



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

SL-0515

October 29, 2003

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

Dear Chairman Diaz:

SUBJECT: SUMMARY REPORT - 506<sup>th</sup> MEETING OF THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS, OCTOBER 1-3, 2003, AND OTHER RELATED ACTIVITIES OF THE COMMITTEE

During its 506<sup>th</sup> meeting, October 1-3, 2003, 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 License Renewal Application for the Fort Calhoun Station, Unit 1, dated October 9, 2003.

LETTER:

Letter to William D. Travers, Executive Director for Operations, NRC, from Mario V. Bonaca, Chairman, ACRS: Draft Final Regulatory Guide 1.168, Revision 1, "Verification, Validation, Reviews, and Audits for Digital Computer Software Used in Safety Systems of Nuclear Power Plants," dated October 8, 2003.

MEMORANDA:

Memorandum to William D. Travers, Executive Director for Operations, NRC, from John T. Larkins, Executive Director, ACRS: Draft Regulatory Guide DG-1129, "Criteria for Independence of Electrical Safety Systems" (Revision 3 to Regulatory Guide 1.75), dated October 7, 2003.

Memorandum to James E. Dyer, Director, Office of Nuclear Reactor Regulation, NRC, from John T. Larkins, Executive Director, ACRS: Kewaunee Nuclear Power Plant - Advisory Committee on Reactor Safeguards, Review of Stretch Power Uprate Amendment (TAC No. MB9031), dated October 9, 2003.

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## HIGHLIGHTS OF KEY ISSUES

### 1. ACRS Meeting with the NRC Commissioners

The Committee met with the NRC Commissioners on October 2, 2003 to discuss several items of mutual interest, including: materials degradation issues; reactor oversight process; and, improvement of the quality of risk information for regulatory decisionmaking.

### 2. Final Review of the Fort Calhoun License Renewal Application

The Committee heard presentations by and held discussions with representatives of the Omaha Public Power District (OPPD) and the NRC staff regarding the license renewal application and associated NRC Safety Evaluation Report (SER) for the Fort Calhoun Station, Unit 1.

The application, requesting renewal of the operating license for Fort Calhoun Station Unit 1 for 20 years beyond the current license term, which expires August 9, 2013, was submitted to the NRC on January 9, 2002 and updated on April 5, 2002. The plant is a single unit, 1500 MWt Combustion Engineering pressurized water reactor (PWR). The staff presented the resolution of open and confirmatory items, significant time-limited aging analyses, inspection findings, and other related matters. The applicant provided information on the commitment tracking, significant operating events, schedule for replacing the reactor pressure vessel head, pressurizer, and steam generators.

#### Committee Action

The Committee issued a report to the NRC Chairman dated October 9, 2003, agreeing with the staff position that the programs instituted by OPPD to manage age-related degradation are appropriate and provide reasonable assurance that Fort Calhoun Station, Unit 1 can be operated in accordance with its current licensing basis for the period of extended operation without undue risk to the health and safety of the public. The ACRS recommended that the license renewal application for the Fort Calhoun Station, Unit 1 be approved.

### 3. Interim Review of the AP1000 Design

The Committee heard presentations by and held discussions with Westinghouse representatives regarding the AP1000 design certification status and specific technical issues requested by the ACRS such as the automatic depressurization system (ADS)- stage 4 squib valve reliability, and the post-loss of coolant accident (LOCA) aerosol deposition calculation. Westinghouse concluded that the ADS-4 squib valve design is a basic design that has been used extensively for many smaller squib valves, and the reliability information from smaller valves will be applicable to larger valves when scaling the design.

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Westinghouse representatives described the post-LOCA design basis aerosol deposition in AP1000 containment. Similar to the AP600 design, the AP1000 containment has a large steel shell cooled on the outside, leading to higher heat transfer rate and higher natural aerosol removal rate for fission product aerosols than would exist from sedimentation alone. Since AP1000 and AP600 have a similar design, the calculation is a repetition of the AP600 calculation with AP1000 parameters and thermal hydraulics.

The NRC staff issued a draft Safety Evaluation Report (SER) on June 16, 2003, that contains 174 open items regarding the AP1000 design review. Currently there are 24 open items that are considered resolved, and 34 open items that require verification. The remaining open items include computer code verification, scaling of test facilities, core level during long term cooling, boron precipitation, seismic, wind and tornado loadings, and leak-before-break analysis. The NRC staff plans to issue its final SER in September 2004.

#### Committee Action

The Committee plans to continue its review of the AP1000 design during future meetings, with a possible interim report to the Commission.

#### 4. Proactive Materials Degradation Assessment Program

The Committee heard presentations by, and held discussions with, representatives of the NRC staff regarding the status of staff's research program addressing materials degradation. The staff discussed major activities of its research program associated with materials degradation. The staff also provided insights to its proactive materials degradation initiative for assessing materials degradation at nuclear power plants.

#### Committee Action

This was an information briefing and no Committee action was taken. The Committee plans to continue its discussion of this matter during future meetings.

#### 5. Subcommittee Report on the Interim Review of the License Renewal Application for H. B. Robinson Nuclear Power Plant

The plant license renewal Subcommittee Chairman presented a report of its September 30, 2003 meeting on the Interim review of the license renewal application (LRA) for H.B. Robinson Nuclear Power Plant. The chairman stated that the applicant used the generic aging lessons learned (GALL) process very effectively in preparing its LRA. All open and confirmatory items have been resolved. The staff performed three inspections of applicant's license renewal activities and concluded that the license renewal activities were conducted as described in the license renewal application.

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#### Committee Action

The Committee decided not to issue an interim report. The full Committee will hear presentations by, and have discussions with, representatives of the NRC staff and Carolina Power and Light Company in March 2004 regarding the staff's final Safety Evaluation Report for the Robinson Nuclear Power Plant LRA.

#### 6. Subcommittee Report on Fire Protection Matters

The Fire Protection Subcommittee Chairman provided a report to the ACRS regarding its meeting with the staff and industry representatives on September 9, 2003. The items discussed included:

- Status of the staff's rulemaking effort to revise 10 CFR 50.48 to allow licensee's to voluntarily adopt NFPA 805 as an alternative to existing fire protection requirements
- Resolution of post-fire safe shutdown circuit analysis issues
- Staff proposal for rulemaking to address licensee's use of operator manual actions in lieu of permanently installed equipment and barriers.

The staff also discussed development of NUREG 1805, "Fire Dynamics Tools (FDTs) Quantitative Fire Hazard Analysis Methods for the U.S. Nuclear Regulatory Commission Fire Protection Inspection Program." The NUREG and associated EXCEL spreadsheets were developed to assist regional fire protection inspectors in performing fire hazard analysis. Fire Protection inspectors may use these tools to perform risk-informed evaluations of credible fires that may cause significant damage to essential safe-shutdown equipment.

#### Committee Action

The Committee plans to review the draft final rule language revising 10 CFR 50.48 and other fire protection matters during future meetings.

#### 7. Operating Experience Assessment Report — Effects of Grid Events on Nuclear Power Plant Performance

The Committee heard presentations from the staff on the results of the staff's assessment of loss of power (LOOP) experience over two distinct periods of time, before deregulation (1985-1996) and after deregulation (1997-2001). The assessment was performed by the Office of Nuclear Regulatory Research to identify changes to grid performance which could impact the relative safety of nuclear power plants. The assessment also provided some numerical measures to characterize grid performance as it relates to the frequency and duration of LOOP events before and after deregulation. The staff also discussed a few recent grid-related events (2001-Present) and their affect on operating nuclear power plants.

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#### Committee Action

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

8. Draft Final Revision to Regulatory Guide 1.168 (DG-1123), "Verification, Validation, Reviews, and Audits for Digital Computer Software Used in Safety Systems of Nuclear Power Plants"

The Committee heard presentations by and held discussions with representatives of the NRC staff regarding the draft final Regulatory Guide 1.168, Revision 1. The proposed revision to Regulatory Guide 1.168 was issued for public comment in January 2003 as draft Regulatory Guide DG-1123. Revision 1 to Regulatory Guide 1.168, dated August 2003, addresses quality assurance for digital computer software in safety-related systems of nuclear power plants, and endorses the Institute of Electrical and Electronics Engineers (IEEE) Standards 1012-1998 and 1028-1997, with minor exceptions. IEEE 1012 is a process Standard that defines the verification and validation processes in terms of specific activities and related tasks. IEEE 1028 is a Standard defining five types of software review, together with procedures required for the execution of each review type.

#### Committee Action

The Committee issued a letter to the EDO on this matter dated October 8, 2003, recommending the issuance of Revision 1 to Regulatory Guide 1.168.

9. Subcommittee Report on Reactor Fuels

The Subcommittee heard a report on the meeting of the Subcommittee on Reactor Fuels, which was held on September 29-30, 2003. The report began with a the history of the high burnup fuel research program, and the ongoing activities to assess the acceptance criteria used by the industry for high burnup fuel during various transients and accidents. The program has made considerable progress towards confirming that current LWR fuel designs are safe to operate up to 62 GWD/MTU. Additional work is progressing to support revisions to 10CFR50.46 criteria, and to generalize the acceptance criteria for new cladding materials. Industry also continues to work to improve the operating performance of reactor fuel through the Electric Power Research Institute's Robust Fuels Program, and these efforts are intended to support extended burnup beyond current regulatory limits. The Committee believes that it is important for the staff to continue to develop its own in-house capability to evaluate fuel performance and behavior. Overall, the fuel work represents a success story for the Office of Nuclear Regulatory Research.

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10. Review of the Phenomena Identification and Ranking Table (PIRT) Process

The Committee heard a presentation by and held discussions with Dr. Nourbakhsh, ACRS Senior Fellow, regarding his review of the PIRT process and his proposed recommendations for enhancing the PIRT process.

Committee Action

This was an information briefing. The Committee did not take any action.

RECONCILIATION OF ACRS COMMENTS AND RECOMMENDATIONS/EDO COMMITMENTS

There were no EDO responses for consideration by the Committee during this meeting.

LIST OF MATTERS FOR THE ATTENTION OF THE EDO

- The Committee plans to review the draft final Revision 3 to Regulatory Guide 1.75 (DG-1129), "Criteria for Independence of Electrical Safety Systems," after reconciliation of public comments.
- The Committee plans to continue its review of the AP1000 design during future meetings.
- The Committee plans to continue its review of the proactive materials degradation program during future meetings.
- The Committee plans to review the adequacy of the resolution of those items, declared resolved by the staff, that were raised by the ACRS in NUREG-1740, "Voltage-Based Alternative Repair Criteria."
- The Committee plans to review the draft final revision to 10 CFR 50.48 to endorse the NFPA-805 fire protection Standard and other fire protection matters during future meetings.

OTHER RELATED ACTIVITIES OF THE COMMITTEE

During the period from September 10, 2003, through October 1, 2003, the following Subcommittee meetings were held:

- Reactor Fuels - September 29-30, 2003

The Subcommittee reviewed progress by the Office of Nuclear Regulatory Research in the area of high burnup fuels and other fuel-related research to more fully understand industry activities associated with the "Robust Fuel Program," and to hear the experience of industry related to crud deposits on reactor fuels.

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- Plant License Renewal - September 30, 2003

The Subcommittee reviewed the license renewal application for the H. B. Robinson nuclear power plant Unit 2 and the associated draft Safety Evaluation Report prepared by the NRC staff.

- Planning and Procedures - October 1, 2003

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

#### PROPOSED SCHEDULE FOR THE 507<sup>th</sup> ACRS MEETING

The Committee agreed to consider the following topics during the 507<sup>th</sup> ACRS meeting, to be held on November 6-8, 2003:

- Draft Final Regulatory Guide 1.32, Revision 3, "Criteria for Power Systems for Nuclear Plants"
- Safeguards and Security Matters
- Proposed Resolution of Generic Safety Issue 189, "Susceptibility of Ice Condenser and Mark III Containments to Early Failure from Hydrogen Combustion During a Severe Accident"
- Regulatory Effectiveness of the Resolution of Unresolved Safety Issue (USI)-A45, "Shutdown Decay Heat Removal Requirements"
- Mixed Oxide (MOX) Fuel Fabrication Facility
- Advanced Non-Light Water Reactor Licensing Framework
- Subcommittee Report - R. E. Ginna License Renewal Application
- NRC Safety Research Program Report
- Early Site Permit Review Standard
- Task Force Report on Operating Experience

Sincerely,

**/RA/**

Mario V. Bonaca  
Chairman