

September 10, 2002

The Honorable Richard A. Meserve
Chairman
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Dear Chairman Meserve:

**SUBJECT: SUMMARY REPORT - 494th MEETING OF THE ADVISORY
COMMITTEE ON REACTOR SAFEGUARDS, JULY 10-12, 2002,
AND OTHER RELATED ACTIVITIES OF THE COMMITTEE**

During its 494th meeting, July 10-12, 2002, the Advisory Committee on Reactor Safeguards (ACRS) discussed several matters and completed the following report and letters. In addition, the Committee authorized Dr. John T. Larkins, Executive Director, ACRS, to transmit the memorandum noted below:

REPORT:

The following report was issued to Chairman Meserve, NRC, from George E. Apostolakis, Chairman, ACRS:

- Draft Final Revision 1 to Regulatory Guide 1.174 and to Chapter 19 of the Standard Review Plan, dated July 23, 2002

LETTERS:

The following letters were issued to William D. Travers, Executive Director for Operations, NRC, from George E. Apostolakis, Chairman, ACRS:

- Draft Advanced Reactor Research Plan, dated July 18, 2002
- Risk Metrics and Criteria for Reevaluating the Technical Basis of the Pressurized Thermal Shock Rule, dated July 18, 2002

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MEMORANDUM:

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

- Draft Regulatory Guide DG-1119 (Proposed Revision 1 to Regulatory Guide 1.180), "Guidelines for Evaluating Electromagnetic and Radio-frequency Interference in Safety-related Instrumentation and Control Systems," dated July 16, 2002

HIGHLIGHTS OF KEY ISSUES

1. Pressurized Thermal Shock (PTS) Reevaluation Project: Risk Acceptance Criteria

The Committee heard presentations by and held a discussion with the NRC staff regarding the status of the staff's work to identify risk metrics and criteria that can be used in reevaluating the technical basis of the PTS rule. The status of the staff's work is provided in SECY-02-0092 (May 30, 2002).

The staff stated that reactor vessel failure frequency (RVFF) will be used as a key metric and that the criterion for RVFF will be established in a manner consistent with previous NRC consideration of core damage frequency (CDF) and large early release frequency (LERF) in other risk-informed initiatives. The staff intends that the criterion selected will establish a risk level and contribution to risk from RVFF that are consistent with the intent of the current rule.

The staff has developed three options for RVFF acceptance criteria. Pilot studies covering these options are progressing concerning the four selected plants and a draft report has been completed for one plant. Uncertainties in the individual pilot plant studies, safety margins, and the application of defense in depth need to be evaluated. Methods need to be established for extension of the insights gained from pilot plant studies to all pressurized water reactors. The staff plans to continue its interactions with stakeholders and the international community. Reevaluation of the technical basis for the PTS rule is scheduled for completion in December 2002.

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Committee Action

The Committee issued a letter to William Travers, Executive Director for Operations, NRC, on this matter, dated July 18, 2002, observing that the acceptance criteria proposed by the NRC staff do not properly reflect the potential impact of an air oxidation source term on risk. The Committee plans to hold additional discussions with the staff on the PTS rule reevaluation project.

2. Draft Final Revision 1 to Regulatory Guide 1.174, "An Approach to Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," and Associated Standard Review Plan Chapter 19

The Committee heard presentations by and held discussions with representatives of the NRC staff concerning the draft final Revision 1 of Regulatory Guide 1.174 and associated changes to Chapter 19 of the Standard Review Plan (SRP), "Use of Probabilistic Risk Assessment in Plant-Specific, Risk-Informed Decision-making: General Guidance".

The staff stated that Revision 1 includes several changes, including the following:

- Risk-related information may now be requested if new, unforeseen hazards or a substantially greater prospect for a known hazard emerges.
- Increases in power level, fuel burnup rates, and the use of MOX fuel may affect plant risk profiles and consequently current risk parameters, such as LERF. Therefore, a cautionary note has been added to Revision 1 to note that the staff is evaluating their impact on LERF.

The staff stated that rather than including staff endorsements of consensus industry standards and industry peer review process associated with PRA quality in Regulatory Guide 1.174, the staff is in the process of developing a separate regulatory guide to address the industry standards and peer review process. The staff plans to periodically update Regulatory Guide 1.174 to incorporate lessons learned from ongoing regulatory issues.

Committee Action

The Committee issued a report to Chairman Meserve on this matter, dated July 23, 2002, recommending that Revision 1 to Regulatory Guide 1.174 and the associated SRP Chapter 19 not be issued until more substantive changes are made. Publications

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of the current revisions may send the wrong message that incomplete PRAs are acceptable for a broad range of risk-informed changes to the licensing basis.

3. Meeting with the NRC Commissioners

The ACRS members met with the NRC Commissioners on July 10, 2002, to discuss the following items of mutual interest:

- Core power uprates/license renewal activities/future ACRS activities
- Risk-informing special treatment requirements of 10 CFR Part 50
- Advanced reactors
- Pressurized thermal shock technical basis reevaluation project

In a Staff Requirements Memorandum, dated July 17, 2002, the Commission asked:

The ACRS should consider providing a recommendation as to how license renewal guidance documentation should be updated to reflect supporting information, particularly with regard to time-limited aging analyses, that should, as a minimum, be included in license renewal applications to maximize the efficiency of the review process and minimize requests for additional information.

The Committee plans to discuss the Commission request during its September 12-14, 2002 meeting.

4. Risk-Informed Regulation Implementation Plan

The Committee heard presentations by and held discussions with representatives of the NRC staff concerning progress on implementation of risk-informed regulation. The staff provided plans to improve the process for planning activities associated with implementation of risk-informed regulations. The staff summarized agency progress to date, including the reactor oversight process, risk-based performance indicators, risk-informed changes to 10CFR50.46 (acceptance criteria for ECCS), risk-informed changes to 10CFR73.55 (reactor security programs), etc. The staff also reported progress on current activities related to risk-informing special treatment requirements at commercial power plants.

Committee Action

This was an information briefing only. No committee action was taken.

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5. Advanced Reactor Research Plan

The Committee heard presentations by and held discussions with representatives of the NRC staff regarding the draft advanced reactor research plan. The reactor designs that are being considered within the scope of the plan are the Pebble Bed Modular Reactor (PBMR), Gas Turbine-Modular Helium Reactor (GT-MHR), AP1000, and the International Reactor Innovative and Secure (IRIS). Generation IV reactor concepts have not been included in the plan, due to their preliminary stage of development. The plan, however, is expected to be a living document, and will be updated later on to accommodate Generation IV reactor concepts, and other designs such as the European Simplified Boiling Water Reactor (ESBWR), boiling water reactor (SWR-1000), and Advanced CANDU Reactor (ACR-700).

The draft plan originates from a technology-neutral perspective. It is structured to capture both technical and potential safety issues that involve uncertainties. The RES staff envisions the plan to be used in identifying key research areas, tools to address technical issues, key research outputs results and links to the regulatory process, and key milestones and resources over a 5-year period. The plan, however, does not delineate the research that will be conducted by the NRC staff. Rather, it identifies information gaps that exist at the NRC in terms of analytical tools and data.

Committee Action

The Committee issued a letter to the NRC's Executive Director for Operation, dated July 18, 2002, commending the RES staff on its effort. The Committee noted that the plan is not yet complete in the sense that it does not establish resources, schedules, and milestones. Nevertheless, the Committee believed that addressing the research needs already identified in the plan to be very important.

6. Overview of NRC Research Activities in the Seismic Area

The Committee heard presentations by and held discussions with representatives of the NRC staff regarding past, present, and future research activities in the areas of earth sciences and earthquake engineering. The discussions included a review of funding and budgeting for the research, studies, and cooperative efforts that have been performed with other organizations to gather seismographic information. In addition the staff discussed probabilistic seismic hazard assessments and seismic margins programs.

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Committee Action

This briefing was for information only. The Committee will use information obtained during this briefing to prepare input to the annual ACRS report to the Commission on the NRC Safety Research Program.

7. Development of Review Standard for Reviewing Core Power Uprate Applications

The Committee heard a presentation and held discussions with representatives of the NRC staff regarding NRR's plans for development of a Review Standard to be applied to applications for extended power uprates (EPU). Development of this Review Standard is intended to respond, in part, to concerns expressed by the ACRS as a result of the Committee's review of several EPU applications over the past year. The Standard is to provide: a clearer definition of the staff's scope of review, development of technical review criteria, process guidance, and, model, or template, safety evaluations. The staff's schedule calls for issuance of the Review Standard for interim use and public comment in December of this year. ACRS review of the Standard is expected following issuance for public comment.

Committee Action

As this briefing was for information only, no Committee action was taken at this time.

8. Application of the Probabilistic Fracture Mechanics Methodologies to Reactor Vessel Integrity Assessment

The Committee heard presentations by and held discussions with representatives of the NRC staff concerning development of the FAVOR probabilistic fracture mechanics (PFM) computer code and its use for assessing reactor pressure vessel integrity. A brief overview description of the FAVOR code capabilities was presented, followed by a detailed description of code validation efforts stemming from participation in a number of bench-marking exercises.

Committee Action

This was an information briefing only. No committee action was taken.

RECONCILIATION OF ACRS COMMENTS AND RECOMMENDATIONS

- The Committee considered the response from the EDO, dated May 6, 2002, to comments and recommendations included in an ACRS report dated March 14, 2002, concerning the Arkansas Nuclear One, Unit 2, Extended Power Uprate, and the response dated May 13, 2002, to the ACRS report concerning risk-informing the special treatment requirements of 10 CFR Part 50 (Option 2).

The Committee decided that it has continuing concerns relative to the EDO responses in the above letters. Specifically, the ACRS believes that Human Reliability Models should be reviewed, particularly as they are being utilized by the NRC. Also, uncertainty analysis should be performed as part of any risk analysis. The Committee plans to discuss these issues during future meetings.

- The Committee considered the EDO's response of June 25, 2002, to comments and recommendations included in the ACRS report dated May 8, 2002, concerning the PHEBUS-FP Program.

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

- The Committee considered the EDO's response of June 11, 2002, to comments and recommendations included in the ACRS report dated March 14, 2002, concerning Confirmatory Research Program on High-Burnup Fuel.

The Committee plans to continue its discussions with the NRC staff regarding this issue during future meetings.

- The Committee considered the EDO's response of June 6, 2002, to comments and recommendations included in the ACRS report dated April 17, 2002, concerning the GE Nuclear Energy Licensing Topical Report NEDC-33004P, "Constant Pressure Power Uprate," Revision 1.

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

LIST OF MATTERS FOR THE ATTENTION OF THE EDO

- The Committee will continue to meet with the staff on a periodic basis to discuss progress in seismic research.
- The Committee will continue its review of the proposed resolution of GSI-185 during its September 12-14, 2002 meeting.

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- The Committee plans to hold additional discussions with the NRC staff regarding the PTS rule reevaluation project during future meetings.
- The Committee has continuing concerns regarding the EDO response of May 6, 2002 to the ACRS report of March 14, 2002 relative to the ANO, Unit 2 extended power uprate and the EDO response to May 13, 2002 to the ACRS report of March 19, 2002 concerning risk-informing the special treatment requirements of 10 CFR Part 50 (Option 2). The Committee plans to continue its discussion of this matter during future meetings.
- The Committee plans to review the draft final version of DG-1119, "Guidelines for Evaluating Electromagnetic and Radiofrequency Interference in Safety-Related Instrumentation and Control Systems," after reconciliation of public comments.

OTHER RELATED ACTIVITIES OF THE COMMITTEE

During the period from June 1, 2002 through July 9, 2002, the following Subcommittee meetings were held:

- Fire Protection - June 4, 2002

The Subcommittee reviewed (1) the proposed revision to 10 CFR 50.48 to endorse the National Fire Protection Association (NFPA) standard 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants," and (2) the Nuclear Energy Institute (NEI) guidance document NEI-00-01, "Guidance for Post-Fire Safe-Shutdown Circuit Analysis."

- Materials and Metallurgy and Plant Operations - June 5, 2002

The Subcommittees discussed the Root Cause Report and Repair Plan associated with the Davis-Besse vessel head degradation, the status of licensees' response to Bulletin 2002-01, "Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles," Bulletin 2002-01, "Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity," and data used to support findings related to the control rod drive mechanism (CRDM) penetration cracking and the reactor pressure vessel (RPV) head degradation.

- Plant Operations and Fire Protection - June 19, 2002

The Subcommittees discussed the performance of the plants in Region II (Atlanta, GA) including fire protection issues and other plant related issues.

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- Thermal-Hydraulic Phenomena - June 26, 2002

The Subcommittee reviewed portions of RES's Thermal-Hydraulic Research Program. Specific topics discussed included the Phase Separation Test Program being conducted in the Air-Water Test Loop for Advanced Thermal-Hydraulic Studies (ATLATS) test facility, the status of the TRAC-M code consolidation and documentation effort, and the Reflood Test Program being conducted at Pennsylvania State University. The proposed resolution of GSI-185, "Control of Recriticality Following Small-Break LOCAs in PWRs," was also reviewed.

- Future Plant Designs - July 8, 2002

The Subcommittee reviewed the proposed Advanced Reactor Research Plan and its implication on the NRC's Regulatory framework.

- Plant License Renewal - July 9, 2002

The Subcommittee reviewed the Virginia Electric and Power Company's (Dominion's) license renewal application for Surry Power Station Units 1 and 2, and North Anna Power Station Units 1 and 2, and the associated safety evaluation report with open items.

- Planning and Procedures - July 9, 2002

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 495th ACRS MEETING

The Committee agreed to consider the following topics during the 495th ACRS meeting, which will be held on September 12-14, 2002:

- DOE/DOD Naval Reactors Virginia Class Nuclear Propulsion Plant Submarine Design (Closed)
- Human Reliability Analysis Research Plan
- Proposed Resolution of Generic Safety Issue-185, "Control of Recriticality Following Small-Break LOCAs in PWRs"
- Subcommittee Report Regarding D.C. Cook Switchyard Fire
- Subcommittee Report Regarding the Reactor Oversight Process
- Proposed 10 CFR 50.69, Draft Regulatory Guide DG-1121, and NEI Document NEI 00-04

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- Draft Regulatory Guide DG-1120 and Standard Review Plan Section Associated with NRC Code Reviews
- Subcommittee Report on Fire Protection

Sincerely,

/RA/

George E. Apostolakis
Chairman