



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

May 3, 2011

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

**SUBJECT: SUMMARY REPORT – 582<sup>nd</sup> MEETING OF THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS, APRIL 7-9, 2011**

Dear Chairman Jaczko:

During its 582<sup>nd</sup> meeting, April 7-9, 2011, the Advisory Committee on Reactor Safeguards (ACRS) discussed several matters and completed the following letters and memoranda:

**LETTERS**

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

- Chapters 2, 4, 5, 8, 10, 11, 12, 16, 17 and 19 of the Safety Evaluation Report with Open Items associated with the Calvert Cliffs Nuclear Power Plant, Unit 3, Combined License Application, dated April 19, 2011
- Draft Final Revision 3 of Regulatory Guide 1.152, "Criteria for Use of Computers in Safety Systems of Nuclear Power Plants," dated April 20, 2011
- Response to the March 22, 2011, EDO Letter Regarding Comparison of Integrated Safety Analysis and Probabilistic Risk Assessment for Fuel Cycle Facilities, dated April 19, 2011

**MEMORANDA**

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

- Draft Final Regulatory Guides 8.2, 8.24, and 3.67, dated April 12, 2011
- Proposed Regulatory Guides DG-1264, DG-1206, DG-1207, DG-1208, DG-1209, DG-1210, and DG-1267, dated April 12, 2011

- Draft Revision 3 to NUREG-1022, “Event Reporting Guidelines 10 CFR 50.72 and 50.73,” dated April 12, 2011
- Additional Information Regarding the Safety Evaluation Report for the License Renewal of Palo Verde Nuclear Generating Station, Units 1, 2, and 3, dated April 12, 2011

## HIGHLIGHTS OF KEY ISSUES

### 1. Selected Chapters of the Safety Evaluation Report (SER) with Open Items Associated with the Calvert Cliffs, Unit 3, Combined License Application Referencing the U.S. Evolutionary Power Reactor (EPR)

The Committee met with representatives of UniStar Energy and the NRC staff to discuss the following Chapters of the safety evaluation report (SER) with open items associated with the review of the combined license (COL) application for Unit 3 of the Calvert Cliffs Nuclear Power Plant: Chapter 2, “Site Characteristics” (except for Sections 2.3 and 2.4); Chapter 4, “Reactor”; Chapter 5, “Reactor Coolant System and Connected Systems”; Chapter 8, “Electric Power”; Chapter 10, “Steam and Power Conversion”; Chapter 11, “Radioactive Waste Management”; Chapter 12, “Radiation Protection”; Chapter 16, “Technical Specifications”; Chapter 17, “Quality Assurance”; and Chapter 19, “Probabilistic Risk Analysis and Severe Accident Evaluation.” Representatives of UniStar provided information on the characteristics of the Calvert Cliffs site, a general overview of the COL Items, and the major site-specific features of the U.S. EPR design which is referenced by the Calvert Cliffs, Unit 3, COL application. The staff discussed its schedule for reviewing the COL application and summarized the 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 April 19, 2011, 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 will review the staff’s resolution of open items in these SER chapters in future meetings.

### 2. Events at the Fukushima Reactor Site in Japan

The Committee met with representatives of the NRC staff to discuss the events associated with the Fukushima reactor site in Japan. On March 11, 2011, a magnitude 9.0 earthquake and subsequent tsunami caused significant damage to the Fukushima Daiichi nuclear power station. The staff described the resulting accident sequence as well as the current status of each of the six units at the site. The staff described the purpose of Information Notice 2011-05; NRC inspection activities per Temporary Instruction 2515/183, “Followup to the Fukushima Daiichi Nuclear Station Fuel Damage Event”; and industry initiatives to verify and validate each plant’s readiness to manage extreme events. The staff’s presentation also discussed the near-term and long-term task force reviews directed by the Commission, attributes of the Tohoku earthquake and tsunami, the station blackout rule, emergency planning zones, and NRC incident response roles.

### Committee Action

This was an information briefing. No Committee action was necessary at this time. Per Commission direction via COMGBJ-11-0002, the Committee will review the long-term report of the NRC task force evaluating the events in Japan.

### 3. Draft Final Regulatory Guide 1.152, "Criteria for Use of Computers in Safety Systems of Nuclear Power Plants," and Cyber Security Related Activities

The Committee met with representatives of the NRC staff to discuss draft final Revision 3 of Regulatory Guide (RG) 1.152 and other cyber security related matters. The staff's presentation described the current regulatory structure for cyber security, the regulatory developments to address cyber security throughout the lifecycle of a digital safety system, the relationship between RG 1.152 and RG 5.7, "Cyber Security Programs for Nuclear Facilities," and the modifications to RG 1.152 regarding a secure development and operational environment (SDOE). RG 1.152 was revised to address non-malicious challenges to digital safety system development and operation; enhance focus on 10 CFR Part 50 and Part 52 reliability requirements; and reflect the migration of cyber security provision to 10 CFR Part 73. The staff described the integration of 10 CFR Part 50 and Part 52 reviews with 10 CFR Part 73 reviews given the separation of SDOE and cyber security reviews. The staff briefly discussed RG 5.71 and the 148 cyber security controls to safeguard against vulnerabilities that an adversary can use to compromise equipment. Finally, the staff discussed their review of the "identification of hazards associated with digital systems," and the development of an internal procedure for coordination of reviews and inspections among headquarters and Regional staff.

### Committee Action

The Committee issued a letter to the Executive Director for Operations on this matter dated April 20, 2011, recommending that Revision 3 of RG 1.152 not be issued until the following revisions are incorporated:

- RG 1.152, Revision 3, Regulatory Position 2.3, "Design Phase," should be revised to reference RG 5.71 and state that digital safety system designs should incorporate hardware and software architectures capable of providing a cyber security defensive architecture to combat malicious cyber security threats.
- Explicit statements that the licensing design reviews will not address cyber security design features for other than their effect on the safety system should be deleted.
- If the staff cannot provide hazard identification guidance for acceptable methods, RG 1.152 Regulatory Position 2.1, "Concepts Phase," should be revised to state that, while Annex D of IEEE Standard 7-4.3.2-2003 is not endorsed by the NRC, the hazard identification guidance in Annex D may provide useful information on the assessment of the susceptibility of safety systems to inadvertent access.

The Committee also recommended that the Standard Review Plan for Chapters 7, "Instrumentation and Controls," and 13, "Conduct of Operations," formally require internal staff coordination of reviews to RGs 1.152 and 5.71 during the system design reviews.

#### 4. Human Factors Considerations with Respect to Emerging Technology in Nuclear Power Plants

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

During the May 12-14, 2011, ACRS meeting, the Committee will consider a proposed report on this subject.

#### 5. Draft Final Regulatory Guides

The Committee decided not to review the draft final versions of the following Regulatory Guides and has no objection to the staff's proposal to issue them as final:

- Revision 1 to Regulatory Guide 8.2, "Administrative Practices in Radiation Surveys and Monitoring"
- Revision 2 to Regulatory Guide 8.24, "Health Physics Surveys During Enriched Uranium 235 Processing and Fuel Fabrication"
- Revision 1 to Regulatory Guide 3.67, "Standard Format and Content for Emergency Plans for Fuel Cycle and Materials Facilities"

6. Proposed Regulatory Guides

The Committee decided not to review proposed revisions to the following Regulatory Guides and has no objection to the staff's proposal to issue them for public comment. The Committee would like an opportunity to review the draft final version of these guides after reconciliation of public comments:

- Proposed Revision 2 to Regulatory Guide 1.106 (DG-1264), "Thermal Overload Protection for Electric Motors on Motor-Operated Valves"
- Proposed Revision 1 to Regulatory Guide 1.169 (DG-1206), "Configuration Management Plans for Digital Computer Software Used in Safety Systems of Nuclear Power Plants"
- Proposed Revision 1 to Regulatory Guide 1.170 (DG-1207), "Software Test Documentation for Digital Computer Software Used in Safety Systems of Nuclear Power Plants"
- Proposed Revision 1 to Regulatory Guide 1.171 (DG-1208), "Software Unit Testing for Digital Computer Software Used in Safety Systems of Nuclear Power Plants"
- Proposed Revision 1 to Regulatory Guide 1.172 (DG-1209), "Software Requirements Specifications for Digital Computer Software Used in Safety Systems of Nuclear Power Plants"
- Proposed Revision 1 to Regulatory Guide 1.173 (DG-1210), "Developing Software Life Cycle Processes for Digital Computer Software Used in Safety Systems of Nuclear Power Plants"
- Proposed Revision 2 to Regulatory Guide 1.168 (DG-1267), "Verification, Validation, Reviews, and Audits for Digital Computer Software Used in Safety Systems of Nuclear Power Plants"

7. Draft Revision 3 to NUREG-1022, "Event Reporting Guidelines 10 CFR 50.72 and 50.73"

The Committee decided not to review draft Revision 3 to NUREG-1022, "Event Reporting Guidelines 10 CFR 50.72 and 50.73," but would like an opportunity to review the draft final version of this NUREG after reconciliation of public comments.

8. Additional Information Regarding the Safety Evaluation Report (SER) for the License Renewal of Palo Verde Nuclear Generating Station, Units 1, 2, and 3

The Committee decided not to review additional information regarding the SER, for the Palo Verde Nuclear Generating Station License Renewal Application and has no objection to the staff's proposal to issue the final SER.

## RECONCILIATION OF ACRS COMMENTS AND RECOMMENDATIONS/EDO COMMITMENTS

- The Committee considered the EDO's response of February 5, 2011, to comments and recommendations included in the December 13, 2010, ACRS report on the final safety evaluation report associated with the amendment to the AP1000 design control document. The Committee will consider a response to the EDO during their May 12-14, 2011, meeting.
- The Committee considered the EDO's response of March 4, 2011, to comments and recommendations included in the January 31, 2011, ACRS letter on the review of RAMONA5-FA for use in boiling water reactor stability calculations. The Committee decided that it was satisfied with the EDO's response.
- The Committee considered the EDO's response of March 24, 2011, to comments and recommendations included in the March 1, 2011, ACRS report on the safety aspects of the license renewal application for the Palo Verde Nuclear Generating Station. The Committee decided that it was satisfied with the EDO's response.
- The Committee considered the EDO's response of March 3, 2011, to comments and recommendations included in the January 24, 2011, ACRS letter on the draft final Revision 2 to RG 1.174 and Revision 1 to RG 1.177. The Committee decided that it was satisfied with the EDO's response.
- The Committee considered the EDO's response of March 1, 2011, to comments and recommendations included in the January 24, 2011, ACRS letter on the draft final rule, "Enhancement to Emergency Preparedness," and related regulatory guidance documents. The Committee will consider a response to the EDO during their May 12-14, 2011, meeting.
- The Committee considered the EDO's response of March 3, 2011, to comments and recommendations included in the January 24, 2011, ACRS report on the safety aspects of the Southern Nuclear Operating Company combined license application for the Vogtle Generating Plant, Units 3 and 4. The Committee decided that it was satisfied with the EDO's response.
- The Committee considered the EDO's response of March 31, 2011, to comments and recommendations included in the January 21, 2011, ACRS letter on the response to the January 21, 2011, EDO letter regarding the safety culture policy statement. The Committee decided that it was satisfied with the EDO's response.
- The Committee considered the EDO's response of March 22, 2011, to comments and recommendations included in the February 17, 2011, ACRS letter on the comparison of Integrated Safety Analysis (ISA) and Probabilistic Risk Assessment (PRA) for fuel cycle facilities (FCFs). The Committee issued a response letter to the Executive Director for Operations on this matter, dated April 19, 2011.

SCHEDULED TOPICS FOR THE 583<sup>rd</sup> ACRS MEETING

The following topics are scheduled for the 583<sup>rd</sup> ACRS meeting, to be held on May 12-14, 2011:

- Final Safety Evaluation Report associated with the License Renewal Application for the Hope Creek Generating Station
- Final Safety Evaluation Report associated with the License Renewal Application for Salem Nuclear Generating Station, Units 1 and 2
- Advanced Reactor Research Plan

Sincerely,

*/RA/*

Said Abdel-Khalik  
Chairman

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Sincerely,

*/RA/*

Said Abdel-Khalik  
Chairman

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Letter to The Honorable Gregory B. Jaczko, Chairman, from Said Abdel-Khalik, ACRS  
Chairman, dated May 2, 2011

SUBJECT: SUMMARY REPORT – 582<sup>nd</sup> MEETING OF THE ADVISORY COMMITTEE ON  
REACTOR SAFEGUARDS, APRIL 7-9, 2011

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