



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
WASHINGTON, D.C. 20555-0001

April 6, 2001

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

SUBJECT: SUMMARY REPORT - 480TH MEETING OF THE ADVISORY  
COMMITTEE ON REACTOR SAFEGUARDS, MARCH 1-3, 2001  
AND OTHER RELATED ACTIVITIES OF THE COMMITTEE

Dear Chairman Meserve:

During its 480th meeting, March 1-3, 2001, the Advisory Committee on Reactor Safeguards (ACRS) discussed several matters and completed the following letters. In addition, the Committee authorized Dr. John T. Larkins, Executive Director, ACRS, to transmit the memorandum noted below:

LETTERS

- Draft Report, "Regulatory Effectiveness of the Anticipated Transient Without Scram Rule" (Letter to William D. Travers, Executive Director for Operations, NRC, from George E. Apostolakis, Chairman, ACRS, dated March 8, 2001)
- Electric Power Research Institute RETRAN-3D Thermal-Hydraulic Transient Analysis Code (Letter to William D. Travers, Executive Director for Operations, NRC, from George E. Apostolakis, Chairman, ACRS, dated March 15, 2001)

MEMORANDUM

- Proposed Final Regulatory Guide 1.XXX, "Fire Protection for Operating Nuclear Power Plants" (formerly DG-1097) (Letter to William D. Travers, Executive Director for Operations, NRC, from John T. Larkins, Executive Director, ACRS, dated March 7, 2001)

HIGHLIGHTS OF KEY ISSUES CONSIDERED BY THE COMMITTEE

1. RETRAN-3D Thermal-Hydraulic Transient Analysis Code

The Committee heard a report from Dr. Graham B. Wallis, Chairman, Thermal-Hydraulic Phenomena Subcommittee, regarding the status of the Subcommittee's

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review of the Electric Power Research Institute (EPRI) RETRAN-3D thermal-hydraulic transient analysis code. The T/H Phenomena Subcommittee most recently discussed this matter with representatives of EPRI and the NRC staff during a meeting held on February 20, 2001. During this meeting, EPRI agreed to reconsider the justifications of the momentum equations used in RETRAN as well as the example problems illustrating their use for modeling specific components. The Office of Nuclear Reactor Regulation (NRR) issued a safety evaluation report (SER) on use of RETRAN-3D in December 2000.

#### Committee Action

The Committee issued a letter to the EDO, dated March 15, 2001, that included two attachments detailing the major concerns identified by the Thermal-Hydraulic Phenomena Subcommittee regarding use of the momentum equations in RETRAN.

#### 2. Interim Review of the License Renewal Application for Arkansas Nuclear One (ANO) Unit 1

Dr. Bonaca, Chairman of the Plant License Renewal Subcommittee provided a report to the Committee regarding the Subcommittee's review of the ANO Unit 1 license renewal application and the associated NRC staff's SER during a meeting on February 22, 2001. He stated that the scoping and screening methodology used by the applicant to identify structures, systems, and components subject to an aging management review appears well structured and comprehensive. Notwithstanding the remaining open items, the applicant has adequately demonstrated that existing programs and proposed new programs will adequately manage aging effects during the period of extended operation.

#### Committee Action

The Committee decided not to write an interim letter. The Committee plans to complete its review of the ANO Unit 1 license renewal application in September 2001.

#### 3. South Texas Project Exemption Request

Mr. John D. Sieber, Chairman of the ACRS Subcommittee on Plant Operations, made a presentation to the Committee relating to the South Texas Project (STP) exemption request. The presentation was a brief synopsis of a subcommittee meeting held on February 21, 2001 to discuss categorization of structures, systems, and components (SSCs) at STP. The STP and NRC presentations on special treatment requirements

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and the Draft Final Safety Evaluation relating to the exemption request will be heard at future meetings.

Categorization of SSCs is based on the use of plant specific PRAs and on an Expert Panel. The PRA uses the Fussell-Vestelty (FV) importance and the risk achievement worth (RAW). The Expert Panel relies upon five critical questions to which a weighting factor is applied. Components are then ranked according to their risk significance.

At the date of the presentation, there were 12 open items relating to the exemption request yet to be resolved.

#### Committee Action

This was an information briefing and no committee action was required.

#### 4. Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants

The Committee heard presentations by and held discussions with representatives of the NRC staff concerning the staff's findings and recommendations of the final report on spent fuel pool (SFP) accident risk at decommissioning nuclear power plants.

The staff concluded that it is not feasible to define a generic decay heat level and decay time beyond which a zirconium fire is not physically possible. This conclusion is significant because the elimination of a zirconium fire was the established basis for exemptions from insurance requirements.

The staff plans to provide the Commission with a policy Option paper by May 31, 2001, to address this issue. Regulatory actions which could be affected by policy decisions will be held until Commission direction is received. The staff, however, believes that there is no immediate safety concern and there is no need for immediate regulatory action.

The Nuclear Energy Institute (NEI) representatives briefed the Committee regarding the likelihood of SFP failure given a cask drop, and the fission product releases if the SFP is postulated to be rapidly drained.

#### Committee Action

The Committee will take this matter under advisement, and plans to meet with the NRC staff during the May 10-12, 2001 ACRS meeting to discuss the proposed policy options

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and related matters.

5. Management Directive 6.4 Associated with the Revised Generic Issue Process

The Committee heard presentations by and held discussions with the representatives of the NRC staff regarding Management Directive (MD) 6.4 and the results of the case study performed to determine the effectiveness of using the MD to implement the revised Generic Issue process. The staff presented the lessons learned during the trial use of MD 6.4 in addressing candidate reactor materials generic issues. The staff made several recommendations based on the trial use of draft MD 6.4, including the following:

- Clarify the requirements of the "Initial Screening Stage" to limit the scope of the panel
- Combine the Technical Screening and Technical Assessment Stages to provide a better technical basis for decision making or combine the initial screening and technical stages to simplify the process
- Provide clearer guidance on the Distinction between "Adequate Protection," and "Substantial Safety Enhancement"

The staff plans to issue the final version of MD 6.4 in June of 2001.

Committee Action

The Committee plans to issue a letter on this matter during the April ACRS meeting.

6. Operating Event at V.C. Summer Nuclear Station

The Committee heard presentations by and held discussions with representatives of the NRC staff and the Electric Power Research Institute (EPRI) Materials Reliability Project (MRP) concerning the technical issues associated with Alloy 82/182 weld cracking and associated reactor coolant system pressure boundary degradation identified at the V.C. Summer Nuclear Power Plant on October 7, 2000. The Committee discussed licensee actions related to the three-inch axial flaw identified on a weld between the reactor vessel nozzle and the "A" hot leg pipe. The weld location was about three feet from the vessel in a section of "spool-piece" piping. The licensee removed the weld defect and associated section of spool piece piping for failure analysis. The Committee discussed the root causes of the "A" weld defect which involved primary water stress corrosion

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cracking (PWSCC) as well as problems in the original manufacture of the weld. The Committee also discussed the licensee's examination and identification of PWSCC-related weld defects on the "B" and "C" loop piping. The Committee considered the interim inspection guidance and long-term assessment of Alloy 82/182 proposed by the MRP for pressurized water reactors (PWRs). PWSCC was previously thought to be an unlikely phenomena in PWRs.

The Committee discussed the preliminary findings and conclusions of the NRC Special Inspection Team (SIT) that held its exit meeting at the site on February 15, 2001. They considered the guidance in NRC Information Notice (IN) 2000-17 and the associated IN Supplement issued on October 18, and on November 16, 2000, respectively, to inform licensees of the weld cracking phenomena observed at V.C. Summer. The Committee extensively discussed the issues in the staff safety evaluation report issued on February 20, 2001, allowing restart of the Summer unit for one operating cycle.

#### Committee Action

This briefing was for information only. No Committee action was required.

#### 7. NRC Safety Research Program

The Committee discussed its 2001 final draft report to the Commission regarding the NRC safety research programs.

#### Committee Action

The Committee finalized its final draft report on March 16, 2001.

#### RECONCILIATION OF ACRS COMMENTS AND RECOMMENDATIONS

There were no reconciliation items discussed during this meeting.

#### OTHER RELATED ACTIVITIES OF THE COMMITTEE

During the period from February 1 through February 28, 2001, the following Subcommittee meetings were held:

- Thermal-Hydraulic Phenomena - February 20, 2001

The Subcommittee continued its review of the EPRI RETRAN-3D thermal-

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hydraulic transient analysis code, and, received information pertaining to NRR's schedule for review of vendor/applicant thermal-hydraulic codes.

- Joint Meeting on Plant Operations and on Reliability and Probabilistic Risk Assessment - February 21, 2001

The Subcommittee discussed the South Texas Project Nuclear Operating Company's exemption request to exclude certain components from the scope of special treatment requirements in 10 CFR Parts 21, 50, and 100.

- Planning and Procedures - February 28, 2001

The Planning and Procedures 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 FOLLOW-UP MATTERS FOR THE EXECUTIVE DIRECTOR FOR OPERATIONS

- The Committee plans to discuss the special treatment requirements associated with the STP exemption request during the April ACRS meeting and the NRC staff's draft final SER on this matter at the May 2001 ACRS meeting.
- The Committee plans to continue its review of issues related to primary water stress corrosion cracking issue observed at V.C. Summer on October 7, 2000, and requests to be kept informed as more is learned about Alloy 82/182 performance and as NRC and industry actions are completed.
- The ACRS Subcommittee on Thermal-Hydraulic Phenomena plans to hold a meeting in June 2001 to discuss with the NRC staff issues pertaining to significant core power uprates. This meeting will serve as a prelude to the Committee's review of license amendment requests for core power uprates expected to commence this Fall.
- The Committee plans to complete its review of the Management Directive (MD) 6.4 associated with the revised generic issues process after receiving the proposed final MD 6.4.

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PROPOSED SCHEDULE FOR THE 481ST ACRS MEETING

The Committee agreed to consider the following topics during the 481st ACRS Meeting:

Interim Review of the License Renewal Application for Edwin I. Hatch Nuclear Plant Units 1 and 2

Briefing by and discussions with representatives of the NRC staff and Southern Nuclear Operating Company regarding the license renewal application for Hatch Units 1 and 2, associated staff's Safety Evaluation Report (SER), selected Boiling Water Reactor Vessel and Internals Project (BWRVIP) reports and the related staff's safety evaluations.

Proposed Final License Renewal Guidance Documents

Briefing by and discussions with representatives of the NRC staff regarding the proposed final Regulatory Guide 1.188 and Standard Review Plan associated with license renewal, Generic Aging Lessons Learned (GALL) report, and Nuclear Energy Institute (NEI) 95-10, "Industry Guideline for Implementing the Requirements of 10 CFR Part 54 - The License Renewal Rule."

Safety Issues Associated with the Use of Mixed Oxide (MOX) and High Burnup Fuels

Briefing by and discussions with representatives of the NRC staff and the industry regarding safety issues associated with the use of MOX and high burnup fuels in commercial light water reactors.

Thermal-Hydraulic Issues Associated with the AP1000 Passive Plant Design

Briefing by and discussions with representatives of the NRC staff and the Westinghouse Electric Corporation regarding the thermal-hydraulic issues associated with the AP1000 design.

[Note: A portion of this session may be closed to discuss Westinghouse proprietary information applicable to this matter.]

Draft Final Safety Evaluation Report for the South Texas Project Nuclear Operating Company (STPNOC) Exemption Request

Briefing by and discussions with representatives of the NRC staff and STPNOC regarding the staff's draft Final Safety Evaluation Report for the STPNOC exemption request to exclude certain components from the scope of special treatment requirements required by NRC regulations.

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Closure of Generic Safety Issue (GSI)-170, "Reactivity Transients and Fuel Damage Criteria for High Burnup Fuel"

Discussion with representatives of the NRC staff, as needed, regarding the closure of GSI-170.

Subcommittee Report

Report by the Chairman of the Materials and Metallurgy Subcommittee regarding risk-informing 10 CFR 50.46, which was discussed during a joint meeting of the ACRS Subcommittees on Materials and Metallurgy, Thermal-Hydraulic Phenomena, and Reliability and Probabilistic Risk Assessment on March 16, 2001.

Sincerely,

A handwritten signature in black ink, appearing to read "George E. Apostolakis". The signature is stylized and written in a cursive-like font.

George E. Apostolakis  
Chairman



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## LETTERS

- Draft Report, "Regulatory Effectiveness of the Anticipated Transient Without Scram Rule" (Letter to William D. Travers, Executive Director for Operations, NRC, from George E. Apostolakis, Chairman, ACRS, dated March 8, 2001)
- Electric Power Research Institute RETRAN-3D Thermal-Hydraulic Transient Analysis Code (Letter to William D. Travers, Executive Director for Operations, NRC, from George E. Apostolakis, Chairman, ACRS, dated March 15, 2001)

## MEMORANDUM

- Proposed Final Regulatory Guide 1.XXX, "Fire Protection for Operating Nuclear Power Plants" (formerly DG-1097) (Letter to William D. Travers, Executive Director for Operations, NRC, from John T. Larkins, Executive Director, ACRS, dated March 7, 2001)

## APPENDICES

- I. *Federal Register Notice*
- II. Meeting Schedule and Outline
- III. Attendees
- IV. Future Agenda and Subcommittee Activities
- V. List of Documents Provided to the Committee

MINUTES OF THE 480TH MEETING OF THE  
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
MARCH 1-3, 2001  
ROCKVILLE, MARYLAND

The 480th meeting of the Advisory Committee on Reactor Safeguards (ACRS) was held in Conference Room 2B3, Two White Flint North Building, Rockville, Maryland, on March 1-3, 2001. Notice of this meeting was published in the *Federal Register* on February 16, 2001 (66 FR 10761) (Appendix I). The purpose of this meeting was to discuss and take appropriate action on the items listed in the meeting schedule and outline (Appendix II). The meeting was open to public attendance. There were no written statements or requests for time to make oral statements from members of the public regarding the meeting.

A transcript of selected portions of the meeting was kept and is available in the NRC Public Document Room at the One White Flint North Building, Mail Stop 1F-15, Rockville, MD, 20852-2738. [Copies of the transcript are available for purchase from Neal R. Gross and Co., Inc., 1323 Rhode Island Avenue, NW, Washington, DC 20005-3701, and on the ACRS/ACNW Web page at ([www.NRC.gov/ACRS/ACNW](http://www.NRC.gov/ACRS/ACNW)).]

ATTENDEES

ACRS Members: ACRS Members: Dr. George Apostolakis (Chairman), Dr. Mario V. Bonaca (Vice Chairman), Dr. Thomas S. Kress, Mr. Graham M. Leitch, Dr. Dana A. Powers, Dr. William J. Shack, Mr. John D. Sieber, Dr. Robert E. Uhrig, and Dr. Graham B. Wallis. For a list of other attendees, see Appendix III.

I. Chairman's Report (Open)

[Note: Dr. John T. Larkins was the Designated Federal Official for this portion of the meeting.]

Dr. George E. Apostolakis, Committee Chairman, convened the meeting at 8:30 a.m. and reviewed the schedule for the meeting. He summarized the agenda topics for this meeting and discussed the administrative items for consideration by the full Committee.

II. RETRAN-3D Thermal-Hydraulic Transient Analysis Code (Open)

[Note: Mr. Paul A. Boehnert was the Designated Federal Official for this portion of the meeting.]

Dr. G. Wallis, Chairman, Thermal-Hydraulic Phenomena Subcommittee, provided a report on the status of the Subcommittee's review of the EPRI RETRAN-3D thermal-hydraulic transient analysis code. He stated that the Subcommittee met on February 20, 2001 to continue its review of this matter. Key points noted by Dr. Wallis regarding the meeting were:

- Representatives of EPRI, its contractors, and the NRC staff discussed, for the first time, the technical details of RETRAN.
- A representative of the RETRAN modeling group said that they believed the ACRS concerns had been addressed in EPRI's submittals of requests for additional information to the NRC staff, which were submitted last year.
- During detailed discussions of issues related to the modeling of momentum and the application of the code to complex geometry situations, an EPRI contractor admitted that the Committee's technical concerns had merit.
- Mr. J. Haugh, EPRI, subsequently acknowledged that there were problems with the code. He indicated that EPRI would reconsider the justifications of the momentum equations in RETRAN and the example problems illustrating their use for modeling specific components.

