



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

August 21, 2007

**SL-0553**

The Honorable Dale E. Klein  
Chairman  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555-0001

Dear Chairman Klein:

SUBJECT: SUMMARY REPORT – 544<sup>th</sup> MEETING OF THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS, JULY 11-13, 2007, AND OTHER RELATED ACTIVITIES OF THE COMMITTEE

During its 544<sup>th</sup> meeting, July 11-13, 2007, the Advisory Committee on Reactor Safeguards (ACRS) discussed several matters and completed the following reports and letter:

**REPORTS**

Reports to Dale E. Klein, Chairman, NRC, from William J. Shack, Chairman, ACRS:

- Staff's Approach to Verifying the Closure of Inspections, Tests, Analyses, and Acceptance Criteria Through a Sample-Based Inspection Program, dated July 24, 2007
- Draft NUREG/CR, Review of NUREG-0654, Supplement 3, "Criteria for Protective Action Recommendations for Severe Accidents," dated July 27, 2007

**LETTER**

Letter to Luis A. Reyes, Executive Director for Operations, NRC, from William J. Shack, Chairman, ACRS:

- Revisions to Draft Final NUREG-1852, "Demonstrating the Feasibility and Reliability of Operator Manual Actions in Response to Fire," dated July 13, 2007

**HIGHLIGHTS OF KEY ISSUES**

1. Sampling Methodology and Statistical Thresholds for Selecting ITAAC for Inspection

The Committee met with representatives of the NRC staff to discuss the staff's approach to verify closure of Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) using a sample-based inspection process. ITAAC provide reasonable assurance that the facility has been constructed and will be operated in conformity with the license, the provisions of the Atomic Energy Act, and the Commission's rules and regulations. The staff will verify closure of all ITAAC prior to plant operation through documentation review. Closure of some ITAAC will be verified by direct inspection. ITAAC inspections (Inspection Manual Chapter-2503) are a significant portion of the staff's overall construction inspection program (CIP).

The staff explained why ITAAC grouping and prioritization was chosen as an alternative to statistical acceptance sampling. "Families" of ITAAC were identified that have common characteristics and which will involve similar inspection activities. Observing performance of ITAAC activities within a family will provide insights that are applicable to the remainder of the family. Multi-attribute utility theory was used to rank-order ITAAC for inspection. This rank-ordering was based on five ITAAC attributes (safety significance, licensee oversight attention, opportunity to verify by other means, construction and testing experience, and propensity for errors) and the significance of not inspecting the ITAAC in order to optimize resources and minimize the possibility of a significant flaw going undetected. Safety significance was the most heavily weighted attribute. The staff used a threshold value of 0.4 when ranking the ITAAC associated with the ABWR and AP1000 and included at least one ITAAC from each family. This resulted in between 35% to 45% of ITAAC being identified for inspection. The staff also noted that there are additional site-specific ITAAC. The staff explained to the Committee why it would be difficult for licensees to know which ITAAC, and when ITAAC, would be inspected. The licensee's performance will be monitored as part of the CIP Assessment Process (Inspection Manual Chapter-2505) and NRC can expand the sample of ITAAC to be inspected based on poor performance.

#### Committee Action

The Committee issued a report to the NRC Chairman on this matter, dated July 24, 2007, concurring with the staff's ITAAC closure verification process using sample-based inspections as described in SECY-07-0047. The Committee concluded that the threshold value that was used to select the ITAAC to be inspected should result in adequate samples for the ABWR and AP1000.

#### 2. Dissimilar Metal Weld Issue

The Committee met with representatives of the NRC staff, Exelon, and Dominion Engineering, Inc., to discuss the ongoing NRC staff and industry activities for addressing dissimilar metal weld issues resulting from the October 2006 inservice inspection of the Wolf Creek pressurizer nozzles. Analyses performed by the NRC staff in late 2006 and early 2007 indicated that large flaws, similar to those found at Wolf Creek, may lead to rupture before any measurable leakage occurs. As a result, the staff has determined that inspections or mitigation activities on these welds at nine plants should be completed by the end of 2007 rather than the spring of 2008. All other plants either do not have these types of welds or will have inspected or performed mitigation activities by December 2007.

