



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

May 25, 2017

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

SUBJECT: SUMMARY REPORT – 640th MEETING OF THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS, FEBRUARY 9-11, 2017

Dear Chairman:

During its 640th meeting, February 9-11, 2017, the Advisory Committee on Reactor Safeguards (ACRS) discussed several matters and completed the following report, letters, and memoranda:

REPORT

Report to Kristine L. Svinicki, Chairman, NRC, from Dennis C. Bley, Chairman, ACRS:

- “Response to the December 15, 2016 Staff Letter Regarding ‘Draft Final Rule on Mitigation of Beyond-Design-Basis Events and Associated Regulatory Guidance’,” dated February 14, 2017

LETTERS

Letters to Victor M. McCree, Executive Director for Operations, NRC, from Dennis C. Bley, Chairman, ACRS:

- “Interim Letter: Chapters 2, 5, 8, 10, and 11 of the NRC Staff’s Safety Evaluation Report with Open Items Related to the Certification of the APR1400 Design,” dated February 21, 2017
- “Safety Evaluation of Topical Report, ‘Fluidic Device Design for the APR1400’,” dated February 21, 2017
- “Revision of Regulatory Guidance for Evaluating the Effects of Light-Water Reactor Water Environments in Fatigue Analyses of Metal Components,” dated February 22, 2017
- “Safety Evaluation of APR1400 Topical Report, ‘KCE-1 Critical Heat Flux Correlation for PLUS7 Thermal Design’,” dated February 23, 2017

MEMORANDA

Memoranda to Victor M. McCree, Executive Director for Operations, NRC, from Andrea D. Veil, Executive Director, ACRS:

- “Regulatory Guides,” dated February 15, 2017
 - Draft Regulatory Guide, DG-1325, “Applications for Nuclear Power Plants”
 - Regulatory Guide 5.18, “Limit of Error Concepts and Principles of Calculation in Nuclear materials Control” (Withdrawal)
- “Documentation of Receipt of Applicable Official NRC Notices to the Advisory Committee on Reactor Safeguards for February 2017,” dated February 15, 2017

HIGHLIGHTS OF KEY ISSUES

1. Selected Chapters of the Safety Evaluation Reports (SERs) with Open Items Associated with the Advanced Power Reactor 1400 (APR1400) Design Certification and Selected Topical Reports

1.1. NRC Staff’s Safety Evaluation Report with Open Items Related to the Certification of the APR1400 Design.

The Committee met with representatives of the NRC staff, the Korea Electric Power Corporation (KEPCO), and Korea Hydro & Nuclear Power Company, Ltd. (KHNP) to review the following chapters of the safety evaluation report with open items associated with the APR1400 design certification application: Chapter 2 “Site Characteristics;” Chapter 5 “Reactor Coolant System and Connected Systems;” Chapter 8 “Electric Power Systems;” Chapter 10 “Steam and Power Conversion System;” and Chapter 11 “Radioactive Waste Management.” The staff and applicant representatives discussed the use of a shutdown cooling pump to provide automatic containment spray, possible challenges of full load rejection, turbine missile generation, and core bypass flow under hot reactor conditions.

Committee Action

The Committee issued a letter report to the NRC Executive Director for Operations on this matter, dated February 21, 2017, with the following conclusion and recommendations: 1) Our reviews to date have not identified any issues that would significantly impact the overall review, 2) The staff should confirm that a shutdown cooling pump can provide automatic containment spray flow during conditions when the suction paths for the associated containment spray pump are isolated, and 3) The design certification should be explicit that it is for a single plant with base load operation.

1.2. Safety Evaluation of APR1400 Topical Report, "Fluidic Device Design for the APR1400"

The Committee met with representatives of the NRC staff, KEPCO, and KHNP to review the topical report, "Fluidic Device Design for the APR1400," and the associated staff advanced topical report safety evaluation. The staff and applicant representatives discussed the undershoot observed during testing of the fluidic device standpipe level, and if that could create an undesirable mechanical condition.

Committee Action

The Committee issued a letter to the NRC Executive Director for Operations on these matters, dated February 21, 2017, with the following conclusion: The safety injection tank fluidic device design, testing, and evaluation are acceptable and conform to the specified design and performance requirements.

1.3. Safety Evaluation of APR1400 Topical Report, "KCE-1 Critical Heat Flux Correlation for PLUS7 Thermal Design"

The Committee met with representatives of the NRC staff, KEPCO, and KHNP to review the topical report, "KCE-1 Critical Heat Flux Correlation for PLUS7 Thermal Design," and the associated staff advanced topical report safety evaluation. The staff and applicant representatives discussed the critical heat flux tests conducted to verify the thermal performance of the PLUS7 fuel, development and use of the KCE-1 correlation, and use of the TORC thermal-hydraulic computer code.

Committee Action

The Committee issued a letter to the NRC Executive Director for Operations on these matters, dated February 23, 2017, with the following conclusion: There is reasonable assurance that the use of the KCE-1 critical heat flux correlation is acceptable in calculating the critical heat flux for the PLUS7 fuel design, provided the conditions and limitations identified by the staff are met.

2. Draft Final Regulatory Guide 1.207, Revision 1, "Guidelines for Evaluating the Effects of Light-Water Reactor Coolant Environments in Fatigue Analyses of Metal Components" and NUREG/CR-6909, Revision 1, "Effect of LWR Water Environments on the Fatigue Life of Reactor Materials"

The Committee met with representatives of the NRC staff to discuss draft final Regulatory Guide 1.207, "Guidelines for Evaluating the Effects of Light Water Reactor Water Environments in Fatigue Analyses of Metal Components" and associated NUREG/CR-6909, Revision 1, "Effect of LWR Water Environments on the Fatigue Life of Reactor Materials." Regulatory Guide 1.207, Revision 1, describes methods and procedures that the NRC staff considers acceptable for use in determining fatigue lives of components evaluated by a cumulative usage factor calculation in accordance with the fatigue design rules in Section III of the ASME Boiler and Pressure Vessel Code, to account for the effects of LWR water environments. Revision 1 of NUREG/CR-6909 summarizes, reviews, and quantifies the effects of LWR environments on the fatigue lives of reactor materials, including carbon steels, low-alloy steels, nickel-chromium-iron (Ni-Cr-Fe) alloys, and austenitic stainless steels. The primary purpose of Regulatory Guide 1.207 is to provide

guidance on use of NUREG/CR-6909. The staff discussed methods and procedures that are considered acceptable for use in determining the acceptable fatigue lives of metal components.

Committee Action

The Committee issued a letter to the Executive Director for Operations on this matter, dated February 22, 2017, with the following recommendations: 1) Revision 1 of Regulatory Guide 1.207 and NUREG/CR-6909 should be issued and 2) The staff should continue to participate in American Society of Mechanical Engineers Code Committee efforts to incorporate environmental fatigue effects through Code Case N-792.

3. Generic Quality Assurance Lessons Learned – New Reactors

The Committee met with representatives of the NRC staff to discuss generic quality assurance (QA) lessons learned relative to the design process leading to certification under 10 CFR Part 52 and the consideration of these lessons learned in the ongoing and future oversight of the QA program implementation. The staff presented background information and QA lessons learned from NUREG-1055, “Improving Quality and Assurance of Quality in the Design and Construction of Nuclear Power Plants,” which were incorporated into the 10 CFR Part 52 licensing process. The staff also affirmed that 10 CFR Part 50, Appendix B applies to the development of safety-related information reflected in a certified design under 10 CFR Part 52. The staff discussed the NRC’s responsibility, and the design certification and combined license applicants’ respective responsibilities with regard to the design, implementation, and oversight of the QA program. The staff stated that the current QA licensing review process and inspection programs are effective. The staff continues to review and update guidance on licensing reviews and inspection.

Committee Action

This was an information briefing. No Committee action was necessary.

RECONCILIATION OF ACRS COMMENTS AND RECOMMENDATIONS

- The Committee considered the Executive Director for Operations’ response of December 15, 2016, to the December 6, 2016 ACRS letter, “Draft Final Rule on Mitigation of Beyond-Design-Basis Events and Associated Regulatory Guidance.” The Committee issued a response to Chairman Svinicki, dated February 14, 2017, providing rationale for its disagreement with the staff’s responses to Recommendations 1 and 2 in the December 6, 2016 ACRS letter and requesting staff briefings to better understand how the site-specific evaluations are performed in practice and the staff’s considerations during their reviews of seismic risk assessments where ground motion response exceeds the current safe shutdown earthquake by more than a factor of two in the 1 to 10 Hertz frequency range.
- The Committee considered the Executive Director for Operations’ response of December 19, 2016, to the November 14, 2016 ACRS letter, “Review of SECY-16-0106, Proposed Final Rule 10 CFR Part 61, ‘Low-Level Radioactive Waste Disposal’.” The Committee decided that its report and the staff’s response adequately describe the differing points of opinion on this matter, and no further written exchange was needed.

- The Committee considered the Executive Director for Operations' response of December 22, 2016, to the November 15, 2016 ACRS letter, "Report on the Safety Aspects of Dominion Virginia Power Combined License Application for North Anna Unit 3." The Committee was satisfied with the Executive Director for Operations' response.
- The Committee considered the Executive Director for Operations' response of January 17, 2017, to the December 13, 2016 ACRS letter, "Closure of Fukushima Recommendations Related to Evaluation of Natural Hazards Other Than Seismic and Flooding, Periodic Confirmation of Natural Hazards, and Real-Time Radiation Monitoring." The Committee decided that its report and the staff's response adequately describe the differing points of opinion on this matter, and no further written exchange was needed.

SCHEDULED TOPICS FOR THE 641st ACRS MEETING

The following topics are scheduled for the 641st ACRS meeting, to be held on March 9-11, 2017:

- Proposed Updates to NRC Guidance for Cost-Benefit Analysis
- Advanced Reactor Design Criteria and Implementation Action Plan
- An Overview of the Generic Issues Program and Status of Generic Issues

Sincerely,

/RA/

Dennis C. Bley
Chairman

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/RA/

Dennis C. Bley
Chairman

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