



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

SL-0523

July 30, 2004

The Honorable Nails J. Diaz
Chairman
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Dear Chairman Diaz:

SUBJECT: SUMMARY REPORT - 514th MEETING OF THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS, JULY 7-9, 2004 AND OTHER RELATED ACTIVITIES OF THE COMMITTEE

During its 514th meeting, July 7-9, 2004, the Advisory Committee on Reactor Safeguards (ACRS) discussed several matters and completed the following report, letter, and memoranda:

REPORT:

Report to Nils J. Diaz, Chairman, NRC, from Mario V. Bonaca, Chairman, ACRS:

- Report on the Safety Aspects of the Westinghouse Electric Company Application for Certification of the AP1000 Passive Plant Design, dated July 20, 2004.

LETTER:

Letters to Luis A. Reyes, Executive Director for Operations, NRC, from Mario V. Bonaca, Chairman, ACRS:

- Proposed Draft Final Generic Letter on Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at PWRs, dated July 19, 2004.

MEMORANDA:

Memoranda to Luis A. Reyes, Executive Director for Operations, NRC, from John T. Larkins, Executive Director, ACRS:

- Draft Final Revision to 10 CFR 50.55a, "Codes and Standards," dated July 13, 2004
- Deferral of ACRS Review of Draft Regulatory Guide, DG-1128, "Criteria for Accident Monitoring Instrumentation for Nuclear Power Plants," (Revision 4 to Regulatory Guide 1.97), dated July 15, 2004

HIGHLIGHTS OF KEY ISSUES

1. Final Safety Evaluation Report (SER) Associated with the AP1000 Design Certification

The Committee heard presentations by and held discussions with representatives of the NRC staff and Westinghouse regarding the safety aspects of the Westinghouse Electric Company application for certification of the AP1000 passive plant design. The Committee reviewed the application which consists of the AP1000 design control document (DCD), and the probabilistic risk assessment. The ACRS viewed the AP1000 design in concert with all the ACRS review activities conducted for certification of the AP600 design. The ACRS focused on the changes from the AP600 design made to accommodate the increased power level and ensured that such changes did not pose any new safety considerations or result in an unacceptable increase in risk. The new phenomena identification and ranking table was also reviewed to determine if any new phenomena were identified and that there were no significant changes in ranking of events. The ACRS reviews did not address security related issues.

During the AP1000 review, the ACRS identified technical issues that needed additional discussions such as the automatic depressurization system (ADS)-4 squib valve function, assurance of long-term cooling (strainer blockage), code deficiencies, range of pi-groups values, in-vessel retention/fuel-coolant interaction, organic iodine production, and catastrophic failure of a free-standing steel containment. The ACRS agreed with the resolutions proposed by the staff of all but two of these issues. For the in-vessel retention and organic iodine production, the ACRS developed its own arguments for the resolution. All ACRS issues have been resolved. The Committee also discussed concerns expressed by a member of the public. Most of these concerns are process related and are within the purview of the staff. The Committee considered one technical item raised by the individual. This item concerned the effect of solar heating on the passive containment cooling system's ability to deal with design basis accidents. The Committee found Westinghouse's assumption for this item to be sufficiently conservative.

Committee Action

The Committee issued a report to Chairman Nils J. Diaz on this matter, dated July 20, 2004. The report provides a brief description of the design and summarizes the Committee's review. The Committee in its report concluded that the AP1000 design is robust and there is reasonable assurance that it can be built and operated without undue risk to the health and safety of the public.

2. Draft Final Generic Letter on Potential Impact of Debris Blockage on Emergency Recirculation During Design-Basis Accidents at PWRs

The Committee heard presentations from the NRC staff and from the Nuclear Energy Institute (NEI) concerning the proposed draft final generic letter (GL) related to the potential impact of debris blockage on emergency recirculation during design basis accidents at pressurized water reactors (PWRs). The staff presented a version of the GL to the Thermal-Hydraulic Phenomena Subcommittee on June 22-23, 2004, together with its resolution of the public comments from various stakeholders. This version of the proposed GL was "action-oriented"

and directed licensees to perform analyses and take corrective action to resolve identified discrepancies in accordance with the schedule approved by the Commission for resolving Generic Safety Issue (GSI)-191, "Assessment of Debris Accumulation on PWR Sump Performance." At the full Committee meeting on July 7, the staff provided the Committee with a different version of the GL, which removed many of the action-oriented requirements, and returned the letter to the format that was originally issued for public comment. The staff explained that the Office of the General Counsel (OGC) could not accept the "action-oriented" provisions of the letter, because they imposed new requirements on licensees, and that a GL could not be used for this purpose. Therefore, the version that was discussed on July 7 was more of a request for information from licensees, to allow the staff to determine whether they were in compliance with 10 CFR 50.46.

Subsequently, on July 9, the staff returned to the meeting, and informed the Committee that its discussions with OGC had continued, and it appeared that it might be able to return some of the "action-oriented" provisions to the GL. The staff could not make a commitment that this would actually occur, but it left the Committee with the impression that it would continue to work with OGC to develop a GL that would be as "action-oriented" as possible, given the legal constraints of the GL process. The Committee also understood that the Committee to Review Generic Requirements (CRGR) would also review the proposed GL, and would ensure that it complied with the process requirements for generic communications.

During the discussion of the GL, the Committee questioned the staff about the need and utility of issuing the GL before the review of the industry guidance document is complete. Because the GL references the guidance document, and is intended to be used to ensure its implementation, the Committee did not understand why the staff's safety evaluation for the guidance document and the GL should not be issued simultaneously. The staff explained that it wanted the industry to see the GL as soon as possible and there was no reason to delay its issuance until the guidance had been reviewed.

Mr. Pietrangelo (NEI) commented on July 7 that he had not seen the version of the GL that the Committee was considering, but from the discussion, it appeared that it was very similar to the version that had been issued for public comment. He urged the staff not to issue the GL in that form and he noted that the industry comments consistently asked the staff to issue the GL in a form that is more "action-oriented," and that acknowledges that the position that the staff is taking is a backfit. He explained that the industry is fully prepared to make any necessary modifications, but they would prefer a process that followed the one used to resolve this issue for BWRs, rather than the one proposed in the original draft GL.

Committee Action

The Committee issued a letter to the Executive Director for Operations (EDO) on this matter, dated July 19, 2004, recommending that a GL be issued, with the format and process to be defined by the staff. Also, the staff should continue confirmatory research in areas where the technical basis of the guidance is uncertain, and on issues such as chemical and downstream effects that are not directly addressed by the guidance proposed by NEI. The Committee will consider the technical issues associated with the industry guidance document at a September Subcommittee meeting, and during its October 2004 meeting.

3. Risk-Informing 10 CFR 50.46, "Acceptance Criteria for Emergency Core Cooling Systems for Light-Water Nuclear Power Reactors"

The Committee met with representatives of the NRC staff to discuss risk-informing 10 CFR 50.46, "Acceptance Criteria for Emergency Core Cooling Systems for Light-Water Nuclear Power Reactors." The briefing focused on the staff's approach to responding to the Commission's July 1, 2004, Staff Requirements Memorandum (SRM) and the upcoming *Federal Register Notice* to solicit public comment on the staff's conceptual framework for risk-informing 10 CFR 50.46. The Office of Nuclear Regulatory Research (RES) also briefed the Committee on the status of its expert elicitation in support of the proposed rulemaking. The staff concluded that LOCA frequency estimates can be sensitive to the method used to analyze panelists' input.

Committee Action:

This was an information briefing. The Committee plans to review the proposed rule to risk-inform the requirements addressing large break loss-of-coolant accidents in November 2004.

4. Differences in Regulatory Approaches and Requirements Between U.S. and Other Countries

In an April 28, 2003, SRM on the April 11, 2003 meeting with the ACRS, the Commission stated that "In the course of its routine activities of reviewing and advising the Commission on reactor issues, the Committee should explore and consider other international regulatory approaches. Where there are significant differences in regulatory approaches and requirements, The Commission should be informed." Dr. Nourbakhsh, ACRS Senior Staff Engineer, has prepared a draft white paper which is to be used by the ACRS in responding to the Commission. During the July 7-9, 2004, ACRS meeting, the Committee was briefed by Dr. Nourbakhsh regarding his draft White Paper on differences in regulatory approaches and requirements between U.S. and other countries.

Committee Action

The Committee plans to discuss the draft final of the white paper on differences in regulatory approaches and requirements between U.S. and other countries during the September 8-11, 2004 ACRS meeting.

5. Proposed Generic Communication on the Use of Ultrasonic Flow Measurement Devices for Measuring Feedwater Flow Rates in Nuclear Plants

The purpose of this session was to hear presentations from the staff and industry regarding a proposed generic communication on Ultrasonic Flow Measurement (UFM) devices.

The staff's presentation described the basic principles of UFM technology, their application in nuclear power plants, and several overpower events caused by inaccuracies in UFM instruments. It was noted that these overpower incidents are not a safety issue because the uncertainties in these devices are small compared to existing safety margins. The staff proposes to issue a bulletin which will (1) advise addressees of operating experience with UFM

devices that have not provided the intended accuracy needed to maintain plant operation within licensed thermal power, (2) advise addresses that there are potential questions regarding the use of UFM devices because of sensitivities to plant configuration and lack of data to support instrument performance, (3) recommend the licensees confirm UFM accuracy by comparisons with standard tests of known accuracy, and (4) require addresses provide a written response that verifies actions taken to ensure plants are not operated above licensed thermal power or outside the licensed design basis.

A member of the staff presented another approach for addressing this problem. Since inaccuracies in UFM devices are not safety significant nor a generic issue, the staff should issue an Information Notice or Regulatory Information Summary instead of a Bulletin.

A representative from Caldon, a vendor of UFM instruments, read a prepared statement to the Committee. Caldon believes that certain types of UFM instruments have a measurement uncertainty which is greater than that approved by the staff in Safety Evaluation Reports (SER). It was noted that the staffs approval was based upon proprietary information contained in a topical reports.

Committee Action

The Committee has deferred action to write a letter until after it has reviewed additional documents and had further discussions with the staff and industry.

6. Status of the ACRS Members' Assessment of the Quality of Selected NRC Research Projects

RES is required to have an independent evaluation of the quality of its research programs. This evaluation is mandated by the Government Performance and Results Act (GPRA) and needs to be in place during the next fiscal year. The Committee has agreed to assist RES in assessing the effectiveness and utility of the NRC research programs. The Committee has previously approved the strategy for the review of the quality of selected research projects. This strategy is to be tried during FY 2004 and refined in FY 2005. During the July 7-9, 2004 ACRS meeting, the Committee discussed the status of the activities of cognizant ACRS members associated with the assessment of the quality of the research projects on Sump Blockage and on MACCS Code.

Committee Action

The Committee plans to discuss the preliminary assessment of the quality of the research projects on Sump Blockage and MACCS Code during the September 8-11, 2004 ACRS meeting.

7. Future Plant Designs Subcommittee Report

The Chairman of the ACRS Subcommittee on Future Plant Designs provided a report to the Committee regarding the NRC staff's proposed "Regulatory Structure for New Plant Licensing, Part 1: Technology-Neutral Framework" document that was discussed at the June 24, 2004, Subcommittee meeting. The staff has developed a set of four protective strategies: initiating

event frequency, barrier integrity, protective systems, and accident management. The objective of this document is to develop and implement a risk-informed regulatory structure. To meet this objective, four tasks are proposed: development of a technology-neutral framework, formulation of proposed content, development of guidance on a technology-specific basis, and formulation of regulatory guides.

The expected regulatory structure will have desired characteristics to establish acceptance criteria of the technology-neutral framework. These characteristics include reproducible, traceable, understandable, defensible, flexible, risk-informed, performance-based, completeness, uncertainty, defense-in-depth, and consistency.

The proposed framework document has three major parts. Part 1 represents framework for a technology-neutral regulatory structure that describes framework road map, safety fundamentals-protective strategies, risk guidelines and design/construction/operation expectations, treatment of uncertainties, and development of technology-neutral requirements. Part 2 (content of technology-neutral requirements) and Part 3 (framework for a technology-specific regulatory structure) have not been written yet.

Committee Action

The staff's briefing was provided for information only. The Subcommittee will follow-up on the progress of this matter during future meetings.

8. Thermal-Hydraulic Phenomena Subcommittee Report

Dr. Wallis, Chairman of the Thermal-Hydraulic Phenomena Subcommittee, reported that the Subcommittee met on June 22-23, 2004, to discuss the technical guidance methodology developed by NEI to address PWR sump blockage during large, break LOCAs (GSI-191). He noted that it included several conservative features, supplemented by potential "refinements" that could be applied by individual licensees, and also included a risk-informed proposal to treat breaks above a particular size using assumptions about equipment operation and operator actions that would not normally be allowed in a strict design-basis method. He commented that it appeared that the staff would need to perform a large number of plant-specific reviews of the implementation of this methodology, and the ACRS would consider it in more detail after the staff has completed its evaluation.

9. ACRS Plant and Region Visit

The ACRS Plant Operations Subcommittee members and staff visited the Donald C. Cook Nuclear Plant on June 9, 2004 and Region III on June 10, 2004.

The annual plant visits provide the members an opportunity to tour the facility and hear presentations from plant management and staff to gain first hand knowledge of plant operations and issues. In addition to the plant tour, topics discussed were the D.C. Cook Improvement Plan, reactor vessel head inspection, debris multi-disc screens, digital turbine controls, and PRA model improvements.

The Plant Operations Subcommittee meetings with the Regions are also held annually to allow ACRS members to gain valuable information regarding issues related to and the status of the plants in the region. Some topics discussed at the meeting were organization and challenges, region plant performance (inspections, performance indicators, cross cutting issues, etc.), materials issues (reactor head inspections, pressurizer issues, and power uprates/license renewal/steam dryer issues), the reactor oversight process (SRAs and regional/resident inspectors), and fire protection.

RECONCILIATION OF ACRS COMMENTS AND RECOMMENDATIONS/EDO COMMITMENTS

- The Committee considered the EDO's response of June 7, 2004, to conclusions and recommendations included in the ACRS report dated April 27, 2004, concerning the draft plan for implementing the Commission's phased approach to probabilistic risk assessment (PRA) quality.

The Committee decided that it was satisfied with the EDO's response. The Committee plans to review the draft NUREG document that provides guidance for performing bounding, sensitivity, and uncertainty analyses as described in the staff's plan for implementation of the Commission's phased approach to PRA quality.

- The Committee considered the EDO's response of June 17, 2004, to observations and recommendations included in the ACRS report dated April 22, 2004, concerning Options and Recommendations for Policy Issues Related to Licensing Non-Light Water Reactor Designs.

The Committee decided that it was satisfied with the EDO's response. The Committee plans to hold further discussions with the staff after the staff has developed its positions, including how the staff has included the ACRS views and issues in its evaluation of the treatment of integrated risk.

- The Committee considered the EDO's response of June 18, 2004, to conclusions and recommendations included in the ACRS letter of May 13, 2004, concerning Good Practices for Implementing Human Reliability Analysis.

The Committee decided that it was satisfied with the EDO's response, although the staff did not commit to a peer review by domestic and international experts as recommended by the ACRS. The staff plans to brief the Committee on human reliability analysis good practices document in fall 2004, before the final report is issued.

OTHER RELATED ACTIVITIES OF THE COMMITTEE

During the period from June 2, 2004, through July 6, 2004, the following Subcommittee meetings were held:

- Plant Operations Subcommittee - June 10, 2004

The Subcommittee held discussions with representatives of NRC Region III staff regarding matters related to regional operations.

- Thermal-Hydraulic Phenomena Subcommittee - June 22-23, 2004

The Subcommittee discussed the ongoing staff review associated with GSI-191, "Assessment of Debris Accumulation on PWR Sump Performance." Representatives from NEI presented a description of their guidelines for use by licensees. The staff presented their initial assessment of guidelines, and the results of the public comments on the draft generic letter regarding PWR sump blockage. RES provided initial results of experimental programs to investigate chemical phenomena in PWR sumps.

- Future Plant Designs Subcommittee - June 24, 2004

The Subcommittee reviewed and discussed the NRC staff's proposed technology-neutral framework document for future plant licensing.

- Future Plant Designs Subcommittee - June 25, 2004

The Subcommittee reviewed the AP1000 Final Safety Evaluation Report (FSER) and the resolution of any remaining open items and ACRS concerns.

- Planning and Procedures - July 6, 2004

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 review and discuss Options and Recommendations for Policy Issues Related to Licensing Non-Light Water Reactor Designs once the NRC staff has developed its positions.
- The Committee plans to review the proposed regulatory structure for new plant licensing technology-neutral framework document, once it is completed, during future meetings.
- The Committee plans to write a lessons learned letter, as a result of the review of the AP1000 design, during the October 2004 ACRS meeting.
- The Committee plans to review the draft final report on Good Practices for Implementing Human Reliability Analysis in the fall 2004.
- The Committee decided to postpone its site visit to the Chalk River facility used for the ACR-700 design. The Committee, however, plans to review the pre-application documents during the October 2004 ACRS meeting.

- The Committee plans to review the proposed rule to risk-inform the requirements addressing large break loss-of-coolant accidents in November 2004.
- The Committee plans to review the draft NUREG document that provides guidance for performing bounding, sensitivity, and uncertainty analyses as described in the staff's plan for implementation of the Commission's phased approach to PRA quality.
- The Committee plans to meet with the staff and the Industry to discuss staff and industry activities associated with the resolution of steam dryer cracking events.
- The Committee plans to review the draft final Regulatory Guide, DG-1128, "Criteria for Accident Monitoring Instrumentation for Nuclear Power Plants," (Revision 4 to Regulatory Guide 1.97) after reconciliation of public comments.

PROPOSED SCHEDULE FOR THE 515th ACRS MEETING

The Committee agreed to consider the following topics during the 515th ACRS meeting to be held on September 7-9, 2004:

- Final Review of the License Renewal Application for the Dresden and Quad Cities Nuclear Plants
- Proposed Changes to the License Renewal Program
- Trip Report - AP1000 Workshop in China
- Trip Report - Chalk River Facility in Canada
- Safeguards and Security Matters
- Assessment of the Quality of the Selected NRC Research Projects
- Divergence in Regulatory Approaches Between U.S. and Other Countries

Sincerely,

/RA/

Mario V. Bonaca
Chairman