During Committee discussion, the following points were noted:

- Dr. Wallis noted that the Subcommittee found it necessary to get involved in the detailed review of the code equations. Dr. Apostolakis said that this is not the job of the ACRS to get involved in such details. He indicated that the Committee may have to advise the Commission on this matter.
- Dr. Apostolakis noted that Dr. Wallis has prepared two documents relating to the problems discovered with the RETRAN code and recommended that the Committee send these documents to the EDO in a transmittal letter.
- Dr. Landry, NRR, agreed with Dr. Wallis's critique of the code. NRR has urged EPRI to provide additional documentation explaining the details of the code and why the code is acceptable. While the staff's SER has been issued, NRR would

- Dr. Landry, NRR, agreed with Dr. Wallis's critique of the code. NRR has urged EPRI to provide additional documentation explaining the details of the code and why the code is acceptable. While the staff's SER has been issued, NRR would issue a supplement or addenda as necessary to address resolution of the issues noted above.
- Dr. Bonaca noted that concerns pertaining to the modeling of momentum date to 1973-74. The RELAP and TRAC codes are not significantly impacted, because the codes were reformulated. He is unsure whether RETRAN is in error here, but he is convinced that the documentation is insupportable.
- Dr. Shack noted that the RETRAN momentum equation would give correct results when applied in a strictly one dimensional fashion. There would be problems, however, if users tried to implement its supposed multidimensional capability.
- NRR said that a major "lesson learned" for this review is that it is necessary to review older versions of new codes, since errors in the older codes are being perpetuated in the newer versions.

#### Committee Action

The Committee issued a letter to the EDO, dated March 15, 2001, that includes two attachments detailing the major concerns identified by the Thermal-Hydraulic Phenomena Subcommittee regarding use of the momentum equations in RETRAN.

#### III. Interim Review of the License Renewal Application for Arkansas Nuclear One (ANO) Unit 1 (Open)

[Note: Mr. Noel F. Dudley was the Designated Federal Official for this portion of the meeting.]

Dr. Mario Bonaca, Chairman of the License Renewal Subcommittee, summarized the February 22, 2001 Subcommittee meeting. He explained that the representatives of the applicant presented the contents of the Arkansas Nuclear One, Unit 1 (ANO-1) license renewal application and the staff presented the contents of its safety evaluation report (SER). He noted that ANO-1 utilized the lessons learned from the license renewal of Oconee, which facilitated the subcommittee's review of ANO-1 aging issues.

Dr. Bonaca stated that the Subcommittee had the following observations:

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- The scoping and screening methodology utilized by the applicant to identify structures and components subject to an aging management review appears well structured and comprehensive.
- The process used by the applicant for identifying aging effects requiring aging management appears comprehensive and effective.
- Structures and components subject to a time limited aging analysis have been adequately addressed by the ANO-1 application. ANO-1 has demonstrated the applicability of the appropriate BAW topical reports and generic resolutions to this plant.
- Notwithstanding the remaining four SER open items, the applicant has adequately demonstrated that these existing programs and proposed new programs will adequately manage aging effects during the period of extended operation.
- The staff has performed an effective review of the ANO-1 application.

Dr. Bonaca stated that during the meeting, subcommittee members raised many questions regarding components not in scope. In all cases, the applicant and the staff showed that the component was actually in scope or provided credible justification for the component not being in scope.

Dr. Bonaca concluded that the staff had performed an effective review of the ANO-1 application and that the subcommittee members agree with the staff findings and with the remaining open items.

#### Committee Action

The Committee decided not to write an interim letter. The Committee plans to complete its review of the ANO Unit 1 license renewal application in September 2001.

#### IV. South Texas Project Exemption Request (Open)

[Mrs. Maggalean W. Weston was the Designated Federal Official for this portion of the meeting.]

Mr. John D. Sieber, Chairman of the ACRS Subcommittee on Plant Operations, made a presentation to the Committee on the South Texas Project (STP) exemption request. The presentation was a brief synopsis of a subcommittee meeting held on February 21,

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2001. The subcommittee meeting only covered categorization of structures, systems, and components (SSCs) at STP. The STP and NRC presentations on special treatment requirements and the Draft Final Safety Evaluation relating to the exemption request will be heard at future meetings.

Mr. Sieber gave a brief description of the plant and listed the number of components at the plant. He stated that the purpose of the STP exemption request is to identify components important to safety and eliminate those not important to safety. Categorization of SSCs is based on the use of plant specific PRAs and on an Expert Panel. The risk significance of a component modeled in the PRA is based on Fussell-Vesseley (FV) importance and the risk achievement worth. The Expert Panel relies upon five critical questions to which a weighting factor is applied. After a final score is determined for each component, the components are ranked according to their risk significance. The STP categorization process results show that the largest number (60 %) of SSCs are non-safety related, non-risk significant.

At the date of the presentation, there were 12 open items yet to be resolved.

#### Committee Action

This was an information briefing and no committee action was required.

#### V. Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants (Open)

[Note: Dr. Medhat El-Zeftawy was the Designated Official for this portion of the meeting.]

The Committee heard presentations by and held discussions with representatives of the NRC staff concerning the staff's findings and recommendations of the final report on spent fuel pool (SFP) accident risk at decommissioning nuclear power plants.

The staff concluded that it is not feasible to define a generic decay heat level and decay time beyond which a zirconium fire is not physically possible. This conclusion is significant because the elimination of a zirconium fire was the established basis for exemptions from insurance requirements.

The staff plans to provide the Commission with a policy Option paper by May 31, 2001, to address this issue. Regulatory actions which could be affected by policy decisions will be held until Commission direction is received. The staff, however, believes that

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there is no immediate safety concern and there is no need for immediate regulatory action.

The Nuclear Energy Institute (NEI) representatives briefed the Committee regarding the likelihood of SFP failure given a cask drop, and the fission product releases if the SFP is postulated to be rapidly drained.

#### Committee Action

The Committee will take this matter under advisement, and plans to meet with the NRC staff during the May 10-12, 2001 ACRS meeting to discuss the proposed policy options and related matters.

#### VI. Management Directive 6.4 Associated with the Revised Generic Issue Process (Open)

[Note: Mr. Amarjit Singh was the Designated Federal Official for this portion of the meeting.]

Dr. Thomas S. Kress, cognizant ACRS member, introduced this topic to the Committee. He noted that the Committee recommended that the staff conduct a pilot study to evaluate the effectiveness of using the Management Directive (MD) 6.4. The staff plans to discuss the results of the case study performed to determine the effectiveness of using the MD to implement the revised generic issue process.

#### NRC Staff Presentation

Mr. Harold J. VanderMolen led the discussions for the staff. Mr. Ronald L. Llyod presented the lessons learned during the trial use of MD 6.4 in addressing candidate reactor materials generic issues. He stated that the staff selected three generic issues each in the areas of reactor and materials to process using draft MD 6.4. In the area of materials all three candidates were dropped following the panel review. One of the reactor issues was dropped after initial screening, because it was determined that the issue would be classified as a compliance issue. The staff recommended the following from trial use of draft MD 6.4.

#### Recommendations:

- Add clarifying information to Candidate Generic Issue Submittal Form to better focus the Generic Issue Review Panel.

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- Clarify the requirements of the “Initial Screening Stage” to limit the scope of the panel.
- Combine the Technical Screening and Technical Assessment Stages to provide a better technical basis for decision making or combine the initial screening and technical stages to simplify the process.
- Provide clearer guidance on the Distinction between “Adequate Protection,” and “Substantial Safety Enhancement.”
- Threshold requirements for processing candidate issues should be clarified for materials issues.

The staff plans to issue the final version of MD 6.4 in June of 2001.

#### Committee Action

The Committee plans to issue a letter to Dr. William D. Travers, Executive Director for Operations, during the April ACRS meeting.

#### VII. Operating Event at V.C. Summer Nuclear Station

[Note: Mr. Michael T. Markley was the Designated Federal Official for this portion of the meeting.]

Dr. William Shack, Chairman of the ACRS Subcommittee on Materials and Metallurgy introduced the topic to the Committee. He stated that the purpose of this meeting was to review technical issues associated with Alloy 82/182 weld cracking and associated reactor coolant system pressure boundary degradation identified at the V.C. Summer Nuclear Power Plant on October 7, 2000. He noted that the licensee initially concluded that the three-inch axial flaw on a weld between the reactor vessel nozzle and the “A” hot leg pipe was caused by difficulties in the original manufacture of the weld during plant construction. Dr. Shack stated that the more recent failure analysis determined that the root cause was primary water stress corrosion cracking (PWSCC) and noted that PWSCC was previously thought to be an unlikely phenomena in PWRs. Dr. Shack introduced the staff’s presenters including the NRC’s contractor, Dr. Steven Doctor of Pacific Northwest Laboratories, who participated via teleconference.

### NRC Staff Presentation

Ms. Karen Cotton, NRR licensing project manager, introduced the NRC staff participants and provided a brief overview and history of the weld cracking issue at V.C. Summer. Mr. Gene Carpenter, Office of Nuclear Reactor Regulation, Division of Engineering, discussed the staff's SER and generic actions. Mr. Billy Crowley, NRC Region II inspection team leader, discussed the preliminary findings of the Special Inspection Team (SIT). Significant points made during the presentation include:

- The licensee removed the weld defect and associated section of spool piece piping from the "A" loop for failure analysis. The licensee examined "B" and "C" loop piping and identified weld defect indications that also appear to have been caused by PWSCC.
- The staff issued NRC Information Notice (IN) 2000-17 and the associated IN Supplement issued on October 18 and on November 16, 2000, respectively, to inform licensees of the weld cracking phenomena observed at V.C. Summer.
- The staff performed independent evaluation of the licensee's assessment particularly with regard to "B" and "C" loop piping welds. The SIT held its exit meeting at the site on February 15, 2001. The staff issued a SER on February 20, 2001, allowing restart of the V.C. Summer unit for one operating cycle.
- The staff is pursuing confirmatory research on the adequacy of examination techniques, bounding analysis and modeling, repair and mitigation methods, and crack growth rate performance. The staff is also reviewing similar cracking in primary piping welds at foreign reactors (e.g., Ringhals in Sweden).

### Industry Presentation

Mr. Larry Matthews, Southern Nuclear Operating Company, provided a brief presentation on the actions of EPRI Materials Reliability Program (MRP) Alloy 600 Issue Task Group (ITG) to address the V.C. Summer issues on an industry-wide basis. Significant points made during the presentation include:

- MRP A600 ITG has taken the lead for developing the industry plan. The ITG approach is organized into three focus-group committees:
  - Assessment Committee: short-term action will demonstrate continued operation with Alloy 82/182 welds is acceptable (i.e., demonstrate that most weld defects are axial or axial-radial) and longer-term assessment of

Alloy 82/182 in PWR primary systems (i.e., demonstrate large tolerances for axial and circumferential flaws).

- Inspection Committee: short-term action is to develop a consistent inspection and walkdown approach for use by licensees during upcoming outages and longer-term action is to evaluate the need for alternate/new techniques, provide training and expert assistance to licensees, and evaluate the impact on risk-informed ISI programs.
- Repair/Mitigation Committee: short-term action is to prioritize the repair/mitigation program using risk insights (i.e., likelihood and consequences) and longer-term action includes continued evaluation of Alloy 82/182 welds and Alloy 600 applications.
- Alloy 82/182 is not a near-term safety issue. The NRC has approved leak-before-break (LBB) for PWRs and the phenomena observed at V.C. Summer, albeit new, is consistent with LBB behavior.

Dr. Shack questioned when the last time the vessel nozzle welds were inspected. The staff informed the Committee that the inspection was conducted during the 10-year inservice inspection in 1993.

Dr. Powers questioned technical basis for allowing the licensee to restart for an additional operating cycle. The staff stated that the "A" hot leg weld was replaced with a new spoolpiece and new welds which were properly examined and verified. The staff also stated that the projected crack growth rate for "B" and "C" piping was sufficiently bounded. Dr. Shack noted that the chemistry of PWSCC is well understood.

Dr. Wallis questioned what supplemental leak detection would be performed during the operating cycle. Mr. Leitch questioned what was meant by enhanced leak detection. The MRP representative stated that walkdowns would be performed prior to restart and during unplanned shutdowns. The MRP representative also stated that the plant staff performs identified and unidentified leak detection measures on a daily basis but acknowledged that a leak such as that identified on the "A" loop piping is difficult to identify because it is secured by mirror-insulation and that any leak would normally flash to steam and condense to boric acid (i.e., there would likely be no observable dripping of primary coolant). The staff stated that the licensee plans to do more frequent inventory balance calculations and noble gas sampling. The staff stated that the licensee also plans to add some thermocouples in the area of the vessel safe-ends to identify thermal changes that might be indicative of a small leak.

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Mr. Sieber questioned whether the licensee was pursuing any operating measures to mitigate crack growth rate (i.e., reduce operating hot leg temperatures by 10 degrees Fahrenheit). The MRP representative stated that it is unlikely that the licensee would consider such a measure, that substantially reduces unit efficiency and production revenue, unless the crack growth rate exceeded projections.

#### Committee Action

This briefing was for information only. No Committee action was required. However, the Committee plans to continue its review of issues related to primary water stress corrosion cracking and requests to be kept informed as more is learned about Alloy 82/182 performance and as NRC and industry actions are completed.

#### VIII. NRC Safety Research Program (Open)

[Note: Dr. Medhat El-Zeftawy was the Designated Federal Official for this portion of the meeting.]

The Committee discussed its 2001 final draft report to the Commission regarding the NRC safety research programs.

#### Committee Action

The Committee finalized its final draft report on March 16, 2001.

#### IX. Executive Session (Open)

[Note: Dr. John T. Larkins was the Designated Federal Official for this portion of the meeting.]

##### A. Reconciliation of ACRS Comments and Recommendations

[Note: Mr. Sam Duraiswamy was the Designated Federal Official for this portion of the meeting.]

There were no reconciliation items discussed during this meeting.

B. Report on the Meeting of the Planning and Procedures Subcommittee  
(Open)

The Committee heard a report from Dr. Apostolakis and the Executive Director, ACRS, on the Planning and Procedures Subcommittee meeting held on February 28, 2001. The following items were discussed:

— Review of the Member Assignments and Priorities for ACRS Reports and Letters for the March ACRS Meeting

Member assignments and priorities for ACRS reports and letters for the March ACRS meeting were discussed. Reports and letters that would benefit from additional consideration at a future ACRS meeting were also discussed.

— Anticipated Workload for ACRS Members

The anticipated workload of the ACRS members through May 2001 was discussed. The objectives were:

- Review the reasons for the scheduling of each activity and the expected work product and to make changes, as appropriate.
- Manage the members' workload for these meetings.
- Plan and schedule items for ACRS discussion of topical and emerging issues.

During this session, the Subcommittee discussed and developed recommendations on the items that require Committee decision.

— ACRS Action Plan for CY 2001

During the December 2000 ACRS meeting, the Committee approved the ACRS Action Plan for CY 2001. The Action Plan has been sent to all Commissioners. We expect to receive comments from the NRC. After reconciliation of the comments, the Action Plan will be published.

— Assignments for Reviewing the Safety Evaluation Report (SER) Associated with Edwin I. Hatch Units 1 and 2 License Renewal Application

The ACRS is scheduled to review the Hatch Units 1 and 2 license renewal application and the associated staff SER during the April 2001 ACRS meeting. Since this is the first BWR plant license renewal application, the Committee will consider issuing an interim report at the April meeting. The ACRS Subcommittee on Plant License Renewal held a meeting on March 28, 2001 to review this matter. Proposed assignments for reviewing various chapters of the staff SER were discussed. Copies of the staff SER were sent to the members.

