



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

April 14, 2023

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

SUBJECT: SUMMARY REPORT – 703rd MEETING OF THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS, MARCH 2, 2023

Dear Chair Hanson:

During its 703rd meeting, March 2, 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

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

- Safety Evaluation for Framatome Inc., Topical Report, ANP10353P, Revision 0, “Increased Enrichment for PWRs,” dated March 20, 2023, ADAMS Accession No. ML23067A337.

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 March, dated March 7, 2023, ADAMS Accession No. ML23066A080.

HIGHLIGHTS OF KEY ISSUES

1. Safety Evaluation for Framatome Inc., Topical Report, ANP10353P, Revision 0, “Increased Enrichment for PWRs”

The Committee heard from Framatome and the NRC staff and issued its letter dated March 20, 2023, with the following conclusion and recommendation:

- a. The methodology documented in ANP-10353P, Revision 0, when applied within the staff-imposed limitations and conditions (L&Cs), is acceptable for the calculation of pressurized water reactor fuel performance with enrichments higher than 5% uranium (U)-235.
- b. The safety evaluation (SE) report should be issued.

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

- a. The Committee discussed the Full Committee and Subcommittee schedules through July 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 February 2023 (this activity is documented in the memorandum dated March 7, 2023).
- c. The ACRS Executive Director noted that there were no regulatory guides or draft guides to discuss.
- d. Member-at-large Petti led a discussion of the status of topics related to Title 10 of the *Code of Federal Regulations* (CFR) Part 53 rulemaking activities to include:
 - I. The Part 53 Rulemaking package was sent to the EDO.
 - II. Member-at-large Petti also started discussions about the staff's responses to the last ACRS letter on this subject and stated that the reconciliation will occur at the April Full Committee meeting. The staff's response has been uploaded to the SharePoint site and is available in ADAMS.
- e. Member-at-large Petti led a discussion of upcoming activities on the Kairos (HERMES) construction permit application and highlighted that the Committee has received all safety evaluation reports, which were distributed to members and uploaded to the SharePoint site.

Subcommittee meetings have been scheduled for March, April, and May; and a tentative agenda item for the May Full Committee meeting has been reserved. It was acknowledged that the letter writing may need to continue into the June Full Committee meeting.

- f. Member March-Leuba led a discussion about the recent meeting of the Accident Analysis: Thermal-Hydraulic Subcommittee on the subject of the Framatome Topical Report on COBRA-FLX: ORFEO-HMP Critical Heat Flux Correlation.

On February 16, 2023, the Accident Analysis – Thermal Hydraulics Subcommittee met with members of the staff to review their draft SE for Framatome's Supplement 1P to topical report ANP-10311P-A, entitled "COBRA-FLX: ORFEO-HMP Critical Heat Flux [CHF] Correlation." This report documents the evaluation of the accuracy of a new CHF correlation using a large dataset of historical experimental data. The staff has used the framework in Draft NUREG/KM-0013, which allows for a structured approach to the review. Framatome also used the framework for generating their topical report, which

facilitated the review and allowed it to be completed in remarkably short time. The staff has found the use of the correlation and associated uncertainties to be justified based on the available data.

Member March-Leuba has reviewed the SE report and concurred with the staff findings. Use of the NUREG/KM-0013 framework should be encouraged in the future. During the presentation, the staff presented results from a similar SE for the Biasi CHF correlation (EMF-2310, Revision 1, Supplement 2P, Revision 0) that has recently been completed. In consultation with members present at the Subcommittee meeting, Member March-Leuba recommended that a discussion of this topic during a Full Committee meeting and a letter are not required (the conclusions would be positive but would delay the final SE report). Thus, Member March-Leuba requested that the Committee adopt the recommendation to issue both SE reports without delay. The Committee agreed.

- g. Chairman Rempe led a discussion of a proposed draft scheduling note that would be sent to SECY in preparation for the Commission meeting with the ACRS scheduled for June 9, 2023.

