



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

SL-0520

May 11, 2004

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

SUBJECT: SUMMARY REPORT - 511<sup>th</sup> MEETING OF THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS, APRIL 15-17, 2004, AND OTHER RELATED ACTIVITIES OF THE COMMITTEE

Dear Chairman Diaz:

During its 511<sup>th</sup> meeting, April 15-17, 2004, the Advisory Committee on Reactor Safeguards (ACRS) discussed several matters and completed the following reports, letters, and memoranda:

REPORTS:

The following reports to Nils J. Diaz, Chairman, NRC, from Mario V. Bonaca, Chairman, ACRS:

- Options and Recommendations for Policy Issues Related to Licensing Non-Light Water Reactor Designs dated April 22, 2004
- Report on the Safety Aspects of the License Renewal Application for the R.E. Ginna Nuclear Power Plant dated April 23, 2004
- SECY-04-0037, "Issues Related to Proposed Rulemaking to Risk-Inform Requirements Related to Large Break Loss-of-Coolant Accident (LOCA) Break Size and Plans for Rulemaking on LOCA with Coincident Loss-of-Offsite Power" dated April 27, 2004
- Draft Plan for Implementation of the Commission's Phased Approach to PRA Quality dated April 27, 2004

MEMORANDA:

The following memoranda to William D. Travers, Executive Director for Operations, NRC, from John T. Larkins, Executive Director, ACRS:

- Draft Final Amendments to 10 CFR Part 50, Appendix E Paragraphs IV.B and IV.F.2 dated April 20, 2004

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## OTHER

The following letter to Ashok Thadani, Director, Office of Nuclear Regulatory Research, NRC, from Mario V. Bonaca, Chairman, ACRS:

- Proposed Approach to Assess the Quality of NRC Research Projects dated April 26, 2004

## HIGHLIGHTS OF KEY ISSUES

### 1. Action Plan for Implementing the Phased Approach for Improving PRA Quality

The Committee met with representatives of the NRC staff and the Nuclear Energy Institute to discuss their draft action plan for implementing the Commission's phased approach to Probabilistic Risk Assessment (PRA) Quality. The NRC staff concludes in NUREG/CR-6832 that a significant reduction in the risk associated with the loss of decay heat removal was achieved as a result of plant changes from the implementation of other regulatory initiatives.

#### Committee Action:

The Committee issued a report to the Chairman on this matter, dated April 27, 2004. The Committee concluded that the NRC staff has developed a practical strategy that would encourage the development of guidance documents necessary to implement the Commission's phased approach to PRA quality. The Committee recommended that a licensee using a PRA scope greater than that for which guidance documents exist should not be given low priority staff review. The Committee also recommended that proactive licensees should not be discouraged by the prospect of low priority staff review from pushing the boundaries of the state of the practice and should be encouraged to address in their application the relevant technical issues cited in the December 18, 2003 SRM. The staff should give high priority to these reviews. Finally, the Committee recommended that development of guidance on how to perform sensitivity and uncertainty analyses should receive a higher priority in the action plan and the staff should be prepared to develop its own guidance documents if industry consensus standards are not developed in a timely manner to meet the Commission's deadline for achieving Phase 3.

### 2. SECY-04-0037, "Issues Related to Proposed Rulemaking to Risk-Inform Requirements Related to Large Break Size and Plans for Rulemaking on LOCA with Coincident Loss-of-Offsite Power"

The Committee met with representatives of the NRC staff and the Nuclear Energy Institute to review SECY-04-0037. In SECY-04-0037, the NRC staff identifies a number of policy and technical issues that it felt needed to be resolved to ensure that the new rulemaking for maximum break size redefinition does not result in any unintended consequences.

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Committee Action:

The Committee issued a report to the Chairman on this matter, dated April 27, 2004. The Committee concluded that the risk-informed revision to 10 CFR 50.46 should permit a wide range of applications of the new break size as long as it can be demonstrated that the resulting changes in risk are small and adequate defense-in-depth is maintained. The Committee believes that the process and criteria in Regulatory Guide 1.174 are appropriate for evaluating the acceptability of changes proposed under a revised rule. The Committee concurs with the recommendation of the staff that the appropriate metric for the design basis maximum break size is the direct LOCA initiating event frequency.

3. Options and Recommendations for Functional Performance Requirements and Criteria for the Containments of Non-LWRs

The Committee heard presentations by and held discussions with representatives of the NRC staff regarding options and recommendations for policy issues related to licensing non-light water reactor (LWR) designs.

In a June 26, 2003 Staff Requirements Memorandum (SRM), the Commission requested the staff to provide further details on the options for, and associated impacts of, requiring that modular reactor designs account for the integrated risk posed by multiple reactors. In addition, the staff should pursue the development of functional performance standards [for non-LWR containment functional performance] and then submit options and recommendations to the Commission.

