



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

March 29, 2012

The Honorable Gregory B. Jaczko
Chairman
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

SUBJECT: SUMMARY REPORT – 592nd MEETING OF THE ADVISORY COMMITTEE ON
REACTOR SAFEGUARDS, MARCH 8-10, 2012

Dear Chairman Jaczko:

During its 592nd meeting, March 8-10, 2012, the Advisory Committee on Reactor Safeguards (ACRS) discussed several matters and completed the following report, letters, and memorandum:

REPORT

Report to Gregory B. Jaczko, Chairman, NRC, from J. Sam Armijo, Chairman, ACRS:

- ACRS Review of Proposed Orders in Response to Fukushima Lessons Learned (SECY-12-0025), dated March 14, 2012

LETTERS

Letters to R. W. Borchardt, Executive Director for Operations, NRC, from J. Sam Armijo, Chairman, ACRS:

- Response to February 27, 2012 Letter Regarding Final Disposition of Fukushima-Related ACRS Recommendations in Letters Dated October 13, 2011 and November 8, 2011, dated March 13, 2012.
- Chapters 6, 7, 11, 13, 15, 16, and 18 of the Safety Evaluation Report with Open Items Associated with the U.S. Evolutionary Power Reactor Design Certification Application, dated March 15, 2012
- Final Safety Evaluation Report Associated with the Florida Power and Light Turkey Point Nuclear Plant, Units 3 and 4, License Amendment Request for an Extended Power Uprate, dated March 20, 2012

- Review and Evaluation of the NRC Safety Research Program, to be issued by April 15, 2012

MEMORANDUM

Memorandum to R. W. Borchardt, Executive Director for Operations, NRC, from Edwin M. Hackett, Executive Director, ACRS:

- Draft Final Regulatory Guide 1.82, dated March 15, 2012

HIGHLIGHTS OF KEY ISSUES

1. Selected Chapters of the Safety Evaluation Report (SER) with Open Items Associated with the Review of the U.S. Evolutionary Power Reactor (EPR) Design Certification Application

The Committee met with representatives of the NRC staff and AREVA NP to discuss the following chapters of the SER with Open Items associated with the review of the U.S. EPR design certification application: Portions of Chapter 6, "Engineered Safety Features" (except for Sections 6.2.1.2 and 6.2.2); Chapter 7, "Instrumentation and Controls"; Chapter 11, "Radioactive Waste Management"; Chapter 13, "Conduct of Operations"; Portions of Chapter 15, "Transient and Accident Analysis" (except for Section 15.6.5); Chapter 16, "Technical Specifications"; and Chapter 18, "Human Factors Engineering." Representatives of AREVA provided a general overview of the U.S. EPR design certification application for each of the chapters including its major design features, main safety systems, severe accident mitigation strategies, and protection features for external hazards. The staff discussed its schedule for reviewing the EPR design certification application and summarized the number of open items in each of these SER chapters.

Committee Action

The Committee issued a letter to the EDO on this matter, dated March 15, 2012, concluding that the staff has identified appropriate open items in its review of these chapters of the U.S. EPR design certification application and can move to resolution of these open items. The Committee also identified four additional issues in connection with these chapters that the staff should consider as they resolve the open items. These issues are associated with the "watchdog" timer design, the importance of human activities, operation with only three reactor coolant pumps, and the algorithm for the evaluation of the departure from nucleate boiling ratio (DNBR).

2. Source Terms for Small Modular Reactors

The Committee met with representatives of the Nuclear Energy Institute (NEI) to discuss the development of a framework for establishing source terms for small modular reactors (SMRs). The focus of the current effort is on integrated pressurized water reactor (iPWRs). The industry has formed a working group for this activity. The work includes establishing a sound technical

basis for the radionuclide inventories in iPWRs, and the postulated release and transport mechanisms. The iPWR design and operations attributes that are different from the large light water reactors could result in the need for research. These attributes include the radionuclide composition, release point proximity to ground, and timing of release. Additional research and development would be needed for computer code development for SMR beyond design basis events, passive removal mechanisms in small containment and reactor volumes, and atmospheric dispersion at close distances. The task force work also includes a regulatory evaluation to determine applicable regulatory requirements and guidance. NEI plans to develop a position paper on the subject of SMR source terms.