After reviewing the list of letters issued by the ACRS since the last meeting with the Commission on June 3, 2022, the following topics and presenters were agreed upon for inclusion in the draft scheduling note:

- Overview by Chairman Rempe
- SHINE Operating License Application Review by Member Ballinger
- Regulatory Guide 1.82, "Water Sources for Long-Term Recirculation Cooling Following a Loss-of-coolant Accident," Revision 5, by Member March-Leuba
- 10 CFR Part 53 and Fusion by Member-at-large Petti

The Executive Director stated that a draft scheduling note with the above information would be sent to SECY and that feedback from SECY should be forthcoming.

Subsequent to the P&P meeting, SECY requested that the Regulatory Guide (RG) 1.82 item be replaced with a presentation on the ACRS letter regarding the NuScale Topical Report (TR) on plume exposure emergency planning zones. The affected Committee members agreed to make the change.

- h. Member Ballinger led a discussion of an upcoming visit to the Westinghouse Fuel Fabrication Facility. The Metallurgy and Reactor Fuels Subcommittee is planning a visit to this Westinghouse facility in Columbia, SC, during Subcommittee week in September (9/19-9/20). A draft schedule and agenda are being prepared.
- i. Member Ballinger led a discussion regarding the TRISO-X, LLC, submittal of an application to process and use special nuclear material in the proposed TRISO-X Fuel Fabrication Facility. The proposed facility will use uranium enriched to less than 20% in the production of TRISO-based fuel to support several advanced reactors being considered for development. The facility will be located in Roane County, TN, within the city limits of Oak Ridge, TN. Because the facility will use uranium up to 20% enrichment, there are different safety issues that must be addressed in the application. The

committee has previously reviewed the license application for a mixed oxide fuel fabrication facility. Based on a review of relevant documents and previous ACRS reviews of similar facilities, Member Ballinger recommends that the committee review this application.

The Committee agreed, and Member Ballinger will work with the ACRS staff to arrange the appropriate Subcommittee meetings.

- j. Member Ballinger led a discussion on the U.S. Department of Defense Strategic Capabilities Office (SCO) initiation of Project Pele, for the construction and demonstration of a prototype transportable microreactor or Transportable microreactor Nuclear Power Plant (TNPP). Under Project Pele a prototype transportable microreactor and associated reactor fuel will be fabricated at existing commercial facilities while startup and operation of the microreactor will be demonstrated at the U.S. Department of Energy's (DOE's) Idaho National Laboratory (INL) site.

Pacific Northwest National Laboratory (PNNL) has been tasked by SCO to address the regulatory challenges associated with safe transport of TNPPs containing irradiated nuclear fuel. In a previous study documented in PNNL-31867 (*Proposed Risk-Informed Regulatory Framework for Approval of Microreactor Transportation Packages*), it was determined that the expected radioactive inventory in the irradiated fuel of a TNPP would likely require shipment in an NRC-approved Type B package (or spent nuclear fuel cask), but that a TNPP "package" is unlikely to meet NRC requirements in 10 CFR Part 71 for a Type B package. It was therefore concluded that shipment of the TNPP package under existing regulations would likely require NRC approval using the 10 CFR 71.12 ("Specific exemptions") exemption process that relies on risk-informed decision making supported by quantitative risk assessment.

The NRC transportation regulations in 10 CFR Part 71 do not currently include a risk-informed framework or definitive process for approval of transportation of radioactive materials. Rather, current regulations specify that packages used to transport radioactive materials meet deterministic performance standards.

Because of this gap (and the fact that the risk associated with not fully meeting the deterministic performance requirements in the current regulations may be acceptable), a risk-informed regulatory framework was proposed in PNNL-31867 for demonstrating that a TNPP package (and the associated shipment process and controls) provides equivalent safety to that of a Type B package.

Based on a review of the documents related to Pele transportation and the likelihood that transportation issues related to other micro and advanced reactors (eVinci, etc.) will require addressing key safety issues using risk-informed processes, Member Ballinger recommends that the committee conduct a review of the transportation issues.

The Committee agreed and Member Ballinger will work with the ACRS staff to schedule the appropriate Subcommittee meetings.

- k. Member Ballinger led a discussion of a Proposed Rule: American Society of Mechanical Engineers (ASME) Code Cases Update and Update Frequency.

