June, and the meetings have not yet been rescheduled.

III. The review for the next "Part 53-related" technical guidance document, DANU-ISG-2023-01, "Material Compatibility" will be led by Member Ballinger supported by ACRS staff engineer Christopher Brown.

e. Member-at-large Petti led a discussion of upcoming activities on the Kairos (HERMES) construction permit application. The Committee anticipates receiving the staff SE reports by February 7, 2023. A list of lead Members, chapters, and topical reports has been sent to the Committee, and Subcommittee meeting dates have been arranged as shown on the rainbow chart.

Also discussed was the invitation by Kairos to visit its facilities in California and/or New Mexico. The Committee discussed the overall workload of the ACRS and the timing of the Committee's review. It was decided that a visit to these facilities would not be possible at this time; a better time to visit may be during the operating license application review phase.

f. Member Halnon led a discussion of Molten Salt-Cooled Dissolved Fuel Reactors. There are upcoming activities with two technologies using molten salt coolants with the fuel dissolved within the coolant. The Abilene Christian University Molten Salt Research Reactor (MSRR) has submitted application information to the NRC for review. The ACRS will not formally review this application due to it being an Atomic Energy Act, Section 104c reactor. However, learnings from the staff review will be shared and

applied to interactions related to the Terrestrial Energy USA (TEUSA) reactor. The ACRS will formally review the licensing request from TEUSA Integral Molten Salt Reactor (IMSR) and the associated staff SE. To become familiar with molten salt-dissolved fuel reactors, which differ from the molten salt cooled reactors using TRISO fuel (such as Kairos – HERMES), the Committee agreed to request a two-part briefing (by staff and design developers). The first of the two-part briefing will focus on the use of dissolved fuels in molten salt coolants including the neutronics and thermodynamics of such reactors coupled with a “question and answer” period with staff experts. In the second part of the briefing, the two technologies will be presented (in closed sessions as necessary) to further Committee understanding of the research and industrial applications of this technology. It is anticipated that this two-part briefing will require a full day.

g. Member Ballinger provided a status report on the Seabrook Alkali-Silica Reaction (ASR) topic.

Region I performed an onsite inspection with the assistance of NRR structural engineers at the Seabrook Station in June 2021. The inspectors focused on four structures that NextEra identified to have individual elements (walls, slabs, or beams) that did not meet the Seabrook’s design and licensing basis because of additional ASR-related loads. NextEra documented these evaluations and conclusions in a consolidated "prompt operability determination (POD)." The NRC documented these results in the Seabrook 2nd Quarter integrated inspection report (ML21222A126). The NRC inspectors found that NextEra staff members were appropriately implementing the NRC-approved methodology related to ASR and that their additional evaluations in their POD were technically adequate to demonstrate that Seabrook concrete structures remained capable of performing their safety functions. Notwithstanding this finding, the NRC inspectors concluded the POD was not "forward looking," as required by NextEra's POD procedure, to trend their accumulated measurement data to account for the progression of ASR in their POD to the next scheduled examination. This issue is documented in the inspection report as a "green finding" (of very low safety significance) because, in part, the structures remained capable of performing as intended.

On April 27, 2022, the ACRS held a joint meeting of the Plant Operations, Radiation Protection and Fire Protection and Fuels, Materials, and Structure subcommittees. The decision was made to continue to follow the inspections and licensee actions until the issue is closed. The licensee is finalizing the required evaluations targeted to be complete in January 2023.

An inspection is planned to occur in the 1st quarter of 2023 to review the evaluation that the licensee should complete by the end of January 2023. The staff plans to document the findings in the Seabrook Station first quarter integrated inspection report, which will be available in the April/May 2023 timeframe. The licensee is also planning to enter containment for further measurements during their April 2023 refueling outage. The Committee will review this report and determine if further interaction is appropriate based on the results of that inspection.

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.

i. Vice Chair Kirchner led a discussion on the status of the Westinghouse eVinci design activities. The Westinghouse eVinci microreactor is an advanced nuclear reactor and is currently in the design phase. Westinghouse has provided the staff with several white papers to facilitate licensing discussions regarding the eVinci micro-reactor design. Westinghouse intends to pursue a 10 CFR Part 52 application for the eVinci microreactor and is continuing to follow NRC's development of 10 CFR Part 53.

j. Member Ballinger led a discussion of the visit to the Westinghouse Fuel Facility. The Metallurgy and Reactor Fuels Subcommittee is planning a visit to the Westinghouse fuel fabrication facility in Columbia, SC, during Subcommittee week in September (9/19-9/20). A draft schedule and agenda are being prepared.

k. Member Ballinger led a discussion on planned interactions with the Electric Power Research Institute (EPRI). The Metallurgy and Reactor Fuels Subcommittee is planning a series of three Subcommittee meetings with EPRI to discuss key materials-related areas industry considers of current and future importance. The first meeting, which will be held during March Subcommittee week (3/22), will focus on structural materials issues. The second meeting, which will be held during May Subcommittee week (5/18), will focus on plant engineering related issues, including balance of plant topics. The third meeting, which will be held during June Subcommittee week (6/22) will focus on fuels-related issues, including spent fuel storage and transportation topics. A detailed agenda for the March meeting is in draft form and will be finalized at a meeting with EPRI representatives on 2/9.

l. Member Bier reported on recent activities by the working group on safety goals. The working group held a planning meeting on January 13, 2023. Topics discussed included the overall goal of the working group, the anticipated work product(s), the proposed scope of work (i.e., likely topics to be addressed), and next steps. The working group also discussed possible speakers or information sources to be contacted and identified useful publications and technical reports to be explored. The immediate next step was to schedule a presentation to the Subcommittee on Regulatory Policies and Practices by someone knowledgeable about the original development of safety goals by the ACRS in 1980. A Regulatory Policies and Practices Subcommittee meeting has been tentatively scheduled for the afternoon of February 16, 2023, for this briefing.

m. Chairman Rempe led a discussion regarding her review of the Committee's workload and subcommittee structure. The Chairman previously sent proposed minor changes in assignments to all Members and solicited feedback.

n. Chairman Rempe led a discussion of the status of outreach efforts to international counterparts regarding the planned multinational event to be held in March 2023. Members discussed meeting logistics and reviewed draft slides that ACRS members will present during this meeting.

o. Executive Director Moore noted that there were no reconciliations for this meeting.

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

5. Scheduled Topics for the 703rd ACRS Meeting

The following topic was on the agenda for the 703rd ACRS meeting which was held March 2-3, 2023:

- Topical report on increased enrichment for pressurized water reactors.

Sincerely,

Signed by Rempe, Joy on 03/20/23

Joy L. Rempe
Chairman

March 20, 2023

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