



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

June 21, 2011

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

SUBJECT: SUMMARY REPORT – 583rd MEETING OF THE ADVISORY COMMITTEE ON
REACTOR SAFEGUARDS, MAY 12-14, 2011

Dear Chairman Jaczko:

During its 583rd meeting, May 12-14, 2011, 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 Said Abdel-Khalik, Chairman, ACRS:

- Report on the Safety Aspects of the License Renewal Application for the Salem Nuclear Generating Station, Units 1 and 2, dated May 25, 2011

LETTERS

Letters to R. W. Borchardt, Executive Director for Operations, NRC, from Said Abdel-Khalik, Chairman, ACRS:

- High Temperature Gas-Cooled Reactor (HTGR) NRC Research Plan, dated May 20, 2011
- Human Factors Considerations Associated with Emerging Technologies in Nuclear Power Plants, dated May 24, 2011
- Response to the March 1, 2011, EDO Letter Regarding Draft Final Rule, "Enhancements to Emergency Preparedness," and Related Regulatory Guidance Documents, dated May 18, 2011
- Response to the February 5, 2011 EDO Letter Regarding the Final Safety Evaluation Report Associated with the Amendment to the AP1000 Design Control Document, dated May 19, 2011
- Response to the April 5, 2011, EDO Letter Regarding Draft Final Regulatory Guides 1.34, 1.43, 1.44, and 1.50, dated May 19, 2011

MEMORANDUM

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

- Supplement 1 to NUREG-1960, "Safety Evaluation Report Related to the License Renewal of Prairie Island Nuclear Generating Plant, Units 1 and 2, Docket Numbers 50-282 and 50-306," dated May 17, 2011

HIGHLIGHTS OF KEY ISSUES

1. Final Safety Evaluation Report Associated with the License Renewal Application for the Hope Creek Generating Station

The Committee met with representatives of the NRC staff and PSEG Nuclear, LLC (PSEG or the applicant) to discuss the staff's safety evaluation report (SER) related to the license renewal application for the Hope Creek Generating Station. The presentations were centered on efforts to resolve one open item (buried piping inspection) and two confirmatory items (inaccessible power cables and environmentally-assisted fatigue analyses) identified in the draft SER issued September 2010 and an emerging issue related to the reactor cavity leakage. The emerging issue is related to the ASME Section XI, Subsection IWE aging management program (AMP). The staff accepted this AMP in its SER, dated March 2011, in part, because the applicant proposed several enhancements related to the four drywell air gap drains that ensure a drainage path to prevent water collection inside the air gap. However, just prior to this meeting, the staff learned through the applicant's borescope inspection that one of the air gap drains was blocked 6 feet prior to reaching the drywell shell and the functionality and configuration of the drain lines has not been established. The staff concluded that this recent discovery will require the applicant to provide additional information describing the details of its field investigation, the impact of the findings on their plans for clearing the drains, and any necessary amendments or modifications to the ASME Section XI, Subsection IWE AMP commitments to ensure that the drywell can perform its intended function through the period of extended operation. The staff will update the SER based on this additional information. The staff concluded that with the exception of the reactor cavity leakage issue, the applicant's programs and commitments are adequate to close the open and confirmatory items and that the requirements of 10 CFR 54.29(a) have been met.

Committee Action

During the June 8-10, 2011, ACRS meeting, the Committee will consider a proposed report on the final SER associated with the license renewal application for the Hope Creek Generating Station.

2. Final Safety Evaluation Report Associated with the License Renewal Application for Salem Nuclear Generating Station, Units 1 and 2

The Committee met with representatives of the NRC staff and PSEG Nuclear, LLC (PSEG or the applicant) to discuss the staff's final SER related to the license renewal application for the Salem Nuclear Generating Station, Units 1 and 2. The presentations of the applicant and the NRC staff centered on efforts to resolve four open items identified in the draft SER issued November 2010 and an additional item that was not included in the final SER issued April 2011. The open items

were related to spent fuel pool leakage of borated water at Unit 1, buried piping, the potential for primary water stress corrosion cracking (PWSCC) of steam generator tube-to-tubesheet welds, and metal fatigue of the reactor coolant pressure boundary. The additional item was related to the staff's recent discovery of an error in the Generic Aging Lessons Learned (GALL) Report regarding crediting boron as a corrosion inhibitor. The applicant and the staff concluded that the applicant's programs and commitments are adequate to close the open and additional items. The NRC staff concluded that the requirements of 10 CFR 54.29(a) have been met for the license renewal of Salem Nuclear Generating Station, Units 1 and 2.

Committee Action

The Committee requested that the staff provide the final SER describing the resolution of the emergent item discussed during the meeting. Upon review of the final SER, the Committee issued a report to the NRC Chairman on this matter dated May 25, 2011, recommending that the application for renewal of the operating license of the Salem Nuclear Generating Station, Units 1 and 2 be approved.

3. High Temperature Gas-Cooled Reactor (HTGR) NRC Research Plan

The Committee met with representatives of the NRC staff to review the HTGR research plan. The staff described how their plan addressed the work needed to prepare for the review of the Next Generation Nuclear Plant (NGNP) licensing application. In accordance with the 2005 Energy Policy Act (EPA), the NRC and Department of Energy (DOE) jointly developed a licensing strategy report for the NGNP, and submitted it to the Congress in August 2008. The EPA required the NGNP to be constructed on DOE's Idaho site and be operational by September 30, 2021. Under a memorandum of understanding, the DOE and NRC are pursuing complementary areas of research and have agreed to share the products of that research. The NRC plans to leverage the DOE work in this area. However, the staff presentation was only focused on the NRC work. The staff noted that DOE has not yet selected a design for the NGNP.

Committee Action

The Committee issued a letter to the Executive Director for Operations on this matter, dated May 20, 2011, concluding that given the current state of design information, the HTGR research plan is a good step toward identifying the research needed for NRC to have an independent assessment capability. The Committee recommended that the staff continue to identify the need for additional experimental data and update the plan as data are received from DOE, when a NGNP design is selected, and if the constraints of the EPA are relaxed. The Committee also noted that it is necessary to examine the integrated NRC/DOE program to be assured that the most important issues are being effectively addressed.

4. Human Factors Considerations Associated with Emerging Technologies in Nuclear Power Plants

During its April 7-9, 2011, meeting the Committee met with representatives of the NRC staff to discuss human factors considerations with respect to emerging technology in nuclear power plants. Specifically, the effects of degraded digital instrumentation and control (I&C) systems on human-system interfaces (HSIs) and operator performance were discussed. The increased use of automation and other technologies in existing, new and advanced nuclear power plant designs has the potential to introduce new human factors engineering (HFE) challenges. The NRC has sponsored a research project at Brookhaven National Laboratory (BNL) to identify human performance research that may be needed to support the review of a licensee's

implementation of new technology in nuclear power plants. The staff indicated that although digital technology potentially can improve operational performance, there are challenges to using this technology in nuclear power plants. Findings of the research project at BNL indicate that I&C degradations are prevalent in plants employing digital systems, and the overall effects on the plant's behavior can be significant, such as causing a reactor trip or equipment to operate unexpectedly. I&C degradations may affect the HSIs used by operators to monitor and control the plant. For example, deterioration of the sensors can complicate the operators' interpretation of displays, and sometimes may mislead them by making it appear that a process disturbance has occurred. The staff also indicated that the information obtained is used as the technical basis upon which to develop HFE review guidance.

Committee Action

The Committee issued a letter to the Executive Director for Operations on this matter, dated May 24, 2011, concluding that the human factors research program has developed valuable information that can be used to improve human performance and plant safety as new digital I&C systems are introduced into nuclear power plants. The Committee also recommended that the staff identify areas where the concepts and understanding about factors affecting human performance with new digital I&C systems can be incorporated into formal regulatory guidance documents.

5. Supplement 1 to NUREG-1960, "Safety Evaluation Report Related to the License Renewal of Prairie Island Nuclear Generating Plant, Units 1 and 2, Docket Numbers 50-282 and 50-306"

The Committee considered Supplement 1 to NUREG-1960 and decided not to review it.

RECONCILIATION OF ACRS COMMENTS AND RECOMMENDATIONS/EDO COMMITMENTS

- The Committee considered the EDO's response of April 8, 2011, to conclusions and recommendations included in the March 23, 2011, ACRS letter on the Point Beach, Units 1 and 2, extended power uprate application. The Committee decided that it was satisfied with the EDO's response.
- The Committee considered the EDO's response of March 26, 2011, to conclusions and recommendations included in the February 17, 2011, ACRS letter on the safety aspects of the South Carolina Electric and Gas Company combined license application for Virgil C. Summer Nuclear Station, Units 2 and 3. The Committee decided that it was satisfied with the EDO's response.
- The Committee considered the EDO's response of March 27, 2011, to conclusions and recommendations included in the February 17, 2011, ACRS letter on SECY-11-0014, "Use of Containment Accident Pressure in Analyzing Emergency Core Cooling System and Containment Heat Removal System Pump Performance in Postulated Accidents." The Committee decided that it was satisfied with the EDO's response.
- The Committee considered the EDO's response of April 22, 2011, to conclusions and recommendations included in the March 16, 2011, ACRS letter on SECY-11-0024, "Use of Risk Insights to Enhance the Safety Focus of Small Modular Reactor Reviews." The Committee decided that it was satisfied with the EDO's response.
- The Committee considered the EDO's response of April 30, 2011, to conclusions and

recommendations included in the March 23, 2011, ACRS letter on the status of groundwater protection task force efforts. The Committee decided it was satisfied with the EDO's response.

- The Committee considered the EDO's response of March 1, 2011, to conclusions and recommendations included in the January 24, 2011, ACRS report on the Draft Final Rule, "Enhancements to Emergency Preparedness," and related regulatory guidance documents. The Committee issued a response letter to the Executive Director for Operations on this matter, dated May 18, 2011.
- The Committee considered the EDO's response of April 5, 2011, to conclusions and recommendations included in the February 24, 2011, ACRS letter on the draft final Revision 1 to Regulatory Guides 1.34, 1.43, 1.44, and 1.50. The Committee issued a response letter to the Executive Director for Operations on this matter, dated May 19, 2011.
- The Committee considered the EDO's response of February 5, 2011, to conclusions and recommendations included in the December 13, 2010, ACRS letter on the final safety evaluation report associated with the amendment to the AP1000 design control document. The Committee issued a response letter to the Executive Director for Operations on this matter, dated May 19, 2011.

SCHEDULED TOPICS FOR THE 584th ACRS MEETING

The following topics are scheduled for the 584th ACRS meeting, to be held on June 8-10, 2011:

- Draft Regulatory Guides DG-1261, "Conducting Periodic Testing for Breakaway Oxidation Behavior," DG-1262, "Testing for Postquench Ductility," and DG-1263, "Establishing Analytical Limits for Zirconium-Based Alloy Cladding"
- Revised Safety Evaluation Report Associated with the License Renewal Application for the Hope Creek Generating Station
- Commission Paper on Level 3 Probabilistic Risk Assessment Activities
- NRC Bulletin 2011-01, "Mitigating Strategies"

Sincerely,

/RA/

Said Abdel-Khalik
Chairman

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- The Committee considered the EDO's response of March 1, 2011, to conclusions and recommendations included in the January 24, 2011, ACRS report on the Draft Final Rule, "Enhancements to Emergency Preparedness," and related regulatory guidance documents. The Committee issued a response letter to the Executive Director for Operations on this matter, dated May 18, 2011.
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/RA/

Said Abdel-Khalik
Chairman

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