

December 6, 2002

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

Dear Chairman Meserve:

**SUBJECT: SUMMARY REPORT - 497<sup>th</sup> MEETING OF THE ADVISORY  
COMMITTEE ON REACTOR SAFEGUARDS, NOVEMBER 7-9, 2002  
AND OTHER RELATED ACTIVITIES OF THE COMMITTEE**

During its 497<sup>th</sup> meeting, November 7-9, 2002, the Advisory Committee on Reactor Safeguards (ACRS) discussed several matters and completed the following report. 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 Richard A. Meserve, Chairman, NRC, from George E. Apostolakis, Chairman, ACRS:

- Recommendations Proposed by the Office of Nuclear Regulatory Research for Resolving Generic Safety Issue-189, "Susceptibility of Ice Condenser and Mark III Containments to Early Failure from Hydrogen Combustion During A Severe Accident," dated November 13, 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-1123, "Verification, Validation, Reviews, and Audits for Digital Computer Software Used In Safety Systems of Nuclear Power Plants," dated November 19, 2002

HIGHLIGHTS OF KEY ISSUES

1. Proposed Resolution of Generic Safety Issue (GSI)-189, "Susceptibility of Ice Condenser and Mark III Containments to Early Failure from Hydrogen Combustion During a Severe Accident"

The Committee heard presentations by and held discussions with representatives of the Office of Nuclear Regulatory Research (RES) regarding their proposed recommendations to resolve GSI-189, "Susceptibility of Ice Condenser And Mark III Containments to Early Failure From Hydrogen Combustion During a Severe Accident."

RES completed additional analyses to quantify uncertainties associated with the benefits of providing combustible gas control for station blackout (SBO) events and the costs of implementing and maintaining backup power to pressurized water reactor (PWR) ice condenser and boiling water reactor (BWR) Mark III plants.

For ice condenser plants, the cost benefit analysis showed that there were large uncertainties, particularly in the risk parameters on the benefit side of the equation, and that the results were highly sensitive to plant specific considerations. The study comparison showed that the net benefit calculation could be either negative or positive and also showed a sizable uncertainty for which the benefits exceeded the costs. As a result, RES recommended further action by the Office of Nuclear Reactor Regulation (NRR) on the generic safety issue for ice condenser plants.

RES also reevaluated the effect air return fans have on ice condenser containment performance. The study found that more ice melted than in the no-fan case, showing that the ice chest melt-out would be sooner when a fan is activated. For postulated core melt events, it would be beneficial to have the ice maintained as long as possible

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in the ice chest as a more effective heat sink and for fission product aerosol scrubbing. RES concluded that air return fans were not needed to avoid deflagration or detonation, and that the igniters alone would be sufficient.

For Mark III containments, the benefits of providing combustible gas control for SBO events at Mark III plants had similar sensitivities as for the ice condenser plants. However, the uncertainty ranges were much narrower. The justification for further action for Mark IIIs was somewhat marginal. Only when considering the upper bound uncertainties was there the potential for the least expensive mitigative option to be cost-beneficial. RES recommended that because these findings were tenuous, further action be taken for these plants.

### Committee Action

The Committee recommended that features to resolve GSI-189 be incorporated into the appropriate plant-specific severe accident mitigation guidelines for both containment types. It also recommended that staff develop guidance on how uncertainties are to be evaluated and considered in regulatory analysis decisions.

## 2. Early Site Permit Process

The Committee heard presentations by and held discussions with representatives of the NRC staff and Nuclear Energy Institute (NEI) regarding the early site permit (ESP) process. The NRC staff stated that Subpart A of 10 CFR Part 52 provides the process for an applicant considering construction of a nuclear power plant to resolve site issues separately from application for a combined license (COL). Three utilities have notified the NRC of their intent to submit ESP applications. These are Exelon (Clinton site) in June 2003, Entergy (Grand Gulf site) in June 2003, and Dominion (North Anna site) in September 2003. The NRC staff is developing ESP review standards to support review of these and any other ESP applications.

NEI representatives stated that 10 CFR 52.17(a)(2) requires an environmental report that focuses on the effects of construction and operation of a reactor, or reactors, which have characteristics that fall within the postulated site parameters. ESP applicants are working together via an NEI task force to define plant parameters envelope (PPE) approach. The PPE is a set of postulated design parameters that bound the characteristics of a reactor that might later be deployed at a site. The PPE would be submitted as part of an application for an ESP. The PPE, together with the description of the site characteristics, allows the NRC staff to evaluate the technical and environmental suitability of the site.

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### Committee Action

The Committee plans to continue its interaction with the NRC staff and industry regarding this matter. The Committee also decided to review the ESP review standard, once it is completed, during future meetings.

#### 3. Peach Bottom License Renewal Application

The Plant License Renewal Subcommittee Chairman briefed the Committee regarding highlights from the staff's Safety Evaluation Report (SER), with open items, of the Exelon Generating Company's license renewal application for Peach Bottom Atomic Power Station Units 2 and 3. The Subcommittee found the staff's SER to be well written, thorough, and complete. The Subcommittee noted that certain non-safety systems, originally not in the scope of license renewal, were added to the scope as a result of Requests for Additional Information (RAI). In order to fully understand which systems are in scope, the Subcommittee had to review the application, SER, RAIs and applicant's response to RAIs. In addition, the Committee expressed interest in resolution of the open item related to intrusion of moisture in moisture resistant cables. Other concerns included the long term integrity of concrete anchor bolts and future commitment tracking. The staff is in the process of developing a document to manage and track these commitments.

### Committee Action

The full Committee agreed with the Subcommittee Chairman's recommendation that no interim letter is needed. The full Committee plans to review the final SER in March 2003 and provide a report to the Commission, summarizing the Committee's views on this matter.

#### 4. Westinghouse AP1000 Design

The Committee heard presentations by and held discussions with representatives of the NRC staff and Westinghouse regarding the AP1000 design features review schedule. The NRC staff stated that in May 2000, Westinghouse requested the NRC to support a 3-phase review for the AP1000 design. The staff completed its Phase 1 review in July 2000.

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In August 2000, Westinghouse requested the NRC to proceed with the phase-2 review to provide the applicant with sufficient pre-application information to determine the technical and economic feasibility of seeking a design certification for the AP1000 (phase-3). Westinghouse requested that during the phase-2 review the NRC address four issues: (1) the applicability of the AP600 test program to the AP1000 design; (2) the applicability of the AP600 analysis codes to the AP1000 design; (3) the acceptability of the AP1000 design acceptance criteria; and (4) the acceptability of certain exemptions for the AP1000 design. Currently, the staff plans to issue a draft safety evaluation report (DSER) in June 2003 and a final safety evaluation report in September 2004.

Westinghouse representatives described the general AP1000 design features and arrangement. The plant's net producible electrical power to the grid is at least 1000Mwe, with a nuclear steam supply system (NSSS) power rating (core plus reactor coolant pump heat) of 3400 Mwt. In March 2002, Westinghouse submitted the AP1000 design control document (DCD). The AP1000 DCD is 80% the same as the approved AP600 DCD. The major AP600 design changes to be incorporated into the AP1000 design include increased core length and number of fuel assemblies, increased size of key NSSS components, increased containment height and design pressure, increased capacity of passive safety system components, and increased turbine island capacity for power rating.

Westinghouse also submitted to the NRC a probabilistic risk assessment (PRA) report regarding the AP1000 design. The PRA has been used extensively in the design and licensing of the AP600 design. Westinghouse representatives stated that since the configuration of the AP1000 reactor and safety systems is the same as the AP600, the AP600 PRA is to be used as the basis of the AP1000 PRA with relevant changes implemented in the model to reflect the AP1000 design changes. The AP1000 PRA addresses shutdown, fire, flooding, and thermal-hydraulic uncertainties.

#### Committee Action

This briefing was for information only. However, the Committee plans to continue its follow-up on the AP1000 design and has scheduled several Subcommittee and full Committee meetings to review certain issues prior to the issuance of the DSER.

#### 5. Risk-Informed Improvements to Standard Technical Specifications

The Committee heard presentations by and held discussions with the staff of the Office of Nuclear Reactor Regulation (NRR) regarding the developments of risk-informed improvements to the standard technical specifications (TS).

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The staff presented the eight initiatives received from the industry for fundamental improvements to the standard TS. They were:

- Initiative 1 - TS Actions - End state modifications
- Initiative 2 - TSTF-358, Missed surveillance requirements (SRs), SR 3.0.3 modification
- Initiative 3 - TSTF-359, Modification of mode restraint requirements of LCO 3.0.4
- Initiative 4 - Risk Informed allowed outage times (AOTs), use of a configuration risk management program
- Initiative 5 - Relocation of non-safety SRs and SR frequency requirements out of the TS
- Initiative 6 - Modification of LCO 3.0.3 Actions and Completion Times
- Initiative 7 - Non-TS support system impact on TS operability determinations
- Initiative 8 - Remove/relocate non-safety and non-risk significant systems from TS that do not meet the 4 criteria of 10 CFR 50.36

Initiative 2 has been approved and is being adopted by plants. The SER for the topical report submitted by the Combustion Engineering Owners Group was also issued for Initiative 1. Work on the other Initiatives is in various stages of development and completion.

#### Committee Action

This was an information briefing and no Committee action was taken. The staff will brief the Committee in the future regarding the additional work.

#### 6. Report Regarding Recent Operating Events

The Committee, in its efforts to continue awareness of recent operating events, discussed the significance determination process (SDP) related to the auxiliary

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feedwater system problem at Point Beach and fires and scrams at various other plants. Also discussed were a shutdown due to primary to secondary leakage at Comanche Peak 1, a reactor coolant system leak at Arkansas Nuclear (ANO 1), foreign material in an auxiliary feedwater (AFW) pump at Callaway, an AFW system problem at Point Beach 1 & 2, an offgas explosion at Oyster Creek, and vessel head penetration issues at Oconee, North Anna 2, and ANO 1.

#### 7. Organizational and Personnel Matters

The Committee discussed organizational and personnel matters as well as potential improvements to internal ACRS policies and procedures.

NOTE: This session was closed pursuant to 5 U.S.C. 552b(c)(2) and (6) to discuss organizational and personnel matters that relate solely to internal personnel rules and practices of ACRS, and information the release of which would constitute a clearly unwarranted invasion of personal privacy.

#### 8. Safeguards and Security Activities

The Subcommittee Chairman gave a report regarding matters discussed at the October 31, 2002 meeting of the ACRS Subcommittee on Safeguards and Security.

NOTE: This session was closed pursuant to 5 U.S.C. 552b(c)(1) to protect national security information.

### RECONCILIATION OF ACRS COMMENTS AND RECOMMENDATIONS

- The Committee considered the response from the EDO, dated October 29, 2002, to comments and recommendations included in an ACRS report dated October 1, 2002, concerning draft Regulatory Guide DG-1120 and draft Standard Review Plan Section 15.0.2 concerning NRC reviews of transient and accident analysis methods.

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

### OTHER RELATED ACTIVITIES OF THE COMMITTEE

During the period from October 10, 2002 through November 6, 2002, the following Subcommittee meetings were held:

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- Safeguards and Security - October 31, 2002

The Subcommittee held a closed meeting to discuss the NRC's ongoing work on the evaluation of NRC-licensed facilities for safeguards and security vulnerabilities.

- Reliability and Probabilistic Risk Assessment/Plant Operations - November 1, 2002

The joint Subcommittees were briefed by the staff on progress related to two risk-informed regulatory programs under the scope of the Reactor Oversight Process, namely: (a) efforts to develop risk-informed improvements to the technical specifications, and (b) progress related to the Industry Trends Program index for initiating events.

- Thermal-Hydraulic Phenomena - November 5, 2002

The Subcommittee discussed the results of additional analyses to quantify uncertainties to support the NRC Office of Nuclear Regulatory Research's proposed recommendation to resolve GSI-189, "Susceptibility of Ice Condenser and Mark III Containments to Early Failure from Hydrogen Combustion During a Severe Accident."

- Safety Research Program - November 6, 2002

The Subcommittee reviewed the NRC safety research program and prepared a draft of the ACRS annual research report to the Commission.

- Planning and Procedures - November 6, 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.

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

- The Committee decided that it will review the proposed draft version of Regulatory Guide DG-1107, "Water Sources for Long-Term Recirculation Cooling Following a Loss-of-Coolant Accident," in conjunction with the proposed draft generic letter pertaining to PWR containment sump performance. A Subcommittee meeting will be scheduled in January 2003 with Committee action expected during its February meeting.

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- The Committee plans to review the draft final version of DG-1123, "Verification, Validation, Reviews, and Audits for Digital Computer Software used in Safety Systems of Nuclear Power Plants," after reconciliation of public comments.
- The Committee plans to review the AP1000 design features thermal-hydraulic codes, AP1000 PRA, and related matters during future Subcommittee and full Committee meetings prior to the staff's issuance of the DSER.
- The Committee plans to complete its review of the draft final SER associated with the license renewal application for Peach Bottom Atomic Power Station, Units 2 and 3 during its March 6-8, 2003 meeting, subject to the timely availability of the draft final SER.
- The Committee plans to review the Early Site Permit review standard when available.
- The staff agreed to brief the Committee on further developments associated with risk-informed improvements to Standard Technical Specifications during future meetings.

#### PROPOSED SCHEDULE FOR THE 498<sup>th</sup> ACRS MEETING

The Committee agreed to consider the following topics during the 498<sup>th</sup> ACRS meeting, December 5-7, 2002:

- Davis-Besse Lessons Learned Task Force Report and Status of NRC Oversight (0350) Panel's Investigation of the Davis-Besse Event
- Framatome ANP, INC., S-RELAP5 Realistic Large-Break LOCA Code
- Meeting with Mr. Laurence Williams, NII, United Kingdom (Closed)
- North Anna and Surry License Renewal Application
- Status of the Development of the Review Standard for Power Upgrades
- Safeguards and Security Activities
- Proposed Options for Resolving Policy Issues for Future Non-Light Water Reactors
- Draft Final ANS External Events Methodology Standard

Sincerely,

**/RA/**

George E. Apostolakis  
Chairman