



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

October 7, 2010

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

**SUBJECT: SUMMARY REPORT - 575<sup>th</sup> MEETING OF THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS, SEPTEMBER 9-11, 2010**

Dear Chairman Jaczko:

During its 575<sup>th</sup> meeting, September 9-11, 2010, the Advisory Committee on Reactor Safeguards (ACRS) discussed several matters and completed the following reports and memoranda:

**REPORTS**

Reports to Gregory B. Jaczko, Chairman, NRC, from Said Abdel-Khalik, Chairman, ACRS:

- Comments on SECY-10-01113, "Closure Options for Generic Safety Issue – 191, Assessment of Debris Accumulation in Pressurized Water Reactor Sump Performance," dated September 17, 2010
- Report on the Safety Aspects of the South Texas Project Nuclear Operating Company Application to Amend the Certified U.S. ABWR Design to Incorporate the Aircraft Impact Assessment Rule, dated September 20, 2010
- Long-Term Core Cooling for the Economic and Simplified Boiling Water Reactor (ESBWR), dated September 22, 2010
- License Application for the Mixed Oxide Fuel Fabrication Facility and the Associated Safety Evaluation Report, dated September 27, 2010

**MEMORANDA**

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

- Draft Final Interim Staff Guidance (ISG-23), "Application of ASTM Standard Practice C1671-07 when Performing Technical Reviews of Spent Fuel Storage and Transportation Packaging Licensing Actions," dated September 10, 2010

- Draft Final Revision to 10 CFR 50.55a, “Codes and Standards,” dated September 10, 2010
- Proposed Revisions to Regulatory Guide 7.4 (DG-7008), “Leakage Tests on Packages for Shipment of Radioactive Materials,” dated September 10, 2010
- Proposed Revisions to Regulatory Guides 8.39 (DG-8048), “Release of Patients Administered Radioactive Materials,” and 8.23 (DG-8052), “Radiation Safety Surveys at Medical Institutions,” dated September 10, 2010

## HIGHLIGHTS OF KEY ISSUES

### 1. Potential Approaches to Resolve Generic Safety Issue (GSI)-191, Assessment of Debris Accumulation on Pressurized Water Reactor Sump Performance

The Committee met with representatives of the NRC staff and the Nuclear Energy Institute (NEI) to discuss the response to a Staff Requirements Memorandum (SRM), dated May 17, 2010, that required submission of a Notation Vote policy paper on approaches to close Generic Safety Issue (GSI)-191, “Assessment of Debris Accumulation on Pressurized Water Reactor (PWR) Sump Performance.” The staff presented the three options described in SECY-10-0113. From these three options, the staff recommended Options 1b and Option 2. Option 1b is risk-informed in the sense that it would set a near-term schedule for the smaller and more likely loss-of-coolant-accidents (LOCAs) and a longer-term schedule for the larger and less likely LOCAs. Option 2 deals with developing additional risk-informed guidance for GSI-191 based on either extending the guidance in Section 6 of NEI 04-07 and the corresponding Safety Evaluation (Option 2a), or the proposed 10 CFR 50.46(a) rule, if the rule is promulgated (Option 2b).

After the staff’s presentation, NEI discussed industry’s views. The industry recommends Options 2 and Option 3 in combination with Option 1b with an emphasis on Option 3. Option 3 uses General Design Criterion (GDC)-4, “Environmental and Dynamic Effects Design Bases,” to exclude debris generation during LOCAs for piping qualified for leak-before-break. The industry believes that the application of GDC-4 to GSI-191 provides means to address unlikely breaks in a manner that is risk-informed and complies with regulatory requirements. This option would allow some plants to recover operational margins. In addition, guidance for GDC-4 is currently available to enable quick staff review and closure of GSI-191.

### Committee Action

The Committee issued a report to the NRC Chairman on this matter, dated September 17, 2010, concluding that Option 1 and Option 2 are both acceptable, provided that a reasonable schedule for reaching resolution is adopted. The Committee also recommended that Option 3 not be considered further. ACRS member, Dr. Sanjoy Banerjee, subsequently represented ACRS in a Commission briefing on GSI-191 on September 29, 2010. This briefing included NRC staff and external stakeholders in addition to ACRS.

## 2. Amendment to the Design Control Document (DCD) for the Certified ABWR Design

The Committee met with representatives of the NRC staff, South Texas Project Nuclear Operating Company (STPNOC) and its supporting contractors to review the staff's Safety Evaluation Report (SER) related to the STPNOC application to amend the certified U.S. Advanced Boiling Water Reactor (ABWR) design. The purpose of the amendment is to address the requirements of the Aircraft Impact Assessment (AIA) Rule specified in 10 CFR 50.150. The ABWR Subcommittee held a meeting on August 18, 2010, to review the application, the AIA performed by STPNOC, the staff's SER, and the AIA inspection report. The AIA was made available to the ACRS by STPNOC for review prior to our ABWR Subcommittee meeting. The STPNOC presentation described details of the AIA. The staff's presentation focused on the AIA inspection. The objective of this inspection is to verify that, with reduced use of operator action, the design can withstand the effects of a large commercial aircraft impact. The staff verified that the AIA was complete and evaluated any deviations from the approach described in DG-1176 (Guidance for the Assessment of Beyond-Design-Basis Aircraft Impacts). Based on this inspection, the staff issued a Notice of Violation that STPNOC failed to use realistic analyses, and did not fully identify and incorporate some features and functional capabilities into the design.

### Committee Action

The Committee issued a report to the NRC Chairman on this matter, dated September 20, 2010, with several recommendations. In this report the Committee concluded that the application to amend the ABWR design certification rule and the staff's SER are acceptable subject to satisfactory closure of issues related to the Notice of Violation in the staff's inspection report and the Committee's recommendation related to the environmental qualification of the Alternate Feedwater Injection (AFI) system instrument rack.

## 3. Long-term Core Cooling Approach for the Economic Simplified Boiling Water Reactor (ESBWR)

The Committee met with representatives of the NRC staff and GE - Hitachi Nuclear Energy (GEH) to discuss how the staff and GEH have addressed the adequacy of the design basis long-term core cooling approach for the ESBWR. An SRM dated May 8, 2008, states that "...the ACRS should advise the staff and Commission on the adequacy of the design basis long-term core cooling approach for each new reactor design based, as appropriate, on either its review of the design certification or the first license application referencing the reactor design." The safety-related core cooling is provided by the Gravity-Driven Cooling System (GDCCS) injection lines and the Passive Containment Cooling System (PCCS). The non-safety related systems that can provide core cooling are the Fuel and Auxiliary Pools Cooling System (FAPCS) and the Reactor Water Cleanup/Shutdown Cooling (RWCU/SDC) system. The GEH presentation also described the potential sources of debris generated during a blowdown, its transport to the suction strainers, and its transport to the reactor vessel. The NRC staff evaluated the analysis of the long-term response of the ESBWR containment to a limiting design basis accident performed by GEH using their TRACG computer model. The staff performed confirmatory calculations using the MELCOR computer model. The models evaluated the passive system response for 3 days and active and passive systems response from 3 to 30 days after a main steam line break (MSLB). Both models showed that the predicted peak containment pressure in the ESBWR

remains below the design limit. Therefore, the ESBWR design-basis MSLB containment long-term pressure response is below the containment design pressure and long-term core cooling has been demonstrated.

#### Committee Action

The Committee issued a report to the NRC Chairman on this matter, dated September 22, 2010, concurring with the staff's assessment that the regulatory requirements for long-term core cooling for design basis conditions have been adequately met for the ESBWR design.

#### 4. License Application for the Mixed Oxide (MOX) Fuel Fabrication Facility and the Associated Safety Evaluation Report

The Committee met with representatives of the NRC staff and Mixed Oxide (MOX) Services to discuss the license application to possess and use radioactive material at the MOX Fuel Fabrication Facility, and to review the staff's draft safety evaluation report (SER). Representatives from MOX Services provided an overview of the MOX facility, focusing on issues raised earlier by the ACRS during their review of the Construction Authorization Request. Key topics included the applicants overall safety approach to address potential "red oil" explosions; their safety strategy to minimize the threat of Hydroxylamine Nitrate (HAN) explosions; their approach to long-term interruption of radioactive waste transfer to storage facilities; and their strategy to address fire in moderation-controlled spaces or spaces where the use of water to suppress fires may initiate criticality.

The NRC staff presented an overview of their technical review, and provided examples using a vertical slice selection to address significant areas such as "red oil" and criticality accidents. In conclusion, the staff found that the license application met the requirements of 10 CFR Part 70, as documented in their SER. The license itself will not be granted until all principal systems, structures, and components (PSSCs) are verified as complete and found to be consistent with the license application.

#### Committee Action

The Committee issued a report to the NRC Chairman on this matter, dated September 27, 2010, concluding that the Mixed Oxide Fuel Fabrication Facility can be constructed, operated, and maintained with no undue risk to the public health and safety. The Committee also recommended that the SER be issued.

