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

January 13, 2014

The Honorable Allison M. Macfarlane
Chairman
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

SUBJECT: SUMMARY REPORT – 610th MEETING OF THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS, DECEMBER 4-7, 2013

Dear Chairman Macfarlane:

During its 610th meeting, December 4-7, 2013, the Advisory Committee on Reactor Safeguards (ACRS) discussed several matters and completed the following reports, letters, and memoranda:

REPORTS

Reports to Allison M. Macfarlane, Chairman, NRC, from J. Sam Armijo, Chairman, ACRS:

- Staff Evaluation and Recommendation for Japan Lessons-Learned Tier 3 Issue on Expedited Transfer of Spent Fuel, dated December 18, 2013

- Safety Evaluation of US-APWR Topical Report MUAP-07001, Revision 5, "The Advanced Accumulator," dated January 6, 2014

- Gerald R. Ford Class Aircraft Carrier Nuclear Propulsion Plant Design, dated December 6, 2013 (NON-PUBLIC)

LETTERS

Letters to Mark A. Satorius, Executive Director for Operations, NRC, from J. Sam Armijo, Chairman, ACRS:

- Chapters 6 and 7 of the Safety Evaluation Report With Open Items for Certification of the US-APWR Design and Related Long-Term Core Cooling Issues, dated December 24, 2013

- Chapters 2, 6, and 7 of the Safety Evaluation Report With Open Items for the Comanche Peak Nuclear Power Plant, Units 3 and 4, US-APWR Reference Combined License Application, dated December 18, 2013

- Chapters 2, 3, 9, 13, and 14 of the Safety Evaluation Report With Open Items Associated With the Calvert Cliffs Nuclear Power Plant, Unit 3, Combined License Application, dated December 12, 2013

MEMORANDA

Memoranda to Mark A. Satorius, Executive Director for Operations, NRC, from Edwin M. Hackett, Executive Director, ACRS:

- Proposed Rulemaking on Station Blackout Mitigation Strategies, dated December 12, 2013

- Draft Revision to Standard Review Plan Sections, dated December 12, 2013

HIGHLIGHTS OF KEY ISSUES

1. Japan Lessons-Learned Tier 3 Issue: Expedited Transfer of Spent Fuel to Dry Cask Storage

The Committee met with representatives of the NRC staff to discuss the staff's regulatory analysis entitled, "Staff Evaluation and Recommendation for Japan Lessons-Learned Tier 3 Issue on Expedited Transfer of Spent Fuel." The staff discussed the Tier 3 evaluation process, regulatory analysis modeling, assumptions, and results. The staff recommended that expedited transfer of spent fuel to dry cask storage not be pursued, and that this Tier 3 Japan lessons learned activity be closed with no further regulatory action.

Committee Action

The Committee issued a letter to the Chairman on this matter dated December 18, 2013, with the following conclusions:

- The staff's safety goal screening analysis has adequately evaluated the safety benefits of expedited transfer from spent fuel pools to dry cask storage systems.

- The safety goal screening evaluation has demonstrated that the NRC Safety Goal Policy and Quantitative Health Objectives are met with orders of magnitude margin for both current high-density spent fuel pool loadings and proposed low-density fuel loadings. Based on these results, the Committee agrees with the staff conclusion that there is insufficient safety benefit to justify the expedited transfer of spent fuel from U.S. pools to dry cask storage systems.

- The staff also performed supplementary regulatory analyses to evaluate the cost/benefit merits of expedited transfer of spent fuel to dry cask storage. In all of the base cases evaluated, the benefits of expedited transfer were found to be far less than the costs of implementation. The base case analyses are adequately conservative and support the staff's recommendation that more detailed evaluations of the benefits of expedited transfer of spent fuel need not be pursued.

- The cumulative effects of conservatisms and assumptions used in the high estimates, and in sensitivity studies of the regulatory analyses, result in exaggerated frequencies of fuel damage and exaggerated benefits of expedited transfer.

The letter also contained additional comments from five ACRS members.