Committee Action

This was an information briefing. No Committee action was necessary. The Committee plans to review assessment of accidents that could lead to core damage in SMRs.

3. Extremely Low Probability of Rupture (xLPR) Program

The Committee met with representatives of the NRC staff to discuss the Extremely Low Probability of Rupture (xLPR) research project. 10 CFR Part 50, Appendix A, General Design Criterion (GDC) 4 allows the dynamic effects of postulated pipe ruptures to be excluded from the design basis if the probability of pipe rupture is extremely low. Standard Review Plan (SRP) section 3.6.3, "Leak-Before-Break Evaluation Procedures," describes a deterministic assessment that can be used to demonstrate this low probability of pipe rupture. However, the SRP does not account for active degradation mechanisms such as primary water stress corrosion cracking. To address this issue, the xLPR program has been developed with the long-term goal of producing a probabilistic assessment tool that can be used to directly demonstrate compliance with GDC 4. Specifically, the tool would account for the effects of both active degradation mechanisms and the mitigation activities used to address this degradation. The staff presented the initial pilot study results used to assess effectiveness of the program, the capabilities of the xLPR codes, and the path forward for future work in this area.

Committee Action

The Committee will consider a proposed report on this matter during its April 12-14, 2012, meeting.

4. Turkey Point Units 3 and 4 Extended Power Uprate Application

The Committee met with representatives of the NRC staff, Florida Power and Light Company (FPL), and their respective consultants to discuss the Turkey Point Nuclear Plant (PTN), Units 3 and 4, extended power uprate (EPU) application and the associated staff draft safety evaluation. FPL has applied for an EPU of approximately 15 percent above the current licensed thermal power of 2300 megawatts thermal (MWt) to 2644 MWt. This uprate also represents

approximately a 20 percent increase from the original licensed thermal power of 2200 MWt. The meeting reviewed remaining issues from the full committee meeting on January 18-19, 2012. The licensee summarized loss of offsite power (LOOP) events and the risk associated with a dual-unit LOOP. The licensee also addressed the shared systems for PTN Units 3 and 4. The staff presented the resolution of open items with a focus on the thermal conductivity degradation (TCD) issue. Also, the staff evaluated FPL's proposed interim solution involving safety analyses which account for the TCD. Based on the comparisons to data, the NRC analysis, and benchmark calculations, the staff concluded that the licensee's analysis methods and the safety analyses results are acceptable.

Committee Action

The Committee issued a letter to the Executive Director for Operations on this matter, dated March 20, 2012, recommending that the license amendment request for an extended power uprate of PTN, Units 3 and 4, be approved.

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

The Committee completed its biennial review and evaluation of the safety research program sponsored by the NRC. In its evaluation of the NRC research activities, the Committee considered the programmatic justification for the research as well as the technical approaches and progress of the work. The evaluation also identifies research crucial to the NRC mission.

Committee Action

The Committee will issue its report entitled, "Review and Evaluation of the Nuclear Regulatory Commission Safety Research Program," by April 15, 2012. The final report will be published as NUREG-1635, Volume 10.

6. Draft Final Regulatory Guide 1.82

The Committee considered draft final Revision 4 to Regulatory Guide 1.82, "Water Sources for Long-Term Recirculation Cooling Following a Loss-of-Coolant Accident," and decided not to review it. The Committee has no objection to the staff's proposal to issue this Regulatory Guide as final.

RECONCILIATION OF ACRS COMMENTS AND RECOMMENDATIONS

- The Committee considered the EDO's response of January 24, 2012, to comments and recommendations included in the December 7, 2011, ACRS report on the safety aspects of the Progress Energy Florida Inc. combined license application for Levy Nuclear Plant, Units 1 and 2. The Committee decided that it was not satisfied with the EDO's response, and it will consider a further response during its April 12-14, 2012, meeting.

- The Committee considered the EDO's response of January 30, 2012, to comments and recommendations included in the August 11, 2011, ACRS report on draft final Revision 3 to Regulatory Guide 1.152, "Criteria for Use of Computers in Safety Systems of Nuclear Power Plants." The Committee decided that it was satisfied with the EDO's response.
- The Committee considered the EDO's response of January 27, 2012, to comments and recommendations included in the November 14, 2011, ACRS report on the draft final Revision 6 of Standard Review Plan Branch Technical Position 7-19, "Guidance for Evaluation of Diversity and Defense-in-Depth in Digital Computer-Based Instrumentation and Control Systems." The Committee decided that it was satisfied with the EDO's response.
- The Committee considered the EDO's response of February 17, 2012, to comments and recommendations included in the January 26, 2012, ACRS report on the proposed draft rule for 10 CFR 50.46c, "Emergency Core Cooling System Performance During Loss-of-Coolant Accidents." The Committee decided that it was satisfied with the EDO's response.
- The Committee considered the EDO's response of November 3, 2011, to comments and recommendations included in the September 22, 2011, ACRS report on a proposed rulemaking to introduce a site-specific performance assessment and human intrusion analysis requirement to 10 CFR Part 61. On another closely related letter on this subject, the Committee also considered the EDO's response of February 3, 2012, to comments and recommendations included in the December 13, 2011, ACRS report on a revised Branch Technical Position regarding concentration averaging and encapsulation of low-level radioactive waste. The Committee decided that it was satisfied with both of the EDO responses.
- The Committee considered the EDO's response of February 27, 2012, to comments and recommendations included in the November 8, and October 13, 2011 ACRS reports on (1) the NRC Near-Term Task Force (NTTF) Report on Fukushima, (2) the staff's recommendations to be taken without delay, and (3) the staff's prioritization of recommended actions to be taken in response to Fukushima lessons learned. The Committee issued a response to the EDO on this matter, dated March 13, 2012, concluding that the staff's disposition of ACRS recommendations are appropriate with the following exceptions:
 - Discussions with stakeholders regarding near-term actions for additional hydrogen control and mitigation measures in plants with Mark I and Mark II containments should be included in the staff's Tier 1 actions.
 - ACRS recommendations regarding fire response procedures should be addressed as part of NTTF Recommendation 8 (Tier 1) since integration of the fire response procedures presents similar challenges to those faced by

integration of the Severe Accident Management Guidelines (SAMGs) and Extensive Damage Mitigation Guidelines (EDMGs) with the Emergency Operating Procedures (EOPs).

SCHEDULED TOPICS FOR THE 593rd ACRS MEETING

The following topics are scheduled for the 593rd ACRS meeting, to be held on April 12-14, 2012:

- Selected Chapters of the Safety Evaluation Report (SER) with Open Items Associated with the Calvert Cliffs Unit 3 Combined License (COL) Application
- Spent Fuel Pool Scoping Study
- Final Safety Evaluation Report Associated with the License Renewal Application for the Columbia Generating Station
- Risk-Informed Regulatory Framework for New Reactors
- Draft Final NUREG-1921, "Fire Human Reliability Analysis (HRA) Guidelines"

Sincerely,

/RA/

J. Sam Armijo
Chairman

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Sincerely,

/RA/

J. Sam Armijo
Chairman

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OFFICE	ACRS	SUNSI Review	ACRS	ACRS	ACRS
NAME	CAntonescu	CAntonescu	CSantos	EMHackett	EMHackett
DATE	03/29/12	03/29/12	03/29/12	03/29/12	03/29

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Letter to The Honorable Gregory B. Jaczko, NRC Chairman, from J. Sam Armijo, ACRS
Chairman, dated March 29, 2012

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