The proposed rule amends 10 CFR Section 50.55a, “Codes and standards.” The proposed rule would update the current NRC regulations to incorporate by reference the following RGs, which list the approved code cases published by the ASME:

- RG 1.84, “Design, Fabrication, and Materials Code Case Acceptability, ASME Section III,” Revision 40
- RG 1.147, “Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1,” Revision 21
- RG 1.192, “Operation and Maintenance Code Case Acceptability, ASME OM Code,” Revision 5

The proposed rule would supersede the incorporation by reference of RG 1.84, Revision 39; RG 1.147, Revision 20; and RG 1.192, Revision 4 (all issued in December 2021). The proposed rule also would revise the in-service inspection (ISI) and in-service testing (IST) code of record update frequency, as directed in Staff Requirements Memorandum (SRM)-SECY-21-0029, “Staff Requirements—SECY-21-0029—Rulemaking Plan on Revision of Inservice Testing and Inservice Inspection Program Update Frequencies Required in 10 CFR 50.55a,” dated November 8, 2021.

The rule would simply update the regulatory guides to include the latest revisions of relevant ASME code cases that can be used by applicants with the exception of the revision of the IST code of record update frequency from 12 to 25 years.

Based on his review of the documents, Member Ballinger’s recommendation was to not review the rule. The Committee agreed.

- l. Member Halnon led a discussion about the planned visit to Region IV in July 2023. Activities will likely include a visit to the Abilene Christian University NEXT Lab, a visit to the Comanche Peak nuclear power plant, and a Plant Operations Subcommittee meeting in the Region IV offices. The trip will occur during the week of July 24, 2023.
- m. Chairman Rempe led a discussion about the international outreach activities that are scheduled during the week of the Regulatory Information Conference.
- n. Member Brown led a discussion about a DOE Meeting on Advanced Remote Monitoring Project (ARM).

On January 19, 2023, the DOE hosted a meeting to discuss industry’s collaborative effort (e.g., NEI, Utilities Service Alliance) of the ARM project. NRC staff included representatives from NRR, RES (Ray Furstenu provided opening remarks), NSIR; and industry included representatives from NEI, INL, DOE, and Utilities Service Alliance. The purpose of the meeting was to discuss the use of automation to perform activities that are normally performed by operators (e.g., operator rounds, fire watches, shift surveillances). The presentations focused on the technology that will be used for

automating these activities (e.g., WIFI, digital sensors for temperature and cameras), the regulatory considerations (e.g., cyber security), and the benefits (e.g., near continuous monitoring, reduction of radiation exposure to the operator).

The NRC staff asked questions on the challenges of using remote monitoring, reliability of the ARM software, how the information gathered from the continuous remote monitoring will be used, and the plan for implementing this project (including the schedule for submitting an application for NRC review).

In addition, the industry plans to implement a pilot program to gather more information on remote monitoring, and they indicated that they plan to submit an application for NRC review by April 2024. The Committee has no action at this time.

- o. The Committee discussed and approved the following regarding Member attendance at Conferences:
 - o Member Ballinger attendance at NEI's Used Fuel Management Conference – April 24 – 27, 2023, in Las Vegas, NV.
 - o Member Ballinger attendance at the International Cooperative Group on Environmentally Assisted Cracking (ICG-EAC) Meeting - May 7–12, 2023, in Kingston, ON, Canada.
- p. Vice Chairman Kirchner provided a quick update on the status of the NuScale standard design approval application acceptance review.
- q. The Committee discussed one reconciliation on the SE of the Kairos Topical Report, KP-TR-011, Revision 2, "Fuel Qualification Methodology for the Kairos Power Fluoride Salt-cooled High Temperature Reactor (KP-FHR)." The Committee agreed that no further action was necessary on this issue.

3. Scheduled Topics for the 704th ACRS Meeting

The following topics are on the agenda for the 704th ACRS meeting scheduled for April 5 - 7, 2023:

- Kairos topics
- Terrapower's Sodium Reactor Design Overview
- Roadmap of Digital Instrumentation and Controls Regulatory Requirements, Industry and Staff Guidance

Sincerely,



Signed by Rempe, Joy
on 04/14/23

Joy L. Rempe
Chairman

April 14, 2023

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