Representatives from Exelon and Dominion Engineering, Inc., described recent advanced finite element analyses being performed to demonstrate that piping is not expected to rupture prior to leakage. The NRC staff is performing its own analyses of cases representative of those at the plants of interest, using an independently developed analysis method to verify the industry results. The industry is expected to submit the results of its analyses to the staff by July 31, 2007. The staff is planning to issue a safety evaluation by August 31, 2007, regarding whether the affected plants will be allowed to extend inspection and mitigation activities into 2008.

### Committee Action

This was an information briefing. No Committee action was necessary. The Committee plans to review the results of the industry study and the associated staff's evaluation during a future meeting.

#### 3. Activities in the Safeguards and Security Areas

The Committee met with representatives of the NRC staff to discuss ongoing and planned activities in the safeguards and securities areas. The staff described the status of the changes in nuclear power plant security as a result of the September 11, 2001, terrorist attack. This included the issuance of orders to nuclear power plant licensees, completed and ongoing rulemaking activities, the issuance of regulatory guidance documents, enhanced coordination with other federal agencies, and the development of lessons learned from the implementation of the orders. The staff also described the nuclear security program requirements contained in the Energy Policy Act of 2005. All of these issues are being incorporated into the development of NRC rules and guidance documents. The staff identified specific topics that will be sent to the ACRS for review.

### Committee Action

This was an information briefing. No Committee action was necessary.

#### 4. Revisions to Draft Final NUREG-1852, "Demonstrating the Feasibility and Reliability of Operator Manual Actions in Response to Fire"

The Committee met with representatives of the NRC staff and a member of the public to discuss revisions to draft final NUREG-1852, "Demonstrating the Feasibility and Reliability of Operator Manual Actions in Response to Fire." In a letter dated June 18, 2007, the Committee recommended that NUREG-1852 be published after revision to address the ACRS concerns discussed in the letter. To address the ACRS concerns, the staff revised the NUREG to (a) include a section in the report describing its intended use in context, (b) provide advice as to the skills of the team that determines the time margin, and (c) mention the potential use of other existing methods to facilitate the search for scenarios initiated by fires. A member of the public described a concern that operator manual actions may not be equivalent to passive physical fire barriers and result in a reduction in defense-in-depth.

### Committee Action

The Committee issued a letter to the Executive Director for Operations on this matter, dated July 13, 2007, stating that the revisions made by the staff to NUREG-1852 addressed the Committee's concerns satisfactorily. The Committee recommended that revised NUREG-1852 be published as final.

5. Draft NUREG/CR, Review of NUREG-0654, Supplement 3, "Criteria for Protective Action Recommendations for Severe Accidents"

The Committee met with representatives of the NRC staff and industry to discuss offsite protective action recommendations (PAR). The staff described the findings and recommendations of a study performed by the Sandia National Laboratories and documented in a draft NUREG/CR entitled, "Review of NUREG-0654, Supplement 3, 'Criteria for Protective Action Recommendations for Severe Accidents'." The study examined the benefits of alternative protective actions compared to the baseline case of radial evacuation following the declaration of a general emergency at a nuclear power plant. The study considered both "fast-evolving" and "slow-evolving" accident scenarios. Various evacuation times and protective action strategies, including radial evacuation, lateral evacuation, shelter-in-place, and preferred sheltering were considered. The study recommended that under certain scenarios and estimated evacuation times, alternative protective actions may provide better protection than the baseline case of radial evacuation. The staff also considered PAR implementation issues such as possible public response to following the directives of the emergency response organization.

Industry representatives presented preliminary results of an effort to develop a risk-informed methodology for quantifying the relative effectiveness of the PAR strategies. Since no documents regarding this work have been formally submitted to the NRC, neither the staff nor the ACRS had an opportunity to perform an adequate review of this effort.

Committee Action

The Committee issued a report to the NRC Chairman on this matter, dated July 27, 2007, recommending that the NUREG/CR report, which documents the results of the PAR study, be published. The Committee agreed with the staff that Supplement 3 to NUREG 0654, Revision 1, should be revised and recommended that these revisions take into consideration model uncertainties, complexity of decision making, and related industry work.

6. Browns Ferry Nuclear Plant Unit 1 Restart Activities

The Committee met with representatives of the NRC staff to discuss the findings and recommendations of the Browns Ferry Unit 1 Restart Panel, activities and problems associated with restart, and the current status of the plant. The staff presented a short history of the Browns Ferry Units up to and including the startup of Unit 1. The staff described the significant number of modifications made to the plant to return it to an operational status from a construction status, as well as the licensing actions and inspections necessary to support and review these modifications. The staff concluded its presentation with a discussion of minor issues that occurred during startup and the current status of the plant.

Committee Action

This was an information briefing. No Committee action was necessary.

## 7. Subcommittee Report on the State-of-the-Art Reactor Consequence Analysis Project

The Chairman of the Regulatory Policies and Practices Subcommittee provided a report to the Committee, summarizing the results of the July 10, 2007, meeting with the NRC staff to discuss the status of staff's efforts associated with the State-of-the-Art Reactor Consequence Analysis (SOARCA) Project. During the meeting, the Subcommittee reviewed several topics including accident sequence selection, containment system states, MELCOR analysis, emergency preparedness, and MACCS2 analysis. As directed by the Commission, the staff has reduced the initial scope of the SOARCA Project. The staff is initially focusing on two sites: Peach Bottom in Pennsylvania and Surry in Virginia. During the closed portion of the Subcommittee meeting, the Subcommittee discussed the staff's initial findings of the accident sequence selection, preliminary MELCOR insights, containment performance, and emergency preparedness for these two plants. The Subcommittee also discussed the various options the staff is evaluating for assessment of dose thresholds for latent cancer fatalities. The Committee plans to continue its review of the SOARCA Project in a future meeting after the staff has made further progress in its analysis.

## 8. Status Report on the Quality Assessment of Selected NRC Research Projects

The Committee was briefed by the members of the ACRS panels regarding the status of their assessment of the quality of the NRC research projects on Cable Response to Live Fire (CAROLFIRE) Testing, Fatigue Crack Flaw Tolerance in Nuclear Power Plant Piping, and Technical Review of the Online Monitoring Techniques for Performance Assessment.

### Committee Action

The Committee plans to discuss a draft report on the results of its assessment of the quality of the above NRC research projects during its September 2007 meeting.

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

- The Committee considered the EDO's response of May 31, 2007, to recommendations included in the April 20, 2007, ACRS report on the technology-neutral framework for future plant licensing. The Committee decided that it was satisfied with the EDO's response.
- The Committee considered the EDO's response of June 27, 2007, to recommendations included in the May 16, 2007, ACRS report on the draft Commission Paper on the staff plan regarding a risk-informed and performance-based revision to 10 CFR Part 50. The Committee decided that it was not satisfied with the EDO's response because it fails to address the Committee's comment that the technology-neutral regulatory framework "is still incomplete and needs modification" prior to publication. In addition, rather than continuing to work on the technology-neutral regulatory framework so it can help guide the development of the licensing strategy for the Next Generation Nuclear Plant (NGNP), the staff plans on developing the NGNP licensing strategy and then incorporate any lessons learned from that effort into future regulatory guidance that would be akin to the framework.

- The Committee considered the EDO's response of June 1, 2007, to comments and recommendations included in the February 14, 2007, ACRS letter on the draft final revision to the Regulatory Guide 1.189 (DG-1170), "Fire Protection for Nuclear Power Plants." The Committee decided that it was satisfied with the EDO's response.
- The Committee considered the EDO's response of June 1, 2007, to recommendations included in the December 18, 2006, ACRS letter regarding draft final Regulatory Guide 1.207 (DG-1144), "Guidelines for Evaluating Fatigue Analyses Incorporating the Life Reduction of Metal Components Due to the Effects of the Light-Water Reactor Environment for New Reactors." The Committee decided that it was satisfied with the EDO's response.
- The Committee considered the EDO's response of July 2, 2007, to comments and recommendations included in the May 18, 2007, ACRS report regarding activities related to digital instrumentation and control systems. The Committee decided that it was satisfied with the EDO's response.
- The Committee considered the EDO's response of June 1, 2007, to comments and recommendations included in the April 23, 2007, ACRS report on human reliability analysis models. The Committee decided that it was satisfied with the EDO's response.
- The Committee considered the EDO's response of June 13, 2007, to comments and recommendations included in the May 16, 2007, ACRS report on the development of an integrated long-term regulatory research plan. The Committee decided that it was satisfied with the EDO's response.
- The Committee considered the EDO's response of June 5, 2007, to comments and recommendations included in the October 23, 2006, ACRS letter on draft Revision 1 to Regulatory Guide 1.200 (DG-1161), "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-informed Activities," and Standard Review Plan Section 19.1, "Determining the Technical Adequacy of Probabilistic Risk Assessment Results of Risk-informed Activities." The Committee decided that it was satisfied with the EDO's response.

**The staff committed to continue to interact with the Committee as Regulatory Guide 1.200 is revised in the future and as the staff proceeds with the development of a draft NUREG on the treatment of uncertainties and sensitivities.**

- The Committee considered the EDO's response of June 6, 2007, to comments and recommendations included in the November 17, 2006, ACRS letter on draft Revision 3 to Regulatory Guide 1.7, "Control of Combustible Gas Concentrations in Containment Following a Loss-of-Coolant Accident," and Standard Review Plan Section 6.2.5, "Combustible Gas Control in Containment." The Committee decided that it was satisfied with the EDO's response.

### OTHER RELATED ACTIVITIES OF THE COMMITTEE

During the period from June 7, 2007, through July 10, 2007, the following Subcommittee meetings were held:

- Regulatory Policies and Practices — July 10, 2007

The Subcommittee discussed the staff's efforts associated with the State-of-the-Art Reactor Consequence Analysis (SOARCA) Project.

- Planning and Procedures — July 10, 2007

The Subcommittee discussed proposed ACRS activities, practices, and procedures for conducting Committee business and organizational and personnel matters relating to ACRS and its staff.

### LIST OF MATTERS FOR THE ATTENTION OF THE EDO

- The Committee plans to continue its discussion on the technology-neutral regulatory framework during the September 2007 meeting.
- The Committee would like an opportunity to review the proposed revisions to NUREG-0654, Supplement 3, "Criteria for Protective Action Recommendations for Severe Accidents."
- The Committee plans to discuss a draft ACRS report on the results of its assessment of the quality of selected NRC research projects during its September 2007 meeting.
- The Committee plans to review revisions to Standard Review Plan Sections 19.0, "Probabilistic Risk Assessment and Severe Accident Evaluation for New Reactors," and 19.2, "Review of Risk Information Used to Support Permanent Plant-Specific Changes to the Licensing Basis: General Guidance," during its September 2007 meeting.
- The Committee plans to continue its review of the SOARCA Project after the staff has made further progress in its analysis.
- The Committee plans to review the results of the industry's advanced finite element study of dissimilar metal welds and the associated staff's evaluation during a future meeting.

### PROPOSED SCHEDULE FOR THE 545<sup>th</sup> ACRS MEETING

The Committee agreed to consider the following topics during the 545<sup>th</sup> ACRS meeting, to be held on September 6-8, 2007:

- Final Review of the License Renewal Application for the Pilgrim Nuclear Power Station

- Revisions to Standard Review Plan Sections 19.0, "Probabilistic Risk Assessment and Severe Accident Evaluation for New Reactors," and 19.2, "Review of Risk Information Used to Support Permanent Plant-Specific Changes to the Licensing Basis: General Guidance"
- Proposed Recommendations for Resolving Generic Safety Issue 156.6.1, "Pipe Break Effects on Systems and Components Inside Containment"
- Status of NRR Activities in the Fire Protection Area
- Draft ACRS Report on the Quality Assessment of Selected NRC Research Projects
- Draft ACRS Report on the NRC Safety Research Program
- Draft ACRS Report on the Technology-Neutral Framework for Future Plant Licensing

Sincerely,

***/RA/***

William J. Shack  
Chairman



- Revisions to Standard Review Plan Sections 19.0, "Probabilistic Risk Assessment and Severe Accident Evaluation for New Reactors," and 19.2, "Review of Risk Information Used to Support Permanent Plant-Specific Changes to the Licensing Basis: General Guidance"
- Proposed Recommendations for Resolving Generic Safety Issue 156.6.1, "Pipe Break Effects on Systems and Components Inside Containment"
- Status of NRR Activities in the Fire Protection Area
- Draft ACRS Report on the Quality Assessment of Selected NRC Research Projects
- Draft ACRS Report on the NRC Safety Research Program
- Draft ACRS Report on the Technology-Neutral Framework for Future Plant Licensing

Sincerely,

/RA/

William J. Shack  
Chairman

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