



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

SL-0543

August 23, 2006

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

Dear Chairman Klein:

SUBJECT: SUMMARY REPORT - 534th MEETING OF THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS, JULY 12-13, 2006, AND OTHER RELATED ACTIVITIES OF THE COMMITTEE

During its 534th meeting, July 12-13, 2006, the Advisory Committee on Reactor Safeguards (ACRS) discussed several matters and completed the following report, letters, and memoranda:

REPORT:

Report to Dale E. Klein, Chairman, NRC, from Graham B. Wallis, Chairman, ACRS:

- Report on the Safety Aspects of the License Renewal Application for the Nine Mile Point Nuclear Station, Units 1 and 2, dated August 2, 2006

LETTERS:

Letters to Luis A. Reyes, Executive Director for Operations, NRC, from Graham B. Wallis, Chairman, ACRS:

- Generic Safety Issue 191 – Assessment of Debris Accumulation on PWR Sump Performance, dated August 1, 2006
- Draft NUREG Report, "Integrating Risk and Safety Margins," dated August 2, 2006

MEMORANDA:

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

- Proposed Revision to Standard Review Plan NUREG-0800, Section 3.9.4, "Control Rod Drive Systems," dated July 14, 2006
- Draft Final Rule Package to amend 10 CFR 50.68, "Criticality Accident Requirements," dated July 14, 2006

HIGHLIGHTS OF KEY ISSUES

1. Final Review of the License Renewal Application for the Nine Mile Point Nuclear Station

The Committee heard presentations by and held discussions with representatives of the NRC staff and Constellation Energy Company, LLC regarding the license renewal application for the Nine Mile Point Nuclear Station (NMPNS), Units 1 and 2, and the final Safety Evaluation Report (SER) prepared by the NRC staff. The operating licenses for Units 1 and 2 expire on August 22, 2009 and October 31, 2026, respectively. The applicant has requested approval for continued operation of each Unit for a period of 20 years beyond the current license expiration dates. The applicant discussed the scoping and screening processes, significant operating experience, and Aging Management Programs. The staff discussed the results of its evaluation of the NMPNS license renewal application as well as the results of the inspection and audit.

Committee Action

The Committee issued a report to the NRC chairman dated August 2, 2006, on this matter, recommending that the Constellation Energy Company's application for renewal of the operating licenses for NMPNS, Units 1 and 2 be approved.

2. Results of the Study to Determine the Need for Establishing Limits for Phosphate Ion Concentration

The Committee met with representatives of the NRC staff and the Oak Ridge National Laboratory (ORNL) to discuss the results of a study to determine the need for establishing limits for phosphate ion concentration at sites of plants applying for license renewal. The staff initiated this study in response to a Committee recommendation. Representatives from ORNL described results obtained to date. Since a review of available literature and contacts with recognized experts did not identify any pertinent information regarding interactions of phosphate ions and cementitious materials, an experimental program was implemented. Portland cement paste specimens were exposed to three saturated solutions that represent a control group and two concentrations of phosphate ions that are higher than would be expected in soil. The specimens were tested for compressive strength, weight changes, and dimensional changes. Scanning electron microscopy and X-ray diffraction examinations were also performed. These tests and examinations were conducted after exposures of 1, 3, 6, and 12 months. Preliminary conclusions from this study indicate that there are no harmful interactions between phosphates and cementitious materials. Additional tests will be performed on specimens after 18 months of exposure to these solutions. ORNL has prepared a draft report on the durability of nuclear power plant concrete structures. The staff committed to provide this report to the Committee. ORNL plans to issue another report describing the criteria for assessment of phosphate effects on nuclear power plant concrete structures. After this work is completed, the staff will establish a position on phosphate ion concentration limits at sites of plants applying for license renewal.

Committee Action

This was an information briefing. The Committee plans to review the final results and recommendations from this study during a future meeting.

3. Integrating Risk and Safety Margins

The Committee heard presentations by and held discussions with representatives of the NRC staff regarding the draft NUREG, "A Framework for Integrating Risk and Safety Margins." This report is intended to provide a framework to address changes in safety margins. The basic approach is to consider a broad range of event scenarios, such as is now done in a PRA to assess core damage frequency and to determine the frequency, with which any safety limits of interest are exceeded after the changes to the plant. This frequency can then be compared to the comparable frequency of exceedance before the changes were made. This comparison could provide a measure of the impact of the change.