The staff plans to respond to the development of non-LWR containment functional performance standards as part of the development of a technology-neutral framework document by late 2004. Therefore, the Committee commented only on the issue of integrated risk.

Committee Action

The Committee issued a report to Chairman Diaz on this matter dated April 22, 2004, which recommended that the Quantitative Health Objectives (QHOs) apply to the site as a whole. The sum of the contributions from each reactor on the site to acute and latent fatalities should be bounded by the QHOs. The Committee, however, has not reached consensus on the approach that should be taken to determine the core damage frequency goal.

4. Criteria for Evaluating the Effectiveness (Quality) of the NRC Research Programs

The Office of Nuclear Regulatory Research (RES) has been charged by the EDO to establish a process to evaluate the effectiveness (Quality) and utility of its 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 this assessment. Its review will focus on assessing the quality of research programs. Cost characteristics and timeliness of the results will not be addressed in the ACRS evaluation. Timeliness will be

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measured as part of a “relevance” review, which is to be performed as a separate but related part of the overall RES quality metric. During the March 2004 ACRS meeting, the Committee discussed a process for developing a quantitative metric (a numerical grade) to be used for evaluating the quality of selected NRC research projects.

#### Committee Action

The ACRS Executive Director, on behalf of the Committee, issued a letter to RES providing a proposed strategy for assessing the quality of individual research projects. This strategy is still under consideration, and the Committee has invited RES to comment so that it can better meet the RES management needs.

#### 5. License Renewal Application for the R.E. Ginna Nuclear Power Plants

The Committee met with the NRC staff and representatives of the Rochester Gas and Electric Company to review and discuss the results of the staff evaluation of the license renewal application for the R. E. Ginna Nuclear Power Plant and the associated final Safety Evaluation Report. The applicant has requested approval for continued operation of the plant for a period of 20 years beyond the current license expiration date of September 18, 2009.

#### Committee's Action

The Committee issued a letter report to the NRC Chairman dated April 23, 2004, which recommended that the RG&E application for renewal of the operating license for R. E. Ginna Nuclear Power Plant be approved.

#### 6. Proposed Generic Communication Regarding Pressurizer Dissimilar Metal Weld Cracking Issues

The Committee heard a presentation by and held discussions with representatives of the Office of Nuclear Reactor Regulation. The purpose of this meeting was to hear a staff presentation on a proposed bulletin regarding inspections of Inconel alloy 82/182/600 pressurizer penetrations and steam-space piping connections.

The proposed bulletin is being developed to address inspections of those Alloy 82/182/600 type locations in or near the boundary of the pressurizer and susceptible to primary water stress corrosion cracking (PWSCC). It requests information from PWR licensees regarding their past, present, and future inspection plans for the locations covered under the scope of the bulletin.

There has been evidence of cracking at all three PWR designs. CE has experienced Alloy 600 cracking in the pressurizer heater sleeves and B&W has experienced diaphragm plate cracking in the heater bundles. Instrument line cracking has been observed at all three designs.

The concern is the potential for the onset of circumferential cracking of the reactor coolant pressure boundary (RCPB) portion of Alloy 82/182/600 materials used in the fabrication of

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pressurizer penetrations and steam space piping connections. There is also concern about the ability of existing licensee degradation management programs to identify the onset of circumferential RCPB cracking at these locations in an effective and timely manner. The immediate identification of the onset of circumferential PWSCC in Alloy 82/182/600 materials exposed to the high temperature pressurizer environment at a given facility is critical because of the potential for rapid initiation and high PWSCC growth rates and the potential for circumferential cracking to abnormal leakage, rapidly propagating failure, and/or gross rupture of the RCPB.

#### Committee Action

This was an information briefing and no further committee action was taken.

#### 7. Subcommittee Report on the Interim Review of the License Renewal Application for the Dresden and Quad Cities Nuclear Power Plants

The Chairman of the Plant License Renewal Subcommittee provided a report to the Committee summarizing the results of the April 14, 2004 subcommittee meeting with the NRC staff and representatives of the Exelon Generating Company to review and discuss the NRC's Safety Evaluation Report (SER) related to the License Renewal Application for the Dresden 2&3 and Quad Cities 1&2 Nuclear Power Stations. The current license expiration dates for Dresden 2&3 are December 22, 2009 and January 12, 2011. Both Quad Cities plant licenses expire December 14, 2012 and the applicant has requested approval for continued operation of each unit for a period of 20 years beyond the current license expiration dates.

During the meeting, the staff noted that they had resolved several of the items since issuance of the draft SER and the review of the remaining issues is ongoing. The remaining items (4 open and 1 confirmatory) must be resolved before issuance of the Final SER scheduled July 2004.

Subcommittee members were concerned with the recent operating experience issues at Quad Cities and requested that the staff be prepared to discuss in detail before the full Committee the decision to exclude certain components from the scope of license renewal and to allow the use of temporary core shroud repair devices for long-term use given the potential for new and different aging mechanisms.

#### Committee Action

The Committee will review the final SER and hold discussions with the staff and applicant during the 515<sup>th</sup> ACRS meeting, scheduled in September, 2004.

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#### 8. Subcommittee Report on Digital I&C System Matters

The Plant Operations Subcommittee Chair provided a report to the Committee summarizing the April 16, 2004 meeting with representatives of the Office of Nuclear Regulatory Research to discuss Digital Instrumentation and Control research activities. The Subcommittee Chair described each of the ongoing research studies to evaluate the quality, appropriateness, and reliability of I&C software to be used as replacement equipment for current plants and in new reactor construction.

The research studies are being conducted at the University of Maryland, University of Virginia, Halden and Brookhaven National Laboratories. During the meeting, the Subcommittee expressed interest in the staff's plan to evaluate the reliability of new software and how the software contributes to the overall risk profile of the plant. The Subcommittee Chair recommended that the Committee hear presentations from the staff during the June 2004 ACRS meeting.

#### Committee Action

The Committee agreed to schedule a subsequent meeting with the staff to hear discussions on the ongoing research activities and the staff's overarching plan that describes the expected outcomes and applications.

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

- The Committee considered the response from the EDO dated March 16, 2004, which addressed the ACRS report on Draft Safety Evaluation Report for the Economic and Simplified Boiling Water Reactor (ESBWR) Pre-Application Review dated February 12, 2004.

**The Committee decided that it was satisfied with the EDO's responses.**

#### OTHER RELATED ACTIVITIES OF THE COMMITTEE

During the period from March 4, 2004, through April 14, 2004, the following Subcommittee meetings were held:

- Reliability and Probabilistic Risk Assessment - March 25, 2004

The Subcommittee discussed the staff's draft action plan for the implementation of the phased approach to the quality of probabilistic risk assessment.

- Plant Operations - March 26, 2004

The Subcommittee discussed digital instrumentation and control research activities including development of digital system reliability models.

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- Plant License Renewal - April 14, 2004

The Subcommittee reviewed the license renewal application for the Dresden Nuclear Power Station, Units 2 and 3, and Quad Cities Nuclear Power Station, Units 1 and 2, and the associated draft safety evaluation report with open items prepared by the staff.

- Reliability and Probabilistic Risk Assessment and Plant Operations - April 14, 2004

The Subcommittee discussed the results of the pilot program on the Mitigating Systems Performance Indicator (MSPI).

- Planning and Procedures - April 14, 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.

- Materials and Metallurgy and Plant Operations - April 2, 2004

The Subcommittees discussed possible generic communications regarding pressurizer dissimilar metal weld cracking issues.

- Regulatory Policies and Practices - April 1, 2004

The Subcommittee discussed the staff's proposed approach for responding to the Commission's March 31, 2003, Staff Requirements Memorandum on risk-informing 10 CFR 50.46 and development of near-term LOCA frequencies.

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

- The Committee plans to review guidance being developed by the NRC staff on how to perform sensitivity and uncertainty analyses. The Committee was told by the staff that the projected completion date for a NUREG on alternate methods and treatment of uncertainties was December 30, 2004. The Committee recommended to the Commission that the development of this guidance receive higher priority in the staff's draft action plan for implementing the Commission's phased approach to PRA Quality.
- The Committee plans to review the technology-neutral framework document. The framework document is intended to provide the technical basis for improving, in the longer term beyond the advanced designs currently in the pre-application reviews, the effectiveness and efficiency of future plant licensing. The ACRS Future Plant Designs Subcommittee plans to hold a meeting on May 25, 2004 to discuss this matter.

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- The Committee plans to review the NUREG documenting the LOCA frequency distributions to be used in redefining the design basis LOCA.

PROPOSED SCHEDULE FOR THE 512<sup>th</sup> ACRS MEETING

The Committee agreed to consider the following topics during the 512<sup>th</sup> ACRS meeting, to be held on May 5-8, 2004:

- Safeguards and Security Matters (Closed)
- Use of Mixed Oxide (MOX) Lead Test Assemblies at the Catawba Nuclear Station
- Risk Management Technical Specifications
- Trial/Pilot Implementation of Regulatory Guide 1.200, "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities"
- Good Practices for Implementing Human Reliability Analysis
- Potential Adverse Effects from Power Uprates
- Subcommittee Report on Fire Protection Issues

Sincerely,

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Mario V. Bonaca  
Chairman