2. Topical Report and Selected Chapters of the Safety Evaluation Report with Open Items Associated with the US-APWR Design Certification and Comanche Peak Nuclear Power Plant, Units 3 and 4, Reference Combined License Application

The Committee met with representatives of Mitsubishi Heavy Industries, LTD. (MHI), Luminant Generation Company (Luminant), and the NRC staff to discuss:

- the United States-Advanced Pressurized Water Reactor (US-APWR) design certification document (DCD),
- Comanche Peak Units 3 and 4 Reference Combined License Application (RCOLA),
- long-term core cooling issues associated with the US-APWR design, and
- the staff's safety evaluation report (SER) with open items related to these topics.

MHI described DCD Chapter 6, "Engineered Safety Features;" DCD Chapter 7, "Instrumentation and Controls;" the resolution of Generic Safety Issue-191, "Assessment of Debris Accumulation on PWR Sump Performance;" and Topical Report MUAP-07001, "The Advanced Accumulator." Luminant's presentation described RCOLA Chapter 2, "Site Characteristics;" RCOLA Chapter 6, "Engineered Safety Features;" and RCOLA Chapter 7, "Instrumentation and Controls." The NRC staff made presentations on all these items.

The main issues discussed for the US-APWR design certification were the location of hydrogen igniters, containment spray operating time, deterministic generation of protection system failure state signals, interface with human factors engineering evaluations, net positive suction head for emergency core cooling system pumps, refueling water storage pit strainer blockage, and debris effects downstream of the strainers.

The main issues discussed for the Comanche Peak RCOLA were details of instrumentation and controls and the site-specific information affecting the analyses of structures, systems, and components which are evaluated in other chapters of the SER.

Committee Action

The Committee issued three letters on these matters:

(1) In the letter to the Executive Director for Operations dated December 24, 2013, on DCD Chapters 6, 7, and Generic Safety Issue-191, the Committee addressed a May 8, 2008, staff requirements memorandum tasking the ACRS to provide advice on "the adequacy of the design basis long-term core cooling approach for each new reactor design." In this letter the Committee made the following recommendations:

- The staff should re-examine the technical justification for not installing hydrogen igniters at the apex of the containment dome.

- The staff should confirm that the US-APWR Emergency Operating Procedures contain unambiguous guidance to ensure that containment pressure is controlled, refueling water storage pit cooling is established, and the full inventory of buffering agent is delivered to the refueling water storage pit during a design basis accident.

- The staff should ensure that sufficient design information is available to provide assurance that watchdog timers will produce the desired reactor protection and engineered safety features actuation failure state signals independently from the Mitsubishi Electric Total Advanced Controller platform software.

- Best estimate analyses with explicit consideration of uncertainties should be performed to determine the available net positive suction head for the containment spray/residual heat removal pumps and the high head injection pumps during design basis loss of coolant accident scenarios.

- The refueling water storage pit strainer head loss performance evaluations should explicitly account for uncertainties that are based on experimental data.

- The core blockage head loss performance evaluations should explicitly account for uncertainties that are based on experimental data.

The Committee also noted that elements of the digital instrumentation and control system design affect the human factors engineering evaluations which are the subject of SER Chapter 18, and the Committee will comment on any safety implications from those interfaces in their review of that chapter.

(2) In the letter to the Executive Director for Operations dated December 18, 2013, on selected chapters the SER with open items for the Comanche Peak RCOLA, the Committee did not identify any issues in Chapter 2 (Sections 2.0 through 2.3), Chapter 6, and Chapter 7 that would preclude issuance of the combined license for Comanche Peak, Units 3 and 4. However, it was noted that the elements of the digital instrumentation and control system design affect the site-specific human factors engineering evaluations which are the subject of SER Chapter 18, and the Committee will comment on any safety implications from those interfaces during their review of that chapter.

(3) In the letter to the Chairman dated January 6, 2014, on the advanced accumulator design, the Committee noted that the US-APWR advanced accumulator is an acceptable passive source of low pressure injection for emergency core cooling, and accumulator injection performance can be characterized adequately by the MHI's defined flow rate coefficient and cavitation factor. The Committee concurs with the staff's recommendations to increase the uncertainties that are used in loss of coolant accident analyses for the high-flow and low-flow injection regimes.

3. Selected Chapters of the Safety Evaluation Report With Open Items Associated With the Calvert Cliffs Nuclear Power Plant, Unit 3, Combined License Application Referencing the Evolutionary Power Reactor

The Committee met with representatives of the NRC staff and UniStar Energy Nuclear Inc., (UniStar) to discuss the following portions of the SER with open items associated with the Calvert Cliffs combined license application for Unit 3:

- Section 2.4, “Hydrologic Engineering”
- Section 2.5,“Geology, Seismology, and Geotechnical Engineering”
- Chapter 3, “Design of Structures, Components, Equipment, and Systems,” (except for Section 3.7, “Seismic Design”)
- Chapter 9, “Auxiliary Systems”
- Chapter 13, “Conduct of Operations”
- Chapter 14, “Verification Programs”

Representatives of UniStar provided information on the characteristics of the Calvert Cliffs site, a general overview of the combined license information items, and the major site-specific features of the U.S. Evolutionary Power Reactor design which is referenced by the Calvert Cliffs Unit 3 combined license application. The staff discussed its schedule for reviewing the combined license application and summarized a number of open items in each of these SER chapters.

Committee Action

The Committee issued a letter to the Executive Director for Operations on this matter dated December 12, 2013, concluding that its review of these SER chapters has not identified any issues that merit further consideration by the Committee at this time. The Committee recommended that these chapters be moved to Phase 4 of the staff’s strategy for the preparation of the SER.

4. Draft Standard Review Plan Sections

The Committee considered draft revisions to the Standard Review Plan Sections 13.7, “Fitness for Duty Introduction,” and 13.7.1, “Fitness for Duty – Operational Program,” and decided not to review them.

5. Draft Report on the Biennial ACRS Review of the NRC Safety Research Program

The Committee discussed its draft 2014 report to the Commission on the NRC Safety Research Program.

Committee Action

The Committee plans to continue discussion of its draft report during its February 5-7, 2014 meeting.

RECONCILIATION OF ACRS COMMENTS AND RECOMMENDATIONS

The Committee considered the EDO's response of August 1, 2013, to comments and recommendations included in the June 17, 2013 ACRS letter on the proposed rulemaking on station blackout mitigation strategies. The Committee decided that it was partially satisfied with the EDO's response. In a December 12, 2013, memorandum from the ACRS Executive Director to the Executive Director for Operations, the Committee requested that a meeting be scheduled with its Fukushima subcommittee to discuss the additional guidance for evaluating the feasibility and reliability of the manual actions necessary to implement the mitigating strategies called for by Order EA-12-049. Of particular interest to the Committee is the timing for the development and use of this additional guidance and its review by the ACRS. Separately, the Committee decided to defer its evaluation of the EDO response to its recommendation regarding failure of decay heat removal capability as an independent or common-cause event as part of the staff efforts on NTTF Recommendation 1 until its February 5-7, 2014, Full Committee meeting.

The Committee considered the EDO's response of November 4, 2013, to comments and recommendations included in the October 8, 2013 ACRS letter on Regulatory Guide 1.79, "Preoperational Testing of Emergency Core Cooling Systems for Pressurized Water Reactors," and Regulatory Guide 1.79.1, "Initial Test Program of Emergency Core Cooling Systems for New Boiling Water Reactors." The Committee decided that it was satisfied with the EDO's response.

The Committee considered the EDO's response of October 22, 2013 to comments and recommendations included in the September 16, 2013 ACRS letter on the Monticello Nuclear Generating Plant extended power uprate application. The Committee decided that it was satisfied with the EDO's response.

SCHEDULED TOPICS FOR THE 611th ACRS MEETING

The following topics are scheduled for the 611th ACRS meeting, to be held on February 5-7, 2014:

- Preparation for Meeting With the Commission
- Biennial Review of the NRC Safety Research Program
- Monticello Maximum Extended Load Line Limit Analysis Plus License Amendment Request
- Proposed Revisions to 10 CFR Part 61

Sincerely,

/RA/

J. Sam Armijo
Chairman

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Sincerely,

/RA/

J. Sam Armijo
Chairman

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