Committee Action

The Committee issued a letter to the Executive Director for Operations dated August 2, 2006, on this matter, recommending that this work be pursued in the context of the technology-neutral framework and for future revisions to Regulatory Guide 1.174. The Committee also recommended that the draft NUREG report be substantially revised before it is published to make its purposes, concepts, and conclusions clearer.

4. Thermal-Hydraulic Phenomena Subcommittee Report on Generic Safety Issue (GSI)-191 - Assessment of Debris Accumulation on PWR Sump Performance

The Chairman of the Thermal-Hydraulic Phenomena Subcommittee provided a report to the Committee summarizing the results of the June 13-14, 2006 meeting with the NRC staff and other participants to review the status of the NRC's sump performance research program. Substantial progress appears to have been made in a number of areas. Progress on developing a predictive tool for debris bed pressure drop without chemical effects is very promising but further work is required. Experiments that have been performed indicate that chemical effects can be substantial. However, the staff has not interpreted the experimental results within the context of a mechanistic model or even correlated them empirically. The staff has only recently initiated calculations to assess potential downstream effects. Additional research in these areas is still warranted. The Subcommittee will discuss this matter when further progress has been made by the staff.

The Committee discussed the May 2, 2006 EDO's response to the comments and recommendations included in the April 10, 2006 ACRS report on GSI-191, which was also discussed during the June 2006 ACRS meeting. At that meeting, the Committee decided that it was not satisfied with the EDO's response and agreed to reconsider this report after the June 13-14, 2006 meeting of the ACRS Thermal-Hydraulic Phenomena Subcommittee. Based on the information gathered at the Subcommittee meeting that was presented to the full Committee by the Subcommittee Chairman, the Committee decided that the staff must have the capability to perform an independent technical assessment of the approaches used by licensees to address GSI-191 issues. A continued research program to address key areas of uncertainty should be pursued as part of a risk-management strategy for reducing the likelihood of erroneous regulatory conclusions.

Committee Action

The Committee issued a letter to the Executive Director for Operations, dated August 1, 2006, recommending that confirmatory research on GSI-191 be continued in order to develop predictive tools to assist the staff in assessing the adequacy of proposed modifications by reactor licensees.

5. Safeguards and Security Matters

The Committee met with representatives of the NRC staff to discuss the staff's plans for performing state-of-the-art reactor consequence analyses. The primary purpose of the discussions was to inform the Committee of the staff's plan for future interactions with the Committee on the key technical aspects of this work.

Committee Action

This was an information briefing. No Committee action was necessary. The staff plans to brief the Committee again on this matter in an open session during the September 7-9, 2006 ACRS meeting. The Committee plans to review the staff's progress on technical issues periodically throughout the project.

6. Digital Instrumentation and Control Systems Subcommittee Report

The Acting Chairman of the Digital Instrumentation and Control Systems Subcommittee provided a report to the Committee, summarizing the results of the July 27, 2006 meeting with the NRC staff to review the ongoing digital system research program and the development of a regulatory guide on risk-informed digital system reviews. The research program discussed at this Subcommittee meeting will ultimately provide information in the development of this regulatory guide. The staff plans to submit a draft of this regulatory guide to the ACRS for review in November 2006.

RECONCILIATION OF ACRS COMMENTS AND RECOMMENDATIONS/EDO COMMITMENTS

- The Committee considered the EDO's response of June 15, 2006, to comments and recommendations included in the May 17, 2006 ACRS report on the modified Draft Final Revision 4 to Regulatory Guide 1.97, "Criteria for Accident Monitoring Instrumentation 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 19, 2006, to comments and recommendations included in the May 22, 2006 ACRS report on the Beaver Valley Extended Power Uprate Application. The Committee decided that it was satisfied with the EDO's response.
- The Committee considered the EDO's response of June 20, 2006, to comments and recommendations included in the March 15, 2006 ACRS report on review and evaluation of the NRC safety research program (NUREG 1635, Vol.7). The Committee decided that it was satisfied with the EDO's response.

- The Committee considered the EDO's response of June 21, 2006, to comments and recommendations included in the May 17, 2006 ACRS report on the Safety Aspects of the License Renewal Application for the Brunswick Steam Electric Plant, Units 1 and 2. The Committee decided that it was satisfied with the EDO's response.

The staff will take into consideration the new two-tiered review process for scoping of balance of plant systems during its review of future license renewal applications.

- The Committee considered the EDO's response of June 21, 2006, to comments and recommendations included in the May 22, 2006 ACRS report on the R. E. Ginna Extended Power Uprate Application. The Committee decided that it was satisfied with the EDO's response.

The staff will take into consideration the additional views on risk-informed regulatory approaches presented by several of the Committee members as development of new initiatives proceeds.

- The Committee considered the EDO's response of June 28, 2006, to comments and recommendations included in the May 22, 2006 ACRS report on the Proposed Revisions to 10 CFR Part 52: Licenses, Certifications, and Approvals for Nuclear Power Plants, and Conforming Amendments to Applicable NRC Regulations. The Committee decided that it was satisfied with the EDO's response.
- The Committee considered the EDO's response of June 29, 2006, to comments and recommendations included in the April 24, 2006 ACRS report on Ongoing Security-Related Activities. The Committee decided that it was satisfied with the EDO's response to two of the three ACRS recommendations.

The Committee requested a brief presentation from the staff to clarify the EDO's response to the third recommendation, after which it will consider whether to submit further recommendations.

OTHER RELATED ACTIVITIES OF THE COMMITTEE

During the period from May 31, 2006, through July 11, 2006, the following Subcommittee meetings were held:

- Thermal-Hydraulic Phenomena — June 13-14, 2006

The Subcommittee reviewed reports concerning industry responses related to the resolution of GSI-191, PWR Sump Performance, and various research activities supporting the resolution of GSI-191 including chemical effects testing.

- Digital Instrumentation and Control Systems — June 27, 2006

The Subcommittee reviewed the ongoing digital system research program and the development of regulatory guidance on risk informed digital system reviews.

- Joint Reliability and Probabilistic Risk Assessment and Human Factors — June 28, 2006

The joint Subcommittees reviewed three current human reliability assessment issues: (1) the ATHEANA User's Guide, (2) the application of ATHEANA to pressurized thermal shock, and (3) comments received on the HRA Methods Evaluation NUREG.

- Planning and Procedures — July 11, 2006

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 staff committed to provide copies of the NUREG/CR report, "Primer on Durability of Nuclear Power Plant Concrete Structures - A Review of Pertinent Factors," to the Committee.
- The Committee plans to review the final results and recommendations from the study to determine the need for establishing limits on phosphate ion concentrations at sites of plants applying for license renewal during a future meeting.
- The Committee has requested a presentation from the staff to clarify the EDO's response to the third recommendation in an April 24, 2006 ACRS report on security-related activities.
- The Committee would like to hear from the staff about further developments associated with the draft NUREG Report, "A Framework for Integrating Risk and Safety Margins."
- The ACRS Subcommittee on Thermal-Hydraulic Phenomena will continue to meet with the staff to discuss the activities associated with the resolution of GSI-191.
- The Committee plans to review the state-of-the-art consequence analysis after further progress has been made in developing this analysis.
- The Committee would like to review the draft final rule package to amend 10 CFR 50.68, "Criticality Assessment Requirements," during its September 7-9, 2006 meeting.

PROPOSED SCHEDULE FOR THE 535th ACRS MEETING

The Committee agreed to consider the following topics during the 535th ACRS meeting, to be held on September 7-9, 2006:

- Final Review of the License Renewal Application for the Monticello Nuclear Generating Plant
- Lessons Learned from the Review of the Early Site Permit Applications
- Draft Final Revision to 10 CFR 50.68, "Criticality Accident Requirements"
- State-of-the Art Consequence Analysis
- EDO Response to the ACRS Report on the Review of Ongoing Security-Related Activities (Closed)
- Risk-Informed Criteria for Societal Risk
- Draft Report on the Quality Assessment of Selected NRC Research Projects

Sincerely,

/RA/

Graham B. Wallis
Chairman