#### 5. Proposed Interim Staff Guidance (ISG) DC/COL-ISG-13, "Assessing the Consequences of an Accidental Release of Radioactive Materials from Liquid Waste Tanks," and Proposed DC/COL-ISG-14, "Assessing Groundwater Flow and Transport of Accidental Radionuclide Releases"

The Committee met with representatives of the NRC staff to discuss comments submitted by NEI on two proposed Interim Staff Guidance (ISG) documents. The two documents are Draft DC/COL-ISG-013, "Assessing the Consequences of an Accidental Release of Radioactive Materials from Liquid Waste Tanks for Combined License Applications," and Draft DC/COL-ISG-014, "Assessing Groundwater Flow and Transport of Accidental Radionuclide Releases." The two ISGs address inconsistencies and lack of guidance in several sections of the Standard

Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants (NUREG-0800). The ISGs apply to an acute, accidental discharge from a liquid tank. One of the primary purposes of the analyses described in these ISGs is to establish technical specifications for the amount and concentrations of radioactive liquids that can be stored in tanks that are susceptible to accidents at the plant site.

#### Committee Action

This was an information briefing. No Committee action was necessary. The Committee plans to review the draft final revisions of these two ISGs after the resolution of the NEI comments.

#### 6. Assessment of the Quality of Selected NRC Research Projects

The Committee discussed the status of the ACRS Panels' review of the quality assessment of NRC research projects on NUREG/CR-6947, "Human Factors Consideration with Respect to Emerging Technology in Nuclear Power Plants," and NUREG/CR-6997, "Modeling a Digital Feedwater Control System Using Traditional Probabilistic Risk Assessment Methods."

#### Committee Action

The Committee plans to discuss its report on the quality assessment of the research projects noted above during its October 7-9, 2010, meeting.

#### RECONCILIATION OF ACRS COMMENTS AND RECOMMENDATIONS/EDO COMMITMENTS

- During the 574<sup>th</sup> ACRS meeting, July 14-16, 2010, the Committee considered the EDO's response of May 25, 2010, to comments and recommendations included in the February 18, 2010, ACRS report on Draft Final Regulatory Guide 1.217, "Guidance for the Assessment of Beyond Design-Basis Aircraft Impacts." The Committee considered a response letter back to the staff during its September 9-11, 2010, meeting. The Committee decided not to issue a response letter to the staff and that it was satisfied with the EDO's response.
- The Committee considered the EDO's response of July 23, 2010, to comments and recommendations included in the June 24, 2010, ACRS letter on Draft Regulatory Guide 1.216, "Containment Integrity Evaluation for Internal Pressure Loadings Above Design-Basis Pressure." The Committee decided that it was satisfied with the EDO's response.
- The Committee considered the EDO's response of August 25, 2010, to comments and recommendations included in the July 29, 2010, ACRS letter on Draft Final Regulatory Guide 3.74, "Guidance for Fuel Cycle Facility Change Processes." The Committee decided that it was satisfied with the EDO's response.
- The Committee considered the EDO's response of July 23, 2010, to comments and recommendations included in the June 16, 2010, ACRS letter on the Response to the April 16, 2010, EDO Letter Regarding Draft Final NUREG-1520, Revision 1, "Standard Review Plan for Review of a License Application for a Fuel Cycle Facility." The Committee decided that it was satisfied with the EDO's response.

- The Committee considered the EDO's response of August 25, 2010, to comments and recommendations included in the July 27, 2010, ACRS report on risk-informed regulatory guidance for new reactors. The Committee decided that it was satisfied with the EDO's response.
- The Committee considered the EDO's response of January 27, 2010, to comments and recommendations included in the December 15, 2009, ACRS report on Draft Final Regulatory Guide 1.205, Revision 1, "Risk-Informed, Performance-Based Fire Protection for Existing Light-Water Nuclear Power Plants," and Draft Final Standard Review Plan Section 9.5.1.2, "Risk-Informed, Performance-Based Fire Protection Program." The Committee decided that it was satisfied with the EDO's response.

#### SCHEDULED TOPICS FOR THE 576<sup>th</sup> ACRS MEETING

The following topics are scheduled for the 576<sup>th</sup> ACRS meeting, to be held on October 7-9, 2010:

- Final Safety Evaluation Report Associated with the ESBWR Design Certification Application
- Final Safety Evaluation Report Associated with the License Renewal Application for the Cooper Nuclear Station
- Final Safety Evaluation Report Associated with the License Renewal Application for the Duane Arnold Energy Center
- Draft Final Rule for Risk-Informed Changes to Loss-of-Coolant Accident (LOCA) Technical Requirements (10 CFR 50.46a)
- Digital Instrumentation and Control ISG on Licensing Process (ISG-6)
- Staff Efforts to Address Containment Liner Corrosion
- Preparation for Meeting with the Commission
- Assessment of the Quality of Selected NRC Research Projects

Sincerely,

/RA/

Said Abdel-Khalik  
Chairman