— Assignments for Reviewing Selected Reports of the Boiling Water Reactor Vessel and Internals Project (BWRVIP) Reports Associated with the Hatch License Renewal, and License Renewal Guidance Documents

The Plant License Renewal Subcommittee will review selected BWRVIP reports pertinent to the Hatch license renewal application and the proposed final revisions to license renewal guidance documents (SRP, GALL, Regulatory Guide, and NEI 95-10). A list of BWRVIP documents for review along with the Hatch license renewal application and the ACRS member assignments for reviewing these documents were discussed. The selected BWRVIP documents, associated staff safety evaluation, and the proposed final license renewal guidance documents were sent to the members.

— Commitments Resulting From the ACRS Retreat

The Committee held a retreat in January 2001 to discuss various matters, including ACRS self assessment, stakeholders' comments on ACRS performance, selected key ACRS products, and other issues pertinent to ACRS operation. During its January 31, 2001 meeting, the subcommittee discussed returning to a mode of operation that will afford more in-depth review of issues when warranted and recommended several actions. The subcommittee discussed other commitments and proposed appropriate actions. The commitments will be included (in part) in the ACRS/ACNW Self Assessment paper to the Commission.

— Commission Meeting on the NRC Safety Research Program

The Commission will hold a meeting on May 10, 2001 to discuss the NRC Safety Research Program with two Panels. The first Panel consists of former Commissioner Rogers and the ACRS members who have the lead responsibility

in preparing CY 2001 report to the Commission on the NRC Safety Research Program. The second Panel consists of representatives of the Office of Nuclear Regulatory Research.

— ACRS Meeting with the NRC Commissioners

The ACRS is tentatively scheduled to meet with the NRC Commissioners on May 11, 2001 to discuss items of mutual interest. Topics proposed by the Planning and Procedures Subcommittee are as follows:

- Proposed framework for risk-informed changes to 10 CFR Part 50
- South Texas Project exemption request
- Thermal-hydraulic codes
- Status report on ACRS review of license renewal applications and related matters

— New Nuclear Plant Construction and the Pebble Bed Modular (PBM) Reactor Design

The ACRS Subcommittee on Advanced Reactor Designs is scheduled to hold a meeting on June 4-5, 2001 to discuss the status of NRC and industry activities associated with future reactor designs such as PBM reactor design and the International Reactor Innovative and Secure (IRIS) design.

In a Staff Requirements Memorandum (SRM) dated February 13, 2001, the Commission instructed the staff to assess its technical, licensing, and inspection capabilities and identify enhancements, if any, that would be necessary to ensure the agency can effectively carry out its responsibilities associated with an early site permit application, license application, and the construction of a new nuclear power plant. The Commission asked the staff to submit an integrated plan for advanced reactor activities by April 30, 2001.

Also in the SRM, the Commission directed the staff to incorporate into the staff planning the need for early interactions with the ACRS so as to ensure that important technical and regulatory issues receive appropriate consideration by the ACRS.

— Member Submission of Travel Voucher and Compensation Claim Information

Members are reminded to submit their travel and compensation claims timely. NRC travel rules direct travelers to submit travel vouchers within five working

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days after completing a trip. While we recognize that this deadline is not normally practical for members, travel voucher information should be submitted no later than 2 weeks after completion of a trip. Compensation claims should be submitted monthly, if possible. Timely submission of travel information and compensation claims will assist us in keeping abreast of Committee expenditures and in the tracking of time expended for work on specific topics.

— Research Report

Dr. Powers provided a draft copy of the proposed ACRS report on research for Committee review and comment. Dr. Powers has proposed recommendations in the Materials and Metallurgy area which differ from those of the cognizant Subcommittee Chairman. It is suggested that the Planning and Procedures Subcommittee propose a course of action to reconcile this difference.

C. Future Meeting Agenda

Appendix IV summarizes the proposed items endorsed by the Committee for the 481st ACRS Meeting, April 5-7, 2001.

The 480th ACRS meeting was adjourned at 12:00 p.m. on March 3, 2001.

Dated: February 12, 2001.

Andrew Bates,  
Advisory Committee Management Officer.  
[FR Doc. 01-3947 Filed 2-15-01; 8:45 am]  
BILLING CODE 7890-01-P

## NUCLEAR REGULATORY COMMISSION

### \* Advisory Committee on Reactor Safeguards; Meeting Notice

In accordance with the purposes of sections 29 and 182b. of the Atomic Energy Act (42 U.S.C. 2039, 2232b), the Advisory Committee on Reactor Safeguards will hold a meeting on March 1-3, 2001, in Conference Room T-2B3, 11545 Rockville Pike, Rockville, Maryland. The date of this meeting was previously published in the *Federal Register* on Friday, November 17, 2000 (65 FR 69578).

#### Thursday, March 1, 2001

8:30 a.m.-8:35 a.m.: *Opening Remarks by the ACRS Chairman* (Open)—The ACRS Chairman will make opening remarks regarding the conduct of the meeting.

8:35 a.m.-10 a.m.: *RETRAN-3D Thermal-Hydraulic Transient Analysis Code* (Open/Closed)—The Committee will hear presentations by and hold discussions with representatives of the Electric Power Research Institute (EPRI) and the NRC staff regarding the EPRI RETRAN-3D thermal-hydraulic transient analysis code, associated staff's Safety Evaluation Report, and resolution of issues previously raised by the ACRS.

Note: A portion of this session may be closed to discuss EPRI proprietary information.

10:15 a.m.-11:45 a.m.: *Interim Review of the License Renewal Application for Arkansas Nuclear One, Unit 1* (Open)—The Committee will hear presentations by and hold discussions with representatives of the Entergy Operations, Inc., and the NRC staff regarding the license renewal application for Arkansas Nuclear One, Unit 1 and the associated staff's Safety Evaluation Report.

12:45 p.m.-2:15 p.m.: *Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants* (Open)—The Committee will hear presentations by and hold discussions with representatives of the NRC staff regarding significant findings and recommendations of the final report on spent fuel pool accident risk at decommissioning plants, new developments, status of developing proposed options, and related matters.

2:30 p.m.-3:45 p.m.: *Management Directive 6.4 Associated with the Revised Generic Issue Process* (Open)—The Committee will hear presentations by and hold discussions with representatives of the NRC staff regarding Management

Directive 6.4 related to the Revised Generic Issue process, results of the case study performed to determine the effectiveness of using the Management Directive to implement the revised Generic Issue process, and related matters.

4 p.m.-7 p.m.: *Discussion of Proposed ACRS Reports* (Open)—The Committee will discuss proposed ACRS reports on the NRC Safety Research Program and on Regulatory Effectiveness of the Anticipated Transients Without Scram (ATWS) Rule.

#### Friday, March 2, 2001

8:30 a.m.-8:35 a.m.: *Opening Remarks by the ACRS Chairman* (Open)—The ACRS Chairman will make opening remarks regarding the conduct of the meeting.

8:35 a.m.-9:45 a.m.: *British Nuclear Powered Submarine Incident* (Closed)—The Committee will hear presentations by and hold discussions with representatives of the DOD/DOE Naval Reactors regarding the recent incident on the British Nuclear Powered Submarine (HMS TIRELESS).

Note: This session will be closed to discuss information classified "Confidential—Restricted Data—Government Sensitive".

10 a.m.-11:30 a.m.: *Operating Event at V.C. Summer Nuclear Station* (Open)—The Committee will hear presentations by and hold discussions with representatives of the NRC staff regarding the October 7, 2000 incident at the V.C. Summer Nuclear Station, involving degraded reactor coolant system pressure boundary, findings and conclusions resulting from the staff's investigation of the incident, and corrective actions taken by the licensee and industry organizations.

11:30 a.m.-11:45 a.m.: *Trip Report* (Open)—The Committee will hear a trip report on the Nuclear Energy Institute (NEI) Fire Protection forum held in San Diego on February 5-7, 2001.

1 p.m.-1:30 p.m.: *Subcommittee Report* (Open)—Report by the Chairmen of the Plant Operations and Reliability and Probabilistic Assessment Subcommittees regarding the South Texas Project Exemption Request that was discussed during a meeting on February 21, 2001.

1:30 p.m.-2 p.m.: *Future ACRS Activities/ Report of the Planning and Procedures Subcommittee* (Open)—The Committee will discuss the recommendations of the Planning and Procedures Subcommittee regarding items proposed for consideration by the full Committee during future meetings. Also, it will hear a report of the Planning and Procedures Subcommittee on matters related to the conduct of ACRS business, and organizational and personnel matters relating to the ACRS.

2 p.m.-2:15 p.m.: *Reconciliation of ACRS Comments and Recommendations* (Open)—The Committee will discuss the responses from the NRC Executive Director for Operations (EDO) to comments and recommendations included in recent ACRS reports and

letters. The EDO responses are expected to be made available to the Committee prior to the meeting.

2:15 p.m.-3 p.m.: *Break and Preparation of Draft ACRS Reports* (Open)—Cognizant ACRS members will prepare draft reports, as needed, for consideration by the full Committee.

3 p.m.-7 p.m.: *Discussion of Proposed ACRS Reports* (Open)—The Committee will discuss proposed ACRS reports.

#### Saturday, March 3, 2001

8:30 a.m.-12:30 p.m.: *Proposed ACRS Reports* (Open)—The Committee will continue its discussion of proposed ACRS reports.

12:30 p.m.-1 p.m.: *Miscellaneous* (Open)—The Committee will discuss matters related to the conduct of Committee activities and matters and specific issues that were not completed during previous meetings, as time and availability of information permit.

Procedures for the conduct of and participation in ACRS meetings were published in the *Federal Register* on October 11, 2000 (65 FR 60476). In accordance with these procedures, oral or written views may be presented by members of the public, including representatives of the nuclear industry. Electronic recordings will be permitted only during the open portions of the meeting and questions may be asked only by members of the Committee, its consultants, and staff. Persons desiring to make oral statements should notify Mr. James E. Lyons, ACRS, five days before the meeting, if possible, so that appropriate arrangements can be made to allow necessary time during the meeting for such statements. Use of still, motion picture, and television cameras during the meeting may be limited to selected portions of the meeting as determined by the Chairman. Information regarding the time to be set aside for this purpose may be obtained by contacting Mr. James E. Lyons prior to the meeting. In view of the possibility that the schedule for ACRS meetings may be adjusted by the Chairman as necessary to facilitate the conduct of the meeting, persons planning to attend should check with Mr. James E. Lyons if such rescheduling would result in major inconvenience.

In accordance with Subsection 10(d) P.L. 92-463, I have determined that it is necessary to close a portion of this meeting noted above to discuss proprietary information per 5 U.S.C. 552b(c)(4), and information classified "Confidential—Restricted Data—Government Sensitive" per 5 U.S.C. 552b(c)(1) and (4).

Further information regarding topics to be discussed, whether the meeting has been canceled or rescheduled, the Chairman's ruling on requests for the opportunity to present oral statements, and the time allotted therefore can be obtained by contacting Mr. James E. Lyons (telephone 301-415-7371), between 7:30 a.m. and 4:15 p.m., EST.

ACRS meeting agenda, meeting transcripts, and letter reports are available for downloading or viewing on the internet at <http://www.nrc.gov/ACRSACNW>.

Videoteleconferencing service is available for observing open sessions of ACRS

meetings. Those wishing to use this service for observing ACRS meetings should contact Mr. Theron Brown, ACRS Audio Visual Technician (301-415-8066), between 7:30 a.m. and 3:45 p.m., EST, at least 10 days before the meeting to ensure the availability of this service. Individuals or organizations requesting this service will be responsible for telephone line charges and for providing the equipment facilities that they use to establish the videoteleconferencing link. The availability of videoteleconferencing services is not guaranteed.

Dated: February 12, 2001.

Andrew L. Bates,

Advisory Committee Management Officer.

[FR Doc. 01-3946 Filed 2-15-01; 8:45 am]

BILLING CODE 7590-01-P

## NUCLEAR REGULATORY COMMISSION

### Advisory Committee on Reactor Safeguards, Subcommittee Meeting on Planning and Procedures; Notice of Meeting

The ACRS Subcommittee on Planning and Procedures will hold a meeting on February 28, 2001, Room T-2B1, 11545 Rockville Pike, Rockville, Maryland.

The entire meeting will be open to public attendance, with the exception of a portion that may be 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.

The agenda for the subject meeting shall be as follows:

Wednesday, February 28, 2001—10 a.m. Until the Conclusion of Business

The Subcommittee will discuss proposed ACRS activities and related matters. The purpose of this meeting is to gather information, analyze relevant issues and facts, and to formulate proposed positions and actions, as appropriate, for deliberation by the full Committee.

Oral statements may be presented by members of the public with the concurrence of the Subcommittee Chairman; written statements will be accepted and made available to the Committee. Electronic recordings will be permitted only during those portions of the meeting that are open to the public, and questions may be asked only by members of the Subcommittee, its consultants, and staff. Persons desiring to make oral statements should notify the cognizant ACRS staff person named below five days prior to the meeting, if

possible, so that appropriate arrangements can be made.

Further information regarding topics to be discussed, the scheduling of sessions open to the public, whether the meeting has been canceled or rescheduled, the Chairman's ruling on requests for the opportunity to present oral statements, and the time allotted therefor can be obtained by contacting the cognizant ACRS staff person, Dr. John T. Larkins (telephone: 301/415-7360) between 7:30 a.m. and 4:15 p.m. (EST). Persons planning to attend this meeting are urged to contact the above named individual one or two working days prior to the meeting to be advised of any changes in schedule, etc., that may have occurred.

Dated: February 8, 2001.

James E. Lyons,

Associate Director for Technical Support, ACRS/ACNW,

[FR Doc. 01-3948 Filed 2-15-01; 8:45 am]

BILLING CODE 7590-01-P

## NUCLEAR REGULATORY COMMISSION

### Public Workshop on Risk-Informed Regulation Implementation Plan (Reactor Safety Arena)

AGENCY: Nuclear Regulatory Commission.

ACTION: Notice of workshop.

**SUMMARY:** The Nuclear Regulatory Commission (NRC) will host a public workshop to provide an opportunity for a discussion of the NRC's Risk-Informed Regulation Implementation Plan (RIRIP). The NRC issued a notice of availability and request for public comment on the RIRIP in the *Federal Register* on December 21, 2000. This workshop will focus on activities associated with regulating nuclear reactors.

**DATES:** The workshop will be held on Thursday, March 15, 2001 from 1:30 p.m. to 4:30 p.m.

**ADDRESSES:** Capital Hilton Hotel, 16th and K Streets, NW., Washington, DC 20036.

**FOR FURTHER INFORMATION CONTACT:** Stewart Magruder, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission, Washington, DC 20555, telephone: (301)-415-3139, email: [slm1@nrc.gov](mailto:slm1@nrc.gov).

**SUPPLEMENTARY INFORMATION:** The NRC's 1995 policy statement on the use of probabilistic risk assessment provided the Commission's expectation on the use of risk information in its regulatory activities. The RIRIP provides guidance

and describes the staff's plans for applying criteria to select regulatory requirements and practices to risk-inform, risk-informing those requirements and practices, and developing the necessary data, methods, guidance, and training. The RIRIP is also intended to explain the agency's activities, philosophy, and approach to risk-informed regulatory policy to internal and external stakeholders. The RIRIP is available on the NRC web site at <http://www.nrc.gov/RES/riskinfreg.htm>.

The purpose of this workshop is to discuss comments received in response to the December 21, 2000, notice in the *Federal Register* and to provide for an exchange of information with all stakeholders regarding the staff's efforts to risk-inform its regulatory requirements and practices. Although comments are welcome on the entire RIRIP, this workshop will focus on the implementation activities in the reactor safety arena portion of the RIRIP (Part 2, Chapter 1.)

As noted in the December 21, 2000, feedback is especially requested on the following specific questions—

1. Does the RIRIP include information activities that should not be undertaken? If so, why not?
2. Does the RIRIP omit implementation activities that should be undertaken? Describe such activities and why they should be undertaken.
3. How should the NRC measure its success in implementing risk-informed regulation?
4. Is the pace for implementing risk-informed regulation about right, or is it too fast or too slow?
5. Are there concerns about the agency's ability to maintain safety while implementing risk-informed regulation? If so, describe the concerns and, if possible, their basis.
6. How can risk-informed regulation increase public confidence?
7. Are the screening criteria clear and sufficient? If applied properly, would they result in identifying those activities amenable for transition to risk-informed regulation?
8. Will the implementation activities described in the RIRIP appropriately improve regulatory efficiency, effectiveness, and realism?
9. Other than requests such as this for written comment and a public workshop, how can stakeholder participation in risk-informed regulation be enhanced?
10. What communication activities would be desired to describe risk-informed regulation? What other interactions would be useful to provide



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
WASHINGTON, D.C. 20555-0001**

**February 8, 2001**

**SCHEDULE AND OUTLINE FOR DISCUSSION  
480<sup>TH</sup> ACRS MEETING  
MARCH 1-3, 2001**

**THURSDAY, MARCH 1, 2001, CONFERENCE ROOM 2B3, TWO WHITE FLINT NORTH,  
ROCKVILLE, MARYLAND**

- 1) 8:30 - 8:35 A.M. Opening Remarks by the ACRS Chairman (Open)  
 1.1) Opening statement (GEA/JTL/SD)  
 1.2) Items of current interest (GEA/SD)  
 1.3) Priorities for preparation of ACRS reports (GEA/JTL/SD)
- 2) 8:35 - <sup>9:14</sup>10:00 A.M. RETRAN-3D Thermal-Hydraulic Transient Analysis Code  
 (Open/Closed) (GBW/PAB) **REVISED**  
 2.1) Remarks by the Subcommittee Chairman  
 2.2) Briefing by and discussions with representatives of the Electric Power Research Institute (EPRI) and the NRC staff regarding the EPRI RETRAN-3D thermal-hydraulic transient analysis code, associated staff's Safety Evaluation Report, and resolution of issues previously raised by the ACRS.

[Note: A portion of this session may be closed to discuss EPRI proprietary information.]

- 10:25 - 10:40 am  
 (10:00 - 10:15 A.M.)  
 9:14 - 10:25  
 3) 10:15 - 11:45 A.M.  
 10:45 - 11:15  
Interim Review of the License Renewal Application for Arkansas Nuclear One, Unit 1 (Open) (MVB/GML/NFD/SD) REVISED  
 3.1) Remarks by the Subcommittee Chairman  
 3.2) Briefing by and discussions with representatives of the Entergy Operations, Inc. and the NRC staff regarding the license renewal application for Arkansas Nuclear One, Unit 1 and the associated staff's Safety Evaluation Report.
- 11:15 - 11:50  
 (11:45 - 12:45 P.M.)  
 11:50 - 12:50  
 4) 12:45 - 2:45 P.M.  
 12:50 - 2:25  
Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants (Open) (TSK/DAP/MME)  
 4.1) Remarks by the Subcommittee Chairman  
 4.2) Briefing by and discussions with representatives of the NRC staff regarding significant findings and recommendations of the final report on spent fuel pool accident risk at decommissioning plants, new developments, status of developing proposed options, and related matters.
- South Texas Project Exemption Request (Revised)  
 \*\*\*BREAK\*\*\* - Briefing by the SLC Chairman (JDS/MWW)  
 Discuss ACRS Report on ATWS  
 \*\*\*LUNCH\*\*\*

Representatives of the nuclear industry will provide their views, as appropriate.

*2:25-2:40*  
~~2:15~~ - ~~2:30~~ P.M.

\*\*\*BREAK\*\*\*

5) *2:40 -*  
~~2:30~~ - 3:45 P.M.

Management Directive 6.4 Associated with the Revised Generic Issue Process (Open) (TSK/AS)

- 5.1) Remarks by the Subcommittee Chairman
- 5.2) Briefing by and discussions with representatives of the NRC staff regarding Management Directive 6.4 related to the Revised Generic Issue process, results of the case study performed to determine the effectiveness of using the Management Directive to implement the revised Generic Issue process, and related matters.

3:45 - 4:00 P.M.

\*\*\*BREAK\*\*\*

6) 4:00 - 7:00 P.M.

Proposed ACRS Reports (Open)

Discussion of proposed ACRS reports on:

- 6.1) NRC Safety Research Program (DAP/MME)
- 6.2) Regulatory Effectiveness of the ATWS Rule (TSK/MWW) *Final*

*[11:15-11:50]*  
*[4:00-4:10]*

*4:20-4:35 RETRAN-3D T/H - Final*

FRIDAY, MARCH 2, 2001, CONFERENCE ROOM 2B3, TWO WHITE FLINT NORTH, ROCKVILLE, MARYLAND

7) 8:30 - 8:35 A.M.

Opening Remarks by the ACRS Chairman (Open) (GEA/JTL/SD)

8) 8:35 - *9:10*  
~~9:45~~ A.M.

British Nuclear Powered Submarine Incident (Closed) (GML/PAB)

- 8.1) Remarks by the Subcommittee Chairman
- 8.2) Briefing by and discussions with representatives of the DOD/DOE Naval Reactors regarding the recent incident on the British Nuclear Powered Submarine (HMS TIRELESS).

Representatives of the NRC staff will provide their views, as appropriate.

[Note: This session will be closed to discuss information classified "Confidential - Restricted Data - Government Sensitive" .]

*9:10 -*  
~~9:45~~ - 10:00 A.M.

\*\*\*BREAK\*\*\*

9) 10:00 - *11:55*  
~~11:30~~ A.M.

Operating Event at V. C. Summer Nuclear Station (Open) (WJS/JDS/MTM)

- 9.1) Remarks by the Subcommittee Chairman
- 9.2) Briefing by and discussions with representatives of the NRC staff regarding the October 7, 2000 incident at the V. C. Summer Nuclear Station, involving degraded reactor coolant system pressure boundary, findings and conclusions resulting from the staff's investigation of this event, and corrective actions taken by the licensee and industry organizations.

Representatives of the nuclear industry will provide their views, as appropriate.

- 10) <sup>1:00 - 1:30</sup>  
~~11:30 - 11:45~~ A.M. Trip Report (Open) (DAP/AS)  
Dr. Powers and Mr. Singh will provide a trip report to the Committee on the Nuclear Energy Institute (NEI) Fire Protection Forum held in San Diego on February 5-7, 2001.
- <sup>11:55 -</sup>  
~~11:45 -~~ 1:00 P.M. **\*\*\*LUNCH\*\*\***
- 11) ~~1:00 - 1:30 P.M.~~ ~~Subcommittee Report (Open) (JDS/GEA/MWW)~~  
~~Report by the Chairmen of the Plant Operations and Reliability and Probabilistic Risk Assessment Subcommittees regarding the South Texas Project Exemption Request that was discussed during a meeting on February 21, 2001.~~
- 12) 1:30 - <sup>2:25</sup>  
~~2:00~~ P.M. Future ACRS Activities/Report of the Planning and Procedures Subcommittee (Open) (GEA/JTL/JEL)  
12.1) Discussion of the recommendations of the Planning and Procedures Subcommittee regarding items proposed for consideration by the full Committee during future ACRS meetings.  
12.2) Report of the Planning and Procedures Subcommittee on matters related to the conduct of ACRS business, organizational and personnel matters relating to the ACRS.
- 13) ~~2:00 - 2:15 P.M.~~ ~~Reconciliation of ACRS Comments and Recommendations (Open) (GEA, et al./SD, et al.)~~  
~~Discussion of the responses from the NRC Executive Director for Operations to comments and recommendations included in recent ACRS reports and letters.~~
- 14) <sup>2:25</sup>  
~~2:15 -~~ 3:00 P.M. Break and Preparation of Draft ACRS Reports  
Cognizant ACRS members will prepare draft reports, as needed, for consideration by the full Committee.
- 15) 3:00 - 7:00 P.M. Proposed ACRS Reports (Open)  
Discussion of proposed ACRS reports on:  
15.1) NRC Safety Research Program (DAP/MME)  
15.2) RETRAN-3D Thermal-Hydraulic Transient Analysis Code (GBW/PAB)  
15.3) Interim Report on License Renewal Application for Arkansas Nuclear One, Unit 1 (MVB/GML/NFD/SD)  
15.4) Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants (TSK/DAP/MME)  
15.5) Management Directive 6.4 Associated with the Revised Generic Issue Process (TSK/AS)  
15.6) Regulatory Effectiveness of the ATWS Rule (TSK/MWW)

**SATURDAY, MARCH 3, 2001, CONFERENCE ROOM 2B3, TWO WHITE FLINT NORTH,  
ROCKVILLE, MARYLAND**

- 16) 8:30 - 12:30 P.M. Proposed ACRS Reports (Open)  
(10:30-10:45 A.M.-BREAK) Continue discussion of proposed ACRS reports listed under Item 15.
- 17) 12:30 - 1:00 P.M. Miscellaneous (Open) (GEA/JTL/JEL)  
Discussion of matters related to the conduct of Committee activities and matters and specific issues that were not completed during previous meetings, as time and availability of information permit.

**NOTE:**

- **Presentation time should not exceed 50 percent of the total time allocated for a specific item. The remaining 50 percent of the time is reserved for discussion.**
- **Number of copies of the presentation materials to be provided to the ACRS - 35.**

APPENDIX III: MEETING ATTENDEES

480TH ACRS MEETING  
MARCH 1-3, 2001

NRC STAFF (March 1, 2001)

J. Murphy, RES  
R. Landry, NRR  
R. Caruso, NRR  
B. Gramm, NRR  
J. Stoudenmeier, NRR  
J. Nakoski, NRR  
B. Pratto, NRR  
C. Grimes, NRR  
S. Mika, NRR  
G. Hubbard, NRR  
D. Jackson, NRR  
D. Diec, NRR  
B. Huffman, NRR  
S. LaVie, NRR  
T. Collins, NRR  
G. Parry, NRR  
P. Ray, NRR  
J. Flack, RES  
R. Lloyd, RES  
H. VanderMolen, RES  
J. Page, RES  
R. Emrit, RES  
M. Sitek, NMSS

ATTENDEES FROM OTHER AGENCIES AND GENERAL PUBLIC

L. Hendricks, NEI  
B. Henry, FAI

NRC STAFF (March 2, 2001)

M. Mayfield, RES  
T. Marsh, NRR  
K. Wichman, NRR  
A. Keim, NRR  
W. Koo, NRR  
W. Norris, RES  
L. B. Marsh, NRR  
R. Sulbraham, NRR  
B. Bateman, NRR  
S. Malik, RES  
J. Page, RES  
D. Jackson, RES  
S. Rosenberg, OEDO  
B. Crowley, RII  
C. Carpenter, NRR  
K. Cotton, NRR  
G. Janosko, NRR  
J. Muscara, RES  
M. Baneji, NRR  
E. McKenna, NRR  
S. Arndt, RES

ATTENDEES FROM OTHER AGENCIES AND GENERAL PUBLIC

S. Kauffman, Naval Reactors  
S. Trautman, Naval Reactor  
K. Cozens, NEI  
L. Mathews, SNOG  
R. Herman, SIA  
S. Hunt, Dominion Engineering, Inc.  
T. Allen, Duke Power Company  
V. Wagoner, CP&L  
F. Emerson, NEI

UNITED STATES  
**NUCLEAR REGULATORY COMMISSION**  
 ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
 WASHINGTON, D.C. 20555-0001

March 12, 2001

**SCHEDULE AND OUTLINE FOR DISCUSSION**  
**481<sup>ST</sup> ACRS MEETING**  
**APRIL 5-7, 2001**

**THURSDAY, APRIL 5, 2001, CONFERENCE ROOM 2B3, TWO WHITE FLINT NORTH,  
 ROCKVILLE, MARYLAND**

- 1) 8:30 - 8:35 A.M. Opening Remarks by the ACRS Chairman (Open)
  - 1.1) Opening statement (GEA/JTL/SD)
  - 1.2) Items of current interest (GEA/SD)
  - 1.3) Priorities for preparation of ACRS reports (GEA/JTL/SD)
  
- 2) 8:35 - 10:30 A.M. Interim Review of the License Renewal Application for Edwin I. Hatch Nuclear Plant Units 1 and 2 (Open) (MVB/GML/SD/RBE)
  - 2.1) Remarks by the Subcommittee Chairman
  - 2.2) Briefing by and discussions with representatives of the NRC staff and Southern Nuclear Operating Company regarding the license renewal application for Hatch Units 1 and 2, associated staff's Safety Evaluation Report (SER), selected Boiling Water Reactor Vessel and Internals Project (BWRVIP) reports and the related staff's safety evaluations.

**10:30 - 10:50 A.M. \*\*\*BREAK\*\*\***
  
- 3) 10:50 - 12:00 Noon. Proposed Final License Renewal Guidance Documents (Open) (MVB/GML/SD/RBE)
  - 3.1) Remarks by the Subcommittee Chairman
  - 3.2) Briefing by and discussions with representatives of the NRC staff regarding the proposed final Regulatory Guide DG-1104 and Standard Review Plan associated with license renewal, Generic Aging Lessons Learned (GALL) report, and Nuclear Energy Institute (NEI) 95-10, "Industry Guidelines for Implementing the Requirements of 10 CFR Part 54 - The License Renewal Rule."

Representatives of the nuclear industry will provide their views, as appropriate.
  
- 4) 1:00 - 2:30 P.M. Safety Issues Associated with the Use of Mixed Oxide (MOX) and High Burnup Fuels (Open) (DAP/MME)
  - 4.1) Remarks by the Subcommittee Chairman

**12:00 - 1:00 P.M. \*\*\*LUNCH\*\*\***

- 4.2) Briefing by and discussions with representatives of the NRC staff regarding safety issues associated with the use of MOX and high burnup fuels in commercial light water reactors.

Representatives of the nuclear industry will provide their views, as appropriate.

**2:30 - 2:50 P.M. \*\*\*BREAK\*\*\***

- 5) 2:50 - 4:15 P.M. Thermal-Hydraulic Issues Associated with the AP1000 Passive Plant Design (Open/Closed) (GBW/PAB)
- 5.1) Remarks by the Subcommittee Chairman
- 5.2) Briefing by and discussions with representatives of the NRC staff and the Westinghouse Electric Corporation regarding the thermal-hydraulic issues associated with the AP1000 design.

[Note: A portion of this session may be closed to discuss Westinghouse proprietary information applicable to this matter.]

- 6) 4:15 - 5:15 P.M. Break and Preparation of Draft ACRS Reports  
Cognizant ACRS members will prepare draft reports, as needed, for consideration by the full Committee.
- 7) 5:15 - 7:00 P.M. Proposed ACRS Reports (Open)  
Discussion of proposed ACRS reports on:
- 7.1) Interim Report on the License Renewal Application for Hatch Units 1 and 2 (MVB/GML/SD/RBE)
- 7.2) Proposed Final License Renewal Guidance Documents (MVB/GML/SD/RBE)
- 7.3) Safety Issues associated with use of MOX and High Burnup Fuels (DAP/MME)
- 7.4) Thermal-Hydraulic Issues Associated with the AP1000 Design (GBW/PAB)

**FRIDAY, APRIL 6, 2001, CONFERENCE ROOM 2B3, TWO WHITE FLINT NORTH, ROCKVILLE, MARYLAND**

- 8) 8:30 - 8:35 A.M. Opening Remarks by the ACRS Chairman (Open) (GEA/JTL/SD)
- 9) 8:35 - 10:30 A.M. Draft Final Safety Evaluation Report for the South Texas Project Nuclear Operating Company (STPNOC) Exemption Request (Open) (JDS/GEA/MWW)
- 9.1) Remarks by the Subcommittee Chairman
- 9.2) Briefing by and discussions with representatives of the NRC staff and STPNOC regarding the staff's draft Final Safety Evaluation Report for the STPNOC exemption request to exclude certain components from the scope of special treatment requirements required by NRC regulations.

**10:30 - 10:50 A.M. \*\*\*BREAK\*\*\***

- 10) 10:50 - 11:45 A.M. Closure of Generic Safety Issue (GSI)-170, "Reactivity Transients and Fuel Damage Criteria for High Burnup Fuel" (Open) (DAP/MME)  
 10.1) Remarks by the Subcommittee Chairman  
 10.2) Discussion with representatives of the NRC staff, as needed, regarding the closure of GSI-170.
- 11:45 - 1:00 P.M. \*\*\*LUNCH\*\*\***
- 11) 1:00 - 1:15 P.M. Subcommittee Report (Open) (WJS/MTM)  
 Report by the Chairman of the Materials and Metallurgy Subcommittee regarding risk-informing 10 CFR 50.46, which was discussed during a joint meeting of the ACRS Subcommittees on Materials and Metallurgy, Thermal-Hydraulic Phenomena, and Reliability and Probabilistic Risk Assessment on March 16, 2001.
- 12) 1:15 - 1:45 P.M. Future ACRS Activities/Report of the Planning and Procedures Subcommittee (Open) (GEA/JTL/JEL)  
 12.1) Discussion of the recommendations of the Planning and Procedures Subcommittee regarding items proposed for consideration by the full Committee during future ACRS meetings.  
 12.2) Report of the Planning and Procedures Subcommittee on matters related to the conduct of ACRS business, and organizational and personnel matters relating to the ACRS.
- 13) 1:45 - 2:00 P.M. Reconciliation of ACRS Comments and Recommendations (Open) (GEA, et al./SD, et al.)  
 Discussion of the responses from the NRC Executive Director for Operations to comments and recommendations included in recent ACRS reports and letters.
- 14) 2:00 - 3:00 P.M. Break and Preparation of Draft ACRS Reports  
 Cognizant ACRS members will prepare draft reports, as needed, for consideration by the full Committee.
- 15) 3:00 - 7:00 P.M. Proposed ACRS Reports (Open)  
 Discussion of proposed ACRS reports on:  
 15.1) South Texas Project Exemption Request (JDS/JEA/MWW)  
 15.2) Closure of GSI-170 (DAP/MME)  
 15.3) Interim Report on the License Renewal Application for Hatch Units 1 and 2 (MVB/GML/SD/RBE)  
 15.4) Proposed Final License Renewal Guidance Documents (MVB/GML/SD/RBE)  
 15.5) Safety Issues associated with use of MOX and High Burnup Fuels (DAP/MME)  
 15.6) Thermal-Hydraulic Issues Associated with the AP1000 Design (GBW/PAB)

**SATURDAY, APRIL 7, 2001, CONFERENCE ROOM 2B3, TWO WHITE FLINT NORTH,  
ROCKVILLE, MARYLAND**

- 16) 8:30 - 12:30 P.M. Proposed ACRS Reports (Open)  
**(10:30-10:50 A.M. BREAK)** Continue discussion of proposed ACRS reports listed under Item 15.
- 17) 12:30 - 1:00 P.M. Miscellaneous (Open) (GEA/JTL/JEL)  
Discussion of matters related to the conduct of Committee activities and matters and specific issues that were not completed during previous meetings, as time and availability of information permit.

**NOTE:**

- **Presentation time should not exceed 50 percent of the total time allocated for a specific item. The remaining 50 percent of the time is reserved for discussion.**
- **Number of copies of the presentation materials to be provided to the ACRS - 35.**

APPENDIX V  
LIST OF DOCUMENTS PROVIDED TO THE COMMITTEE  
480<sup>TH</sup> ACRS MEETING  
MARCH 1-3, 2000

[Note: Some documents listed below may have been provided or prepared for Committee use only. These documents must be reviewed prior to release to the public.]

MEETING HANDOUTS

AGENDA  
ITEM NO.

DOCUMENTS

- 1     Opening Remarks by the ACRS Chairman
  1.     Introductory Statement by the ACRS Chairman (revision to agenda)
  2.     Items of Interest, dated March 1-3, 2001
  
- 2     RETRAN-3D Thermal-Hydraulic Transient Analysis Code
  3.     G. Wallis Report: "Comments on EPRI Response to RAI's and Other Recent Submittals concerning the RETRAN Code, dated February 25, 2001
  4.     G. Wallis Report, "Tutorial on Momentum Equations," dated 1/30, 2/10 and 2/25/01
  5.     Report from ACRS Consultant V. Shrock, "T/H Subcommittee Meeting, February 20, 2001, EPRI RETRAN-3D/NRR Code Review Status," dated February 22, 2001 (ACRS Internal Use Only)
  6.     Working Copy, Minutes of February 20, 2001, T/H Phenomena Subcommittee Meeting, dated February 27, 2001 (Internal Use Only)
  
- 3     South Texas Project Exemption Request
  7.     ACRS Subcommittee Report presentation by J. Sieber, Subcommittee Chairman [Viewgraphs]
  
- 4     Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants
  8.     Suggestions for Enhancing the Spent Fuel Pool Risk Assessment presentation by R. Henry and L. Hendricks [Viewgraphs]
  9.     Industry Observations and Recommendations on Seismic Risk [Viewgraphs]
  
- 5     Management Directive 6.4 Associated with the Revised Generic Issue Process
  10.    Tentative Schedule for Issuance of MD 6.4 [Handout]
  11.    Trial Use of Management Directive 6.4, Generic Issue Program presentation by R. Lloyd and H. VanderMolen [Viewgraphs]
  
- 9     Operating Event at V.C. Summer Nuclear Station
  12.    V.C. Summer Reactor Coolant System "A" Hot Leg Crack presentation by K. Cotton, L. Matthews, B. Crowley, and S. Doctor [Viewgraphs]

13. Discussion of V.C. Summer Technical Review and Generic Activities presentation by C. E. Carpenter, NRR [Viewgraphs]
  14. Industry Response Alloy 82/182 Weld Cracking, Materials Reliability Program Alloy 600 Issue Task Group presentation by L. Mathews, SNC, Chairman [Viewgraphs]
- 10 Trip Report
15. Briefing to the ACRS on the NEI Fire Protection Information Forum March 2, 2001, presentation by A. Singh
- 12 Future ACRS Activities/Report of the Planning and Procedures Subcommittee
16. Future ACRS Activities [Handout No. 13.1]
  17. Final Draft Minutes of Planning and Procedures Subcommittee Meeting - January 31, 2001 [Handout #13.1]
  18. Note to ACRS Members from P. Boehnert, Subject: Discussion Topics for April 18-19, 2001, T/H Phenomena Subcommittee Meeting - Core Power Updates

MEETING NOTEBOOK CONTENTS

TAB

DOCUMENTS

- 2 EPRI Retran -3D T/H Transient Analysis Code
1. Table of Contents
  2. Project Status Report dated March 1, 2001
  3. Memorandum, P. Boehnert to ACRS Members, G. Wallis' Material Supporting Discussion of EPRI
  4. Excerpt from Minutes of 464<sup>th</sup> ACRS Meeting, July 14-16, 1999, "EPRI RETRAN-3D thermal-Hydraulic Transient Analysis Code"
  5. G. Wallis Paper: "A Tutorial pn Momentum Equations," dated January 30, and February 10, 2001
  6. Letter from L. Agee, EPRI, to G. Wallis, ACRS, Subject: Closure of the NRC RETRAN-3D Review," dated February 15, 2001
  7. G. Wallis Paper: "Response to RAIs and Other Recent Submittals," dated February 16, 2001
- 3 Arkansas Nuclear One, Unit 1 License Renewal Application
8. Table of Contents
  9. Status Report
  10. Assignments for reviewing the NRC Staff's SER associated with ANO, Unit 1 License Renewal Application
  11. Letter from David B. Matthews, NRR, to Graig G. Anderson, Entergy Operations, Inc., Subject: Determination of Acceptability and Sufficiency for Docketing and Opportunity for a Hearing regarding an Application of Entergy Operations, Inc., for Renewal of the Operating License for Arkansas Nuclear One, Unit 1, dated February 28, 2000
  12. Excerpts from the NRC staff's SER related to ANO, Unit 1 License Renewal Application, January 2001
  13. ACRS letter dated September 13, 1999, Subject: Interim Letter Related to the License Renewal of Oconee Nuclear Station
  14. ACRS Report dated March 13, 2000, Subject: Report on the Safety Aspects of the License Renewal Application for the Oconee Nuclear Station, Units 1,2, and 3
- 4 Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants
15. Table of Contents
  16. Proposed Presentation Schedule
  17. Project Status Report
  18. ACRS Report dated April 13, 2000
  19. ACRS Report dated November 8, 2000
  20. EDO Response dated January 18, 2001

21. Analysis of EDO Response dated January 25, 2001
  22. Letter from W. Travers (EDO) to the Commission (12/20/00)
  23. Letter from R. Beedle (NEI) to S. Collins (NRR) (1/10/01)
- 5 Management Directive 6.4 Associated with the Revised Generic Issue Process
24. Table of Contents
  25. Proposed Schedule
  26. Status Report
- 8 DOD/DOE Naval Reactors Briefing: British Nuclear Powered Submarine Incident
- 9 Operating Event at V.C. Summer Nuclear Station
27. Table of Contents
  28. Proposed Schedule
  29. Status Report
  30. Licensee Event Report dated November 17, 2000
  31. NRC Information Notice 2000-17 dated October 18, 2000
  32. NRC Information Notice 2000-17, Supplement 1, dated November 16, 2000
  33. NEI Letter dated December 14, 2000
  34. NRC letter dated December 22, 2000 (list of questions)
  35. NRC letter dated December 28, 2000 (additional questions)
  36. SCE&G letter dated January 9, 2001 (response to questions)
  37. NRC memorandum dated February 1, 2001 (meeting summary)
  38. SCE&G letter dated February 9, 2001 (discussion of weld filler material)
  39. SCE&G letter dated February 9, 2001 (commitments related to leak detection)
  40. NRC Safety Evaluation Report

UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
WASHINGTON, D.C. 20555-0001

April 25, 2001

MEMORANDUM TO: Sherry Meador, Technical Secretary  
Advisory Committee on Reactor Safeguards

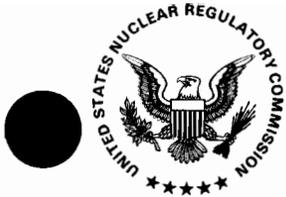
FROM: George E. Apostolakis, Chairman  
Advisory Committee on Reactor Safeguards

SUBJECT: CERTIFIED MINUTES OF THE 480th MEETING OF THE  
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
(ACRS), MARCH 1-3, 2001

I certify that based on my review of the minutes from the 480th ACRS full Committee meeting, and to the best of my knowledge and belief, I have observed no substantive errors or omissions in the record of this proceeding subject to the comments noted below.

  
\_\_\_\_\_  
George E. Apostolakis, Chairman

April 25, 2001  
Date



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
WASHINGTON, D.C. 20555-0001

April 16, 2001

MEMORANDUM TO:       ACRS Members

FROM:                   Sherry Meador *Sherry*  
                              Technical Secretary

SUBJECT:                PROPOSED MINUTES OF THE 480th MEETING OF THE  
                              ADVISORY COMMITTEE ON REACTOR SAFEGUARDS -  
                              MARCH 1-3, 2000

Enclosed are the proposed minutes of the 480th meeting of the ACRS. This draft is being provided to give you an opportunity to review the record of this meeting and provide comments. Your comments will be incorporated into the final certified set of minutes as appropriate.

Attachment:  
As stated

**ADVISORY COMMITTEE ON REACTOR SAFEGUARDS**

**MARCH 1-3, 2001**

Date(s)

**MARCH 1, 2001**

Today's Date

**NRC STAFF SIGN IN FOR ACRS MEETING**

PLEASE PRINT

NAME	BADGE #	NRC ORGANIZATION
<del>MURPHY</del> <del>RALPH LAUDRY</del>	A 6559 B-6634	RES NRR/DSSA/SRXB
RALPH CARUSO	TB-6001	NRR/SRXB
Bob Gramm	B 8582	NRR/DLPM
Joseph Stoudenmire	B-7661	NRR/SRXB
John Nakoski	B-8091	NRR/DLPM/PDIV-1
Bob Pratto	B-8571	NRR/DRIP/RCSB
Chris Grimm	A6135	NRR/DRIP/RCSB
S.K. Mitsu	B6812	NRR/DMP/RCSB
George Hubbard	B-6279	NRR/DSSA/SPLB
Diane Jackson	B-8592	NRR/DSSA/SPLB
David Dtee	B-8620	NRR/DSSA/SPLB
Bill Hoffman	B-8052	NRR/DRIP/RGEB
Steve LaVie	B-8172	NRR/DSSA/SPSB
Tim Collins	A-7568	" "
Gareth Pamy	B-8060	NRR/DSSA
Phillip Ray	B-6977	NRR/DRIP/RGEB
John FLACK	B-6114	RES/DSARE
RON Lloyd	B-8404	RES/DSARE
Harold VanderMolen	B-7214	RES/DSARE
Joel Page	B-6890	RES/DET
Ron Emrit	B-6531	RES/DSARE
Mark Sitek	B-8013	NMSS/IMNS



ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

MARCH 1-3, 2001

Date(s)

MARCH 2, 2001

Today's Date

NRC STAFF SIGN IN FOR ACRS MEETING

PLEASE PRINT

NAME	BADGE #	NRC ORGANIZATION
M. Mayfield		RES
T. Marsh		NRR
K WICHMAN		NRR
A Keim		NRR
W. Koo		NRR
Wallace Norris		RES
L. B. Marsh		NRR
Ram Sullabhadra		NRR
Bill Bateman		NRR
SHAH MALIK	B7396	RES
JOEL PAGE	B-6890	RES-DET
Debbie Jackson	B6296	RES/DET
Stacey Rosenberg	B-7440	OEDO
Billy Crowley	B 2294	RTI
CELIA	36462	NRTT
Karen Cotton	B-7916	NRR
Gary Janosko	A-6932	NRR
JOE MUSCARA	B6836	RES
Maitri Banerji	B8624	NRR
Eileen McKenna	B8226	NRR
STEVEN ARNDT	B8390	RES

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
480<sup>TH</sup> FULL COMMITTEE MEETING

MARCH 1-3, 2001

MARCH 2, 2001  
Today's Date

ATTENDEES - PLEASE SIGN BELOW

PLEASE PRINT

NAME

AFFILIATION

S. Kauffman

Naval Reactors 

S. Trautman

Naval Reactors

KURT COZENS

NET

Larry Matthews

Southern Nuclear Operating Co.

ROBERT HERMAN

SIA

Steve Hunt

Dominion Engineering, Inc.

Tom Alley

Duke Power Company

Vaughn Wagoner

CP&L

FRED EMERSON

NET

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G:ROWE:INTRODUCTORY  
INTRODUCTORY STATEMENT BY THE ACRS CHAIRMAN  
480th MEETING, MARCH 1-3, 2001

THE MEETING WILL NOW COME TO ORDER. THIS IS THE FIRST DAY OF THE 480th MEETING OF THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS. DURING TODAY'S MEETING, THE COMMITTEE WILL CONSIDER THE FOLLOWING:

- (1) RETRAN-3D THERMAL-HYDRAULIC TRANSIENT ANALYSIS CODE
- (2) INTERIM REVIEW OF THE LICENSE RENEWAL APPLICATION FOR ARKANSAS NUCLEAR ONE, UNIT 1
- (3) SPENT FUEL POOL ACCIDENT RISK AT DECOMMISSIONING NUCLEAR POWER PLANTS
- (4) MANAGEMENT DIRECTIVE 6.4 ASSOCIATED WITH THE REVISED GENERIC ISSUE PROCESS
- (5) PROPOSED ACRS REPORTS

I WOULD LIKE TO NOTE SOME CHANGES TO THE AGENDA. RETRAN-3D AND ANO, UNIT 1 LICENSE RENEWAL APPLICATION WERE DISCUSSED BY COGNIZANT SUBCOMMITTEES. AS RECOMMENDED BY THE CHAIRMEN OF THE SUBCOMMITTEES, THERE WILL NOT BE PRESENTATIONS EITHER BY THE STAFF OR BY THE INDUSTRY GROUPS ON THESE MATTERS. INSTEAD, THE SUBCOMMITTEE CHAIRMEN WILL PROVIDE REPORTS TO THE FULL COMMITTEE. REPRESENTATIVES OF THE NRC STAFF WILL BE PRESENT TO ANSWER ANY QUESTIONS FROM THE MEMBERS.

IN ADDITION, THE SUBCOMMITTEE REPORT ON SOUTH TEXAS PROJECT EXEMPTION REQUEST SCHEDULED BETWEEN 1:00 - 1:30 P.M. ON FRIDAY, MARCH 2 WILL BE HEARD TODAY FOLLOWING THE SUBCOMMITTEE REPORT ON RETRAN-3D.

AFTER COMPLETING THE SUBCOMMITTEE REPORTS, THE COMMITTEE WILL DISCUSS THE PROPOSED ACRS REPORT ON THE REGULATORY EFFECTIVENESS OF THE ATWS RULE. I HOPE THESE CHANGES WILL NOT CAUSE ANY INCONVENIENCE TO THE MEETING PARTICIPANTS.

THIS MEETING IS BEING CONDUCTED IN ACCORDANCE WITH THE PROVISIONS OF THE FEDERAL ADVISORY COMMITTEE ACT.

DR. JOHN T. LARKINS IS THE DESIGNATED FEDERAL OFFICIAL FOR THE INITIAL PORTION OF THE MEETING.

WE HAVE RECEIVED NO WRITTEN COMMENTS OR REQUESTS FOR TIME TO MAKE ORAL STATEMENTS FROM MEMBERS OF THE PUBLIC REGARDING TODAY'S SESSIONS. A TRANSCRIPT OF PORTIONS OF THE MEETING IS BEING KEPT, AND IT IS REQUESTED THAT THE SPEAKERS USE ONE OF THE MICROPHONES, IDENTIFY THEMSELVES AND SPEAK WITH SUFFICIENT CLARITY AND VOLUME SO THAT THEY CAN BE READILY HEARD. I WILL BEGIN WITH SOME ITEMS OF CURRENT INTEREST.

DR. POWERS HAS SENT YOU DRAFT 1 OF THE RESEARCH REPORT ON FEBRUARY 26, 2001, AND SOME ADDITIONAL SECTIONS ON FEBRUARY 28, 2001. A <sup>LATEST</sup> COMPLETE COPY OF THE RESEARCH REPORT ALONG WITH ASSIGNMENTS FOR REVIEWING VARIOUS SECTIONS OF THE REPORT WILL BE PROVIDED TO YOU THIS MORNING. MEMBERS SHOULD NOT ONLY REVIEW THE SECTIONS ASSIGNED TO THEM BUT ALSO SHOULD REVIEW THE ENTIRE REPORT AND BE PREPARED TO PROVIDE THEIR VIEWS DURING THE DISCUSSION OF THE REPORT THIS EVENING.

REPRESENTATIVES OF RES WILL ATTEND THE MEETING TO RESPOND TO QUESTIONS FROM THE MEMBERS.

INTRODUCTORY STATEMENT BY THE ACRS CHAIRMAN  
480TH MEETING - MARCH 1-3, 2001

THE MEETING WILL NOW COME TO ORDER. THIS IS THE SECOND DAY OF THE 480TH MEETING OF THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS. DURING TODAY'S MEETING, THE COMMITTEE WILL CONSIDER THE FOLLOWING:

- (1) BRITISH NUCLEAR POWERED SUBMARINE INCIDENT
- (2) OPERATING EVENT AT V. C. SUMMER NUCLEAR STATION
- (3) REPORT ON THE NUCLEAR ENERGY INSTITUTE FIRE PROTECTION FORUM MEETING IN SAN DIEGO ON FEBRUARY 5-7, 2001
- (4) FUTURE ACRS ACTIVITIES/REPORT OF THE PLANNING AND PROCEDURES SUBCOMMITTEE
- (5) RECONCILIATION OF ACRS COMMENTS AND RECOMMENDATIONS
- (6) PROPOSED ACRS REPORTS

A PORTION OF THE MEETING WILL BE CLOSED TO DISCUSS INFORMATION CLASSIFIED "CONFIDENTIAL RESTRICTED DATA -- GOVERNMENT SENSITIVE."

THIS MEETING IS BEING CONDUCTED IN ACCORDANCE WITH THE PROVISIONS OF THE FEDERAL ADVISORY COMMITTEE ACT.

MR. SAM DURAISWAMY IS THE DESIGNATED FEDERAL OFFICIAL FOR THE INITIAL PORTION OF THE MEETING.

WE HAVE RECEIVED NO WRITTEN COMMENTS OR REQUESTS FOR TIME TO MAKE ORAL STATEMENTS FROM MEMBERS OF THE PUBLIC REGARDING TODAY'S SESSIONS. A TRANSCRIPT OF PORTIONS OF THE MEETING IS BEING KEPT, AND IT IS REQUESTED THAT THE SPEAKERS USE ONE OF THE MICROPHONES, IDENTIFY THEMSELVES AND SPEAK WITH SUFFICIENT CLARITY AND VOLUME SO THAT THEY CAN BE READILY HEARD.

**ITEMS OF INTEREST**

**480th ACRS MEETING**

**MARCH 1-3, 2000**

**ITEMS OF INTEREST  
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
480<sup>th</sup> MEETING  
MARCH 1-3, 2000**

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# NRC NEWS

UNITED STATES NUCLEAR REGULATORY COMMISSION

OFFICE OF PUBLIC AFFAIRS

Office of Public Affairs  
Washington, DC 20555-001

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Web Site: <http://www.nrc.gov/OPA>

No. S-01-001

[ [PDF Version \(37 KB\)](#) ]

## Experiences in Stakeholder Involvement in Radiological Risk Assessment and Management

Opening remarks by  
The Honorable Greta Joy Dicus  
Commissioner

U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

At the  
NEA Committee on Radiation Protection and Public Health Conference  
Villigen, Switzerland

January 24, 2001

Good afternoon! I would like to thank the Nuclear Energy Agency and the Swiss Nuclear Safety Inspectorate for hosting this fabulous workshop. I am really very honored and pleased to be here.

During the past day and a half we have all heard some excellent presentations that have provided suggestions on ways to improve our risk communications and how to better define our regulatory expectations. It is with those thoughts in mind that we are now looking forward to this afternoon's session: *Experiences in Stakeholder Involvement in Radiological Risk*. As you can see from the list of upcoming speakers, we will be hearing their stakeholder involvement experiences from each of their country's perspectives. Before I introduce the first speaker, let me share with you a few of the Nuclear Regulatory Commission's public outreach experiences and my vision for the future of regulatory success in this area.

### Overview

As you are all aware, effective regulation relies on coordinated and consistent actions facilitated by effective and clear communication to those we regulate, the public and other interested persons. The Commission's decision to initiate a more effective process for involving the public in NRC decisions grew out of the Commission's experience with the July 1990, *Below Regulatory Concern (BRC) Policy* (July 3, 1990, 55 FR 27522). The BRC Policy was the Commission's first attempt to establish a framework to guide Commission licensing and regulatory decisions for exempting the use of small quantities of radioactive materials from regulation by the NRC. The BRC Policy attempted to establish an overarching framework to guide Commission action on these exemptions and on other health and safety actions in a number of areas, such as decommissioning, waste disposal, recycling, and the manufacturing of consumer products.

As you also may recall, issuance of the BRC Policy created widespread and intense public concern over the implications of the new Policy. This concern was evidenced not only by the many State laws and local ordinances that were enacted to prevent the Policy from being applied in those jurisdictions, but also in legislation and which was introduced on a national level to invalidate the BRC Policy. This legislation was enacted in the U.S. as part of the National Energy Policy Act of 1992. The NRC, in response to this Act, formally revoked our Policy on August 24, 1993 (58 FR 44610).

In response to the concerns that were generated as a result of this proposed Policy, the Commission initiated an evaluation of the feasibility of convening a consensus process to re-evaluate the Policy. This feasibility evaluation involved interviews with over thirty groups nationwide representing the industry we regulate, State and local governments, and citizen and environmental groups. The primary finding was that there

was widespread dissatisfaction with the process that was used to develop the BRC Policy -- even from organizations that supported the Policy! As an example, most groups felt that they had no control or influence over the Policy, and although public comments were considered, most felt that it was unclear how their comments were considered, if at all, in the formulation of the Policy. Although the Commission did hold public meetings on the Policy, it did so only after the Policy was issued.

### Where We are Today

Stimulated by the need for a more effective public involvement program than was demonstrated by the unsuccessful BRC process, the NRC has undertaken a number of initiatives for involving the public in generic and site-specific regulatory decision-making. The NRC has reviewed and revised its public involvement and communications program. Forty-three recommendations were identified that addressed five broad categories:

- Clarity and Timeliness of Communications
- Public Involvement
- Responsiveness to Public Inquiry
- Public Access to NRC Information
- Public Outreach

Then, in 1997, we embarked on a plan to improve public communication by improving the quality, clarity, and credibility of communications with all NRC stakeholders, and particularly with the general public. In order to make this a success, the Commission focused its improvements in the broad areas of more effective written and oral communications with the public, early identification of public concerns, early involvement of the public in NRC regulatory decisions of substantial interest or concern, development of a network of contacts representing the broad spectrum of interests affected by NRC decisions, and more effective outreach to the general public on the roles and responsibilities of the NRC.

One of the best examples of how we now involve our stakeholders early on in a regulatory decision-making process is best illustrated by our "enhanced participatory rulemaking" in establishing radiological criteria for the decontamination and decommissioning of NRC-licensed sites. The objective of this approach is to provide representatives of affected interests with an early opportunity to actively discuss the rulemaking issues with each other and the NRC. An enhanced participatory process allows the agency to convene a dialog among the interests affected by the rulemaking in order to exchange information on viewpoints and concerns, to ensure that all important issues have been identified, and to identify major areas of agreement and disagreement.

A number of observations can be made about the enhanced participatory rulemaking process. First, this type of process was strongly supported by the workshop participants and the public. Participants welcomed the opportunity for early participation in the rulemaking process including the opportunity for participants to exchange information with one another about their views on the subject. Second, workshop participants also believed that the process was valuable in helping them to understand the concerns that formed the basis for other participants' views on the issues. Third, the process brought several significant issues to the attention of the staff that may not have been fully developed or pursued without this early dialogue provided by the workshops. Fourth, it also ensured a thorough evaluation of the rulemaking issues. And finally, but most importantly, there was a noticeable absence of the public "outrage" that had accompanied the BRC Policy, which would ultimately affect the acceptability of the rule.

NRC has also used some innovative public involvement techniques in the decommissioning of individual facilities through the use of "Community Information Roundtables." In this approach, the NRC brings together local community leaders, including those from local government and citizens groups, the licensee, the State and various Federal agencies together for a series of meetings over the life of the project to discuss risks, issues and concerns related to the action. In so doing, the public obtains timely information about NRC processes, has meaningful contact with our staff and can express and document concerns.

### Communication Activities

As you are aware, the methods of communicating to the public are as important as the content of the message and it is clear that our nuclear regulatory programs are undergoing a significant culture change. Any communication plan should have general principles for effective communications with the public that are simple. Examples are being able to tell citizens what risk licensees pose to them, how safe the facilities are, and how those risks might be judged or evaluated.

The NRC has learned to focus its communication efforts to provide greater oversight and coordination of all communication activities. All of these efforts reflect improvements in communication with stakeholders.

### Development of Communications Plans

The Strategic Goals in each arena in NRC's Strategic Plan include the Performance Goal of *Increasing Public Confidence*. This structure reflects the recognition of the importance of building and maintaining public trust. While the strategies discussed in the Strategic Plan are intended to increase public confidence, a fundamental tool that can be used to achieve this goal is the development and implementation of Communication Plans for important programs supporting each arena. In order to complete these plans, several actions should be completed:

- Development of a program supporting each arena for which individual Communications Plans should be developed.
- Identification of a person responsible for each Communication Plan.
- Preparation of Frequent Communication Interfaces, such as stakeholder groups or organizations which communicate or interface with the NRC in each area of regulatory activity.

- **Development of Mandatory Training Courses for Managers and Supervisors.**
- **Overall Review of Internal Communications.** This review includes data collection both within and outside the NRC to learn what we do well and to identify areas of improvement with regards to communication.
- **Redesign of Web Site.**
- **Plain Language Initiatives.** This commitment to improving communications with the public and other agency stakeholders using plain language in documents and at public meetings stemmed from two related initiatives in the U.S. In 1998, then President Clinton sent a *Memorandum on Plain Language in the Government* to the Heads of Executive Departments and Agencies. In addition, a follow-up memorandum from then Vice President Gore provided clear, concise guidelines with examples for writing plain language documents. As a result, a government-wide Plain Language Action Network was created to improve communications from the Federal government to the public.

### Summary

As you can see, the NRC is still in the process of learning, improving, and revising its communication and public outreach programs. These types of programs within regulatory agencies are intended to be fluid and should be expected to be revised as lessons are learned by all in this area. While we all take pride in being technically proficient and well-motivated, we also need to learn to communicate better and more frequently to the public. I believe that improvements to all of these areas are needed to not only advance the Commission's goal (or any regulatory agencies goal), which is to foster better public understanding of, and trust and confidence in, the regulatory program activities, but to also help to educate all of us in understanding the needs of our stakeholders.

Again, thank you for the opportunity to Chair this session and to share some of our U.S. experiences over the past decade with you.

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UNITED STATES  
NUCLEAR REGULATORY COMMISSION

Announcement No. 012

Date: February 23, 2001

To: All NRC Employees  
SUBJECT: SENIOR MANAGEMENT CHANGES

Mr. Frank J. Miraglia, Deputy Executive Director for Reactor Programs, is retiring from the NRC effective March 2, 2001. Mr. Miraglia's departure will bring an end to a long and distinguished career of public service. In a career spanning more than 30 years with the AEC/NRC, Mr. Miraglia has held many key managerial positions. He was appointed to his current position in December 1998. From 1990 to 1998, Mr. Miraglia was the Deputy Director, Office of Nuclear Reactor Regulation (NRR). Prior to that he had served in a number of management positions in NRR including Associate Director, Division Director, Deputy Division Director and Branch Chief.

Accordingly, I am pleased to announce the following senior management appointments:

Mr. William F. Kane has been appointed Deputy Executive Director for Reactor Programs. Mr. Kane has most recently been Director of the Office of Nuclear Material Safety and Safeguards (NMSS), where he also served as Director of the Spent Fuel Project Office from 1997 to 1999. Prior to his appointment as Director of NMSS, Mr. Kane was the Associate Director for Inspection and Programs in NRR. He has also served as the Deputy Regional Administrator in Region I. Mr. Kane joined the AEC/NRC in 1973 and is a 1961 graduate of Widener University, where he earned a B.S. degree in Mechanical Engineering.

Mr. Martin J. Virgilio has been appointed Director of NMSS. Mr. Virgilio currently serves as the Deputy Director of NMSS, the position he has occupied since December 1998. Prior to joining NMSS, he was the Executive Assistant and Director of the Office of the Chairman under Chairman Shirley Jackson. Mr. Virgilio has also been a Deputy Division Director in NRR and had served in a variety of other positions in NRR since joining the NRC in 1977. Mr. Virgilio earned his B.S. degree in Mechanical Engineering from the United States Merchant Marine Academy in 1971.

Ms. Margaret V. Federline will replace Mr. Virgilio as Deputy Director of NMSS. Ms. Federline is currently Deputy Director of the Office of Nuclear Regulatory Research (RES), a position she has held since July 1998. Before joining RES, Ms. Federline was Deputy Director of the Division of Waste Management, Chief of the Hydrology and System Performance Branch, and Chief of the Performance Assessment and Hydrology Branch in NMSS. She also served as a Technical Assistant and Senior Policy Advisor on Chairman Carr's staff. She joined the NRC in 1981. Ms. Federline received a B.A. degree in Biology and Physical Science from West Virginia University in 1968.

Mr. Roy P. Zimmerman will replace Ms. Federline as Deputy Director of RES. Mr. Zimmerman is currently the Deputy Director of NRR, a position he has held since December 1998. Before becoming Deputy Director of NRR, Mr. Zimmerman was NRR's Associate Director for Projects, after serving as a Reactor Inspector, Resident Inspector, Senior Resident Inspector, Branch Chief and Division Director in Regions I and V, and Deputy Division Director in NRR. Mr. Zimmerman joined the NRC in 1978. He received a B.S. degree in Marine (Mechanical) Engineering from the United States Merchant Marine Academy in 1976.

Mr. Jon R. Johnson will replace Mr. Zimmerman as Deputy Director of NRR. Mr. Johnson is currently the Associate Director for Inspection and Programs in NRR. From 1998 until his appointment in NRR, Mr. Johnson was Deputy Regional Administrator in Region II, and Director of the Division of Reactor Projects there as well. He has also served as Deputy Division Director for Reactor Safety and Reactor Projects in the Region. Mr. Johnson joined the NRC in 1978. He received a B.S. degree in Physics from the U.S. Naval Academy in 1970 and an M.E. degree in Nuclear Engineering from the University of Virginia in 1971.

Mr. R. William Borchardt will replace Mr. Johnson as the Associate Director for Inspection and Programs in NRR. Mr. Borchardt has been Director of the Office of Enforcement (OE) since August 1999 and was Deputy Director of that office for the preceding year. Before joining OE, Mr. Borchardt was Director of the Standardization Project Directorate and Chief of the Inspection Program Branch in NRR. He joined the NRC in 1983 as a Reactor Engineer in Region I. Mr. Borchardt received a B.S. degree in Chemistry from the U.S. Naval Academy in 1978.

Dr. Frank J. Congel will replace Mr. Borchardt as Director of OE. Dr. Congel has been Director of Incident Response Operations since 1999. In 1994, he was appointed as Director of the Incident Response Division in the former Office for Analysis and Evaluation of Operational Data. Prior to that he held a number of positions in NRR including Division Director and Branch Chief. Dr. Congel joined the AEC/NRC in 1972. He received a B.S. degree in Physics from LeMoyne College in 1964 and an M.S. degree and Ph.D. in Nuclear Physics from Clarkson

College of Technology in 1967 and 1968, respectively.

These changes will be phased in over the next several weeks. Please join me in congratulating these executives on their new assignments.

/RA/

William D. Travers  
Executive Director for Operations

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**NRC NEWS**  
U.S. NUCLEAR REGULATORY COMMISSION

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No. 01-016

February 16, 2001

**NRC DIRECTS CP&L NOT TO STORE SPENT FUEL  
IN ADDITIONAL STORAGE POOLS PENDING FURTHER ORDER**

The Nuclear Regulatory Commission has directed its staff to provide the Commission with additional information on a recently approved Carolina Power & Light Company (CP&L) license amendment and directed CP&L not to store spent nuclear fuel at its Shearon Harris Nuclear Power plant in Raleigh, N.C., in two additional spent fuel pools until the storage is approved by the NRC's Atomic Safety and Licensing Board (ASLB) or another order is issued by the Commission.

The NRC staff in December had approved CP&L's request to expand the capacity for storage of spent nuclear fuel by placing two additional spent fuel pools in service. As permitted by the Atomic Energy Act and NRC regulations, this staff action was taken even though a hearing by an NRC Atomic Safety and Licensing Board (ASLB) has not been completed because the NRC staff had completed its review of the request and the associated issues.

The Board of Commissioners of Orange County, N.C., which is a party to the ASLB hearing, filed a petition for review and request for immediate suspension and stay of the NRC staff's issuance of the license amendment for spent fuel expansion. The five-person Commission that heads up the NRC, in an order issued Wednesday, rejected the Orange County petition, saying it is not permitted by NRC regulations, but said it would determine whether to exercise its discretion and review the NRC staff's decision that resulted in issuance of the license amendment. The Commission directed its staff to provide additional information and views on the issues within 14 days.

The Commission said it "will entertain no further filings on this issue from any party other than the NRC staff."

To preserve the status quo while the Commission considers the additional information to be provided by the staff, it directed the licensee not to store spent fuel under the license amendment. CP&L may continue necessary pre-storage activities if it so chooses.

The Harris plant, located 21 miles southwest of Raleigh, N.C., was originally designed for four reactors, but only one was completed. However, the plant's fuel handling building has four spent fuel pools, as originally planned. The NRC operating license for Harris issued in 1987 authorized CP&L to use two of those pools for storage of spent fuel from the Harris plant and from the company's other nuclear power reactors, Brunswick Units 1 and 2, near Southport, N.C., and H.B. Robinson, near Hartsville, S.C.

In December 1998, CP&L asked the NRC for a license amendment to approve placing the two additional spent fuel pools in service at Harris in order to provide spent fuel storage capacity for all four of its nuclear units through the end of their current licenses.

In February 1999, the Board of Commissioners of Orange County, N.C., filed a petition to intervene and requested a hearing related to CP&L's request. The NRC granted the petition, and established an NRC Atomic Safety and Licensing Board (ASLB) to review Orange County's contentions. The ASLB's review is ongoing.

However, under NRC regulations, the NRC staff may issue an amendment immediately effective in advance of the holding or completion of a hearing, where it has determined that no significant hazards considerations are involved. A proposed amendment involves no significant hazards consideration if operation of the facility in accordance with the amendment would not: (1) involve a significant increase in the probability or consequences of an accident previously evaluated; (2) create the possibility of a new or different kind of accident from any accident previously evaluated; or (3) involve a significant reduction in a margin of safety.

The NRC staff made a final determination that the amendment for Harris involved no significant hazards considerations and issued an immediately effective amendment on December 21. The basis for this determination was contained in a safety evaluation issued with the amendment. The amendment was subject to modification or other action that may result from the ASLB's decision on the completion of the adjudicatory proceeding.

The ASLB is currently considering legal filings from the parties to the hearing (Orange County, CP&L and the NRC staff) as to whether it is necessary to conduct an oral hearing - - in which the Board would take evidence and hear witnesses - - as opposed to making a decision on the existing written record regarding whether the staff has to conduct a further environmental evaluation.



***NRC NEWS***  
U.S. NUCLEAR REGULATORY COMMISSION

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No. 01-017

February 20, 2001

**NRC APPROVES LICENSE TERMINATION PLAN FOR  
TROJAN NUCLEAR POWER PLANT**

In August 1999, Portland General Electric filed its proposed license termination plan for the site with NRC. In December 1999, NRC issued a proposed determination that there were no significant hazards to be considered with regard to the license termination plan. A public meeting was subsequently held in St. Helens, Oregon, at which officials of the company presented the details of the plan and NRC officials presented a discussion of applicable regulations and inspection policy. Interested citizens asked questions and provided comments on the license termination plan. The public was also given an opportunity to request a hearing or file a petition for leave to intervene. No such requests were made.

The Trojan Nuclear Plant began commercial operation in 1976 and was shut down permanently in January of 1993. The plant currently is being dismantled and decontaminated.

The reactor vessel, which represented almost all of the remaining radioactive material, excluding the spent fuel, was removed from the site in 1999. The company has received a license from NRC to store spent fuel safely in a dry cask storage facility above ground at the site until a permanent waste repository is available. The company will still be responsible for monitoring the safe storage of the spent fuel while it remains on site after its removal from the spent fuel pool, even after the reactor license has been terminated.

Copies of the amendment approving the license termination plan and related documents are available for review at the NRC Public Document Room, 11555 Rockville Pike, Rockville, Maryland, telephone: 301/415-4737, or electronically through the Public Electronic Reading Room link at the NRC web site at <http://www.nrc.gov>. The documents will also be accessible through ADAMS, the Agencywide Documents Access and Management System.

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January 9, 2001

EA-00-208

Garry L. Randolph, Senior Vice  
President and Chief Nuclear Officer  
Union Electric Company  
P.O. Box 620  
Fulton, Missouri 65251

SUBJECT: FINAL SIGNIFICANCE DETERMINATION FOR THREE WHITE FINDINGS AND NOTICE OF VIOLATION (NRC INSPECTION REPORT 50-483/00-17, CALLAWAY PLANT)

Dear Mr. Randolph:

The purpose of this letter is to provide you with the final results of our significance determination of the preliminary White findings identified in the subject inspection report. The inspection findings were assessed using the significance determination process and were preliminarily characterized as three White findings (i.e., issues with low to moderate increased importance to safety, which may require additional NRC inspections).

The findings involved performance deficiencies in your ALARA (As Low As is Reasonably Achievable) planning and controls program. We emphasize that, although there were no exposures in excess of regulatory limits, the performance deficiencies resulted in unnecessary doses to workers during Refueling Outage 10. As documented in the subject inspection report, these deficiencies involved: 1) planning and conducting maintenance activities in the vicinity of the reactor coolant system (RCS), during a time period soon after shutdown, when area dose rates were temporarily elevated by a chemical cleaning process designed to remove radioactive particulate from RCS internal surfaces, without commensurate compensatory measures; 2) planning and conducting maintenance activities in the vicinity of the steam generators before the steam generator bowl drains were flushed, resulting in higher than normal area dose rates without commensurate compensatory measures; 3) conducting maintenance activities on the reactor coolant pumps and steam generators without the steam generator secondary sides filled with water, resulting in higher than normal area dose rates without commensurate compensatory measures; 4) conducting maintenance activities without sufficient mock-up training to familiarize contract workers with plant equipment, use of tools, and techniques to effectively reduce the dose that they would receive; and 5) performing maintenance activities with ineffective communications between radiation protection personnel and the primary contractor, which resulted in additional worker exposure due to ineffective planning and sequencing of work activities. Your staff originally estimated that plant workers would receive exposures totaling 165 person-rem during Refueling Outage 10. The actual value was 305 person-rem. Your staff discussed a number of factors to explain the differences between the actual and estimated values. Notwithstanding, the NRC concluded that a significant portion of this increase was the result of poor ALARA practices.

At your request, a regulatory conference was held on November 9, 2000, to discuss your views on this issue. During the meeting, your staff described your assessment of the significance of the findings, corrective actions, and the root cause evaluations for the issues. You provided supplemental information in a letter dated November 16, 2000, in which you took issue with the NRC's determination of the process control level at which a work activity should be defined as a "job." The job classification is used for the purpose of calculating the amount of excess dose accumulated and consequently characterizing the significance of a finding in accordance with the Occupational Radiation Safety Significance Determination Process (SDP). Based on your interpretation of Callaway Plant procedures, you asserted that the Work Authorizing Document (WAD) is the appropriate process control level that should be used to classify a particular activity as a job for ALARA purposes, and that, utilizing this approach, the findings appeared to constitute one White finding, rather than the three White findings which were identified by the NRC in the subject inspection report.

Notwithstanding that assertion, after considering the information developed during the inspection, the additional information you provided at the regulatory conference, and the information provided in your November 16, 2000, letter, the NRC has concluded that the inspection findings are appropriately characterized as three White findings. We recognize that the term "job" is not formally defined by the SDP and its supporting guidance. However, as discussed in the November 9, 2000, regulatory conference, the term "jobs" in the Occupational Radiation Safety SDP clearly corresponds to those work activities for which distinct ALARA planning and controls are implemented. From our review of your procedure PDP-ZZ-00003, "Work Document Planning," Rev. 28, and your conduct of in-progress job and post-job reviews required by procedure HTP-ZZ-01102, "Pre-Job ALARA Planning and Briefing," Rev. 14, we conclude that your ALARA planning and controls were primarily implemented at the Radiation Work Permit (RWP) level rather than at the WAD level for the work activities in question. For ALARA purposes, Callaway Plant procedures allow multiple WADs to be grouped and controlled under one RWP. Consequently, the bases for the three White findings described in the inspection report remain valid.

The first White finding involved scaffolding activities (RWP-50903). We noted that for scaffolding activities, dose projections were made for the RWP, in-progress reviews were conducted for the RWP, and post-job reviews were conducted for the RWP. None of these activities occurred for the associated scaffold permits or the associated WAD. Since this RWP accrued more than 25 person-rem and exceeded its dose projection by greater than 50 percent, it constituted a single White finding.

The second White finding involved steam generator eddy current/robotic plugging/stabilizing/ electrosleeving activities (RWP-53323). Although dose projections were made for the associated WADs, there were no work process information sheets completed for each WAD. Similarly, an in-progress job review was done for the RWP, not the individual WADs, and post-job reviews were performed for the RWP, and not the individual WADs. Again, since this RWP accrued more than 25 person-rem and exceeded its dose projection by greater than 50 percent, it constituted a second White finding.

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The third White finding occurred because there were four jobs with actual doses greater than 5 person-rem and exceeded their dose projections by more than 50 percent. These jobs included steam generator manway covers and inserts removal and installation (RWP 99-53321), health physics support for primary and secondary steam generator activities (RWP 99-53324), foreign object search and retrieval (RWP 99-53022), and reactor coolant pump seal removal and replacement (RWP 99-52520). ALARA planning and controls were instituted for these four RWPs, and not their associated WADs.

We acknowledge that the performance associated with these findings occurred before April 1, 2000, the implementation date of the revised reactor oversight program (ROP). However, we are assessing these findings in a manner consistent with the ROP initial year implementation guidance which directs that findings identified in inspection reports completed after April 1, 2000, will be assessed under the ROP regardless of when the performance deficiency occurred.

You have 10 business days from the date of this letter to appeal the staff's determination of significance for the identified White findings. Such appeals will be considered to have merit if they meet the criteria given in NRC Inspection Manual Chapter 0609, "Significance Determination Process," Attachment 0609.03.

The NRC has also determined that these demonstrated performance deficiencies constitute a violation of 10 CFR 20.1101(b). Specifically, you did not use, to the extent practical, procedures and engineering controls based upon sound radiation protection principles to achieve occupational doses ALARA. The violation is cited in the attached Notice of Violation (Notice), and the circumstances surrounding the violation are summarized in this letter and described in detail in the subject inspection report. In accordance with the NRC Enforcement Policy, NUREG-1600, the Notice of Violation is considered an escalated enforcement action because it is associated with White findings.

You are required to respond to this letter and should follow the instructions specified in the enclosed Notice when preparing your response. The NRC will use your response, in part, to determine whether further enforcement action is necessary to ensure compliance with regulatory requirements.

Because plant performance for these findings has been determined to be in the degraded cornerstone column of the operating reactor assessment Action Matrix, we will notify you, by separate correspondence, of our determination of the appropriate NRC response.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be made available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/NRC/ADAMS/index.html> (the Public Electronic Reading Room).

Sincerely,

/RA/

Ellis W. Merschoff  
Regional Administrator

Docket No.: 50-483  
License No.: NPF-30

Enclosure: Notice of Violation

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NOTICE OF VIOLATION

Union Electric Company  
Callaway Plant

Docket No. 50-483  
License No. NPF-30  
EA-00-208

During an NRC inspection conducted on August 7-11, 2000, a violation of NRC requirements was identified. In accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions," NUREG-1600, the violation is listed below:

10 CFR 20.1101(b) requires that the licensee use, to the extent practical, procedures and engineering controls based upon sound radiation protection principles to achieve occupational doses and doses to members of the public that are as low as is reasonably achievable (ALARA).

Contrary to the above, during Refueling Outage 10, conducted between October and November 1999, the licensee did not use, to the extent practical, procedures and engineering controls based upon sound radiation protection principles to achieve occupational doses ALARA. Specifically, although the original dose estimate for Refueling Outage 10 indicated that plant workers would receive exposures totaling 165 person-rem, the actual dose received was 305 person-rem and a significant portion of this increase was attributable to poor ALARA work practices. For example:

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- a. the licensee planned and conducted maintenance activities in the vicinity of the reactor coolant system (RCS), during a time period soon after shutdown, when area dose rates were temporarily elevated by a chemical cleaning process designed to remove radioactive particulate from RCS internal surfaces, without commensurate compensatory measures, resulting in doses that were not ALARA.
- b. the licensee planned and conducted maintenance activities in the vicinity of the steam generators before the steam generator bowl drains were flushed, resulting in higher than normal area dose rates without commensurate compensatory measures, resulting in doses that were not ALARA.
- c. the licensee conducted maintenance activities on the reactor coolant pumps and steam generators without the steam generator secondary sides filled with water, resulting in higher than normal area dose rates without commensurate compensatory measures, resulting in doses that were not ALARA.
- d. the licensee conducted maintenance activities without sufficient mock-up training to familiarize contract workers with plant equipment, use of tools, and techniques to effectively reduce the dose that they would receive.
- e. the licensee performed maintenance activities with ineffective communications between radiation protection personnel and the primary contractor, which resulted in additional worker exposure due to ineffective planning and sequencing of work activities.

This violation is associated with three White SDP findings.

Pursuant to the provisions of 10 CFR 2.201, Union Electric Company is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555 with a copy to the Regional Administrator, Region IV, and a copy to the NRC Resident Inspector at the facility that is the subject of this Notice, within 30 days of the date of the letter transmitting this Notice of Violation (Notice). This reply should be clearly marked as a "Reply to a Notice of Violation" and should include for each violation: (1) the reason for the violation, or, if contested, the basis for disputing the violation or severity level, (2) the corrective steps that have been taken and the results achieved, (3) the corrective steps that will be taken to avoid further violations, and (4) the date when full compliance will be achieved. Your response may reference or include previous docketed correspondence, if the correspondence adequately addresses the required response. If an adequate reply is not received within the time specified in this Notice, an order or a Demand for Information may be issued as to why the license should not be modified, suspended, or revoked, or why such other action as may be proper should not be taken. Where good cause is shown, consideration will be given to extending the response time.

If you contest this enforcement action, you should also provide a copy of your response, with the basis for your denial, to the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001.

Because your response will be made available to the Public, to the extent possible, it should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the public without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request withholding of such material, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim of withholding (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.790(b) to support a request for withholding confidential commercial or financial information). If safeguards information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21.

In accordance with 10 CFR 19.11, you are required to post this Notice within two working days.

Dated this 9th day of January 2001

Office of Nuclear Regulatory Research  
Items of Interest  
Week Ending February 16, 2001

Comparison of the Indian and the New Madrid Earthquakes

Prior to the recent earthquake a number of prominent seismologists had drawn comparisons between the Kutch region of India and the New Madrid seismic zone in the central United States. The recent earthquake has aroused interest in these comparisons and has generated a significant number of high quality digital seismograms from both regional and worldwide seismographic stations. Some of the apparent similarities are:

- Both areas are in Stable Continental Regions; there is little or no tectonic activity such as is found in California along the San Andreas fault or in the subduction zones seaward of Japan or South America.
- Both areas have experienced great earthquakes within the last few hundred years: in 2001 and 1819 in India, and in 1811/1812 in New Madrid with geological evidence for earlier earthquakes at a several-hundred-year recurrence period.
- Both have similar ground motion attenuation characteristics; strong ground motions are propagated over larger regions in comparison to regions such as California.
- Both have similar seismicity patterns for the last two hundred years; a limited number of moderate earthquakes, 3 or 4, events with a magnitude 5 to 6.
- Both have limited cumulative land form change given the large size of the earthquakes and the short recurrence period, i.e., there are no mountains or valleys in these areas.

Significant post-earthquake investigations that will increase the knowledge base for the comparison of these two apparently analogous areas are planned by the U.S. Geological Survey, the Indian Geological Survey, numerous research institutes and universities around the world, and commercial geoscience companies.

There is currently no reason for a significant change to the present assessment of the seismic hazard in the New Madrid zone.

The old adage that lightning does not strike twice in the same place is not true for the town of Bhuj. Bhuj was devastated in the January 26, 2001, event (there are reports that 10,000 residents out of a population of 35,000 have perished), and Bhuj suffered a reported 2,000 fatalities/casualties from the 1819 earthquake.

While the NRC is not actively engaged in discussions on nuclear issues with India, it has communicated this recent earthquake, with the Indian geoscience community through the U.S. Geological Survey and university-based research organizations. These leads will be actively pursued to bring to bear the lessons to be learned to US seismic hazard issues as rapidly as possible.

February 16, 2001

ENCLOSURE C



## **NRC NEWS**

**U.S. NUCLEAR REGULATORY COMMISSION**

**Office of Public Affairs**  
**Washington, DC 20555-001**

**Telephone: 301/415-8200**

**E-mail: [opa@nrc.gov](mailto:opa@nrc.gov)**

**Web Site: <http://www.nrc.gov/OPA>**

No. 01-018

February 20, 2001

### **NRC TO HOLD WORKSHOP MARCH 26-28 ON INITIAL IMPLEMENTATION OF THE REACTOR OVERSIGHT PROCESS**

The Nuclear Regulatory Commission will hold a public workshop March 26 - 28 in Gaithersburg, Maryland, to discuss lessons learned from the first year of implementing the agency's new reactor oversight process.

The workshop will be held at the Gaithersburg Hilton Hotel, 620 Perry Parkway, Gaithersburg, Md. The plenary session will be from 10:00 a.m. till noon on March 26. Workshop sessions will be from 1:00 to 5:00 p.m. on March 26; 8:00 a.m. to 5:00 p.m. on March 27; and 8:00 a.m. till noon on March 28. The closing plenary session will be from 1:00 to 3:30 p.m. on March 28.

Interested individuals can pre-register for the workshop on line at:

[www.nrc.gov/NRR/OVERSIGHT/ROP/workshop.html](http://www.nrc.gov/NRR/OVERSIGHT/ROP/workshop.html) on NRC's web site. On-site registration will be from 8:00 to 10:00 a.m. on March 26.

Members of the public, the media, and representatives from state, industry and public interest groups are expected to participate in discussions, providing their views on the reactor oversight process, initially implemented industry-wide last April.

Preliminary topics include issues with selected nuclear power plant performance indicators, assessing maintenance effectiveness, conducting problem identification and resolution inspections, evaluating cross-cutting areas, potential changes to the assessment process, issues associated with the occupational radiation safety cornerstones, and communication of inspection results. NRC plans to post a final agenda on the NRC web site ten days prior to the workshop.

Workshop participants should be familiar with the reactor oversight process in order to facilitate their participation. The NRC web site at: [www.nrc.gov/NRR/OVERSIGHT/index.html](http://www.nrc.gov/NRR/OVERSIGHT/index.html) provides useful information related to performance indicators, inspection findings and reports, and the new processes and procedures. Any questions about the workshop should be directed to August Spector at (301) 415-2140 or email: [AKS@NRC.GOV](mailto:AKS@NRC.GOV).

###

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## RIC 2001

**WELCOME MESSAGE  
FROM THE CONFERENCE CHAIRMAN  
SAM COLLINS, DIRECTOR  
OFFICE OF NUCLEAR REACTOR REGULATION**

- [Nuclear Reactors](#)
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This will be the U.S. Nuclear Regulatory Commission's (NRC) 13th Annual Regulatory Information Conference (RIC). The conference, which is being sponsored by the Office of Nuclear Reactor Regulation, will be an opportunity for managers from NRC, its regulated utilities and other interested stakeholders to meet and communicate directly regarding safety initiatives and regulatory issues.

The agenda for RIC 2001 was created using the input from the post-RIC 2000 Attendee Survey and the on-line stakeholder survey which closed in November. We appreciate all of the comments and input we received. As in years past, the RIC 2001 Program will focus on enhancing and promoting a better understanding of regulatory trends and initiatives for improving nuclear safety. The format of RIC 2001 will include presentations by NRC Chairman Richard A. Meserve, as well as, the NRC Commissioners and the Executive Director for Operations. A forum for discussion of international topics will be included. The conference will continue to emphasize the exchange of views, focusing on those challenges that shape NRC policy and programs. As usual, the RIC is open to the public.

Your participation is necessary to make the conference both interesting and meaningful.

I look forward to seeing you at the next RIC which is scheduled for March 13, 14 and 15, 2001, at the Capital Hilton Hotel, Washington, D.C.

Content validated on January 29,2001

Send comments about this page to content [sab1@nrc.gov](mailto:sab1@nrc.gov)



# RIC 2001

## PROGRAM AND SCHEDULE

[Tuesday, March 13](#) | [Wednesday, March 14](#) | [Thursday, March 15](#) | [Room Map](#) |

= Keynote Speakers.  
Click on names to learn more about a Keynote Speaker

**Please read before viewing Program and Schedule:**  
Below is the draft Program and Schedule for RIC 2001 as of February 13, 2001 which provides revised session informat  
Please be sure to bookmark this page and check back for further updates.

- [Nuclear Reactors](#)
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### Program and Schedule

Session #	This column displays: <ul style="list-style-type: none"> <li>• Session Time and Place</li> <li>• Panel Chair and Panelists</li> <li>• Proposed sub-topics</li> </ul>	This column displays: <ul style="list-style-type: none"> <li>• web links associated with the topic</li> <li>• post conference slides and speeches</li> <li>• post conference action items and IOUs</li> </ul>
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*Conference Opening: Tuesday, March 13, 2001, 1:00 p.m.*

T1	Welcome, Plenary Session 1:00 p.m. - 1:30 p.m. Presidential Ballroom  William D. Travers, Executive Director for Operations (EDO) Nuclear Regulatory Commission (NRC) Samuel J. Collins, Conference Chairman, Director (D), Office of Nuclear Reactor Regulation (NRR)/NRC	
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T2	Plenary Session 1:30 p.m. - 2:15 p.m. , Presidential Ballroom  NRC Chairman Richard A. Meserve	
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Break 2:15 p.m. - 2:45 p.m.

T3	Conference Objectives Plenary Session 2:45 p.m. - 3:15 p.m. , Presidential Ballroom  Samuel J. Collins, D/NRR/NRC RIC 2001 Panel Chairs	
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Break 3:15 p.m. - 3:30 p.m.

Regional Breakout Sessions 3:30 p.m. - 4:30 p.m.

Note: The following Core Topics will be discussed in each of the Regional Breakout sessions:

- ROP Communications
- Processing Risk Significant Issues
- Mid-cycle Inspection Plans
- Operator Licensing

T4	Region I Breakout Licensee Interface and Communication Presidential Ballroom  Hubert J. Miller, Chair Regional Administrator (RA), Region (RG) I, NRC  Panelists: Roy P. Zimmerman, Deputy Director (DD) /NRR/NRC Lee Olivier, Vice President (VP), Millstone Nuclear Power Plant  Topics: See note on core topics above	
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T5	<p><b>Region II Breakout Licensee Interface and Communication</b> Congressional/Senate Rooms</p> <p><b>Luis A. Reyes, Chair</b> RA, RG II, NRC</p> <p><b>Panelists:</b> Samuel J. Collins, D/NRR/NRC Richard T. Purcell, Site Vice President, Sequoyah Nuclear Power Plant</p> <p><b>Session Coordination:</b> Victor McCree, DD/Division of Reactor Projects, RG II, E-Mail <a href="mailto:VMM@nrc.gov">VMM@nrc.gov</a>, Telephone (404) 562-4500</p> <p><b>Topics:</b> See note on core topics above</p>	
T6	<p><b>Region III Breakout Licensee Interface and Communication</b> Federal A/B Rooms</p> <p><b>James E. Dyer, Chair</b> RA, RG III, NRC</p> <p><b>Panelists:</b> Brian W. Sheron, Associate Director for Project Licensing &amp; Technical Analysis, (ADPT)NRR/NRC Robert F. Saunders, President and Chief Nuclear Officer, FirstEnergy Nuclear Operating Company</p> <p><b>Topics:</b> See note on core topics above</p>	
T7	<p><b>Region IV Breakout Licensee Interface and Communication</b> South American A/B Rooms</p> <p><b>Ellis W. Merschoff, Chair</b> RA, RG IV, NRC</p> <p><b>Panelists:</b> Jon R. Johnson, Associate Director For Inspections and Programs (ADIP) NRR/NRC Harold B. Ray, Executive Vice President, Southern California Edison</p> <p><b>Session Coordination:</b> K.E. Brockman, D/Division of Reactor Projects, RG IV, E-Mail <a href="mailto:KEB@nrc.gov">KEB@nrc.gov</a>, Telephone 817-860-8248</p> <p><b>Topics:</b> See note on core topics above</p>	
<b>Break 4:30 p.m. - 4:45 p.m.</b>		
<b>Regional Breakouts Sessions Continue 4:45 p.m. - 5:45 p.m.</b>		
<b>TUESDAY, March 13, 2001 CONFERENCE RECESS 5:45 P.M.</b>		
<b>Wednesday, March 14, 2001</b>		
<b>Wednesday, March 14, 2001</b>		
W1	<p><b>Regulatory Trends Plenary Session</b> 8:00 a.m. - 8:30 a.m. Presidential Ballroom</p> <p><b>Samuel J. Collins, D/NRR/NRC</b></p>	
<b>Break 8:30 a.m. - 8:45 a.m.</b>		
<b>Breakout Sessions 8:45 a.m. - 10:00 a.m.</b>		
W2	<p><b>Reactor Oversight Process</b> Presidential Ballroom</p> <p><b>Bruce A. Boger, Chair</b> D, Division of Inspection Program Management (DIPM)NRR/NRC</p>	<p><b>Web-links:</b> Reactor Oversight Process <a href="http://www.nrc.gov/NRR/OVERSIGHT/index.html">http://www.nrc.gov/NRR/OVERSIGHT/index.html</a></p>

	<p><b>Panelists:</b>                  William M. Dean, Chief, Inspection Program Branch, DIPM/NRR/NRC                  Kenneth E. Brockman, D, Division of Reactor Projects, RG IV, NRC                  Stephen Floyd, D, Regulatory Reform and Strategy, Nuclear Energy Institute (NEI)                  Raymond G. Shadis, Staff Advisor, New England Coalition on Nuclear Pollution                  James L. Setser, Chief, Program Coordination Branch, Environmental Protection Division, Georgia Department of Natural Resources</p> <p><b>Session Coordination:</b>                  Serita Sanders, Reactor Operations Engineer, DIPM/NRR/NRC - (E-MAIL: <a href="mailto:SXS5@nrc.gov">SXS5@nrc.gov</a> : Telephone: (301) 415-2956</p> <p><b>Sub-Topics:</b>                  Where We Are Now                  Program Adjustments                  Crosscutting Issues                  Future Developments - Risk Based Performance Indicators</p>	
<p><b>W3</b></p>	<p><b>Risk Informed Activities</b>                  Congressional/Senate Rooms</p> <p><b>Richard J. Barrett, Chair</b>                  Chief, Probabilistic Safety Assessment Branch (SPSB), Division of Systems Safety &amp; Analysis (DSSA) NRR/NRC</p> <p><b>Panelists:</b>                  James Levine, Executive VP, Generation, Arizona Public Service Company</p> <p><b>Dr. Jill Lipoti, Assistant Director for</b>                  Radiation Protection Programs, New Jersey Department of Environmental Protection</p> <p><b>Cynthia Carpenter, Chief, Generic</b>                  Issues, Environmental, Financial &amp; Rulemaking Branch (RGEB) Division of Regulatory Improvement Programs (DRIP) NRR/NRC</p> <p><b>Thomas L. King, D, Division of Risk</b>                  Analysis and Applications (DRAA) Office of Research (RES)NRC                  Deputy Executive Director for Reactor Programs (DEDR)/NRC</p> <p><b>Session Coordination:</b>                  Mark Caruso, Senior Reliability and Risk analyst, ERAB/DET/RES/NRC, E-Mail <a href="mailto:MAC@nrc.gov">MAC@nrc.gov</a>, Telephone (301)415-1310                  Stu Magruder, Senior Project Manager, RGEB/DRIP/NRR/NRC, E-Mail <a href="mailto:SLM1@nrc.gov">SLM1@nrc.gov</a>, Telephone (301) 415-3139</p> <p><b>Sub-Topics:</b>                  Vision for the Future - challenges, opportunities, roadblocks</p>	<p><b>Web-links:</b>  <a href="http://www.nrc.gov/NRC/REACTOR/RISK50/index.html">http://www.nrc.gov/NRC/REACTOR/RISK50/index.html</a></p> <p><b><u>Risk-Informed Part 50, Modifications to Special Treatment Requirements (Option 2)</u></b></p> <p><b><u>Risk-Informed Part 50, Changes to Technical Requirements (Option 2)</u></b></p> <p><b><u>Use of Risk Information in Review of Non-Risk Informed License Amendment Requests</u></b></p> <p><b><u>Rulemaking Plan for Risk-Informing Special Treatment Requirements (SRM 99-256)</u></b></p> <p><b><u>STAFF REQUIREMENTS - SECY-99-264 - PROPOSED STAFF PLAN FOR RISK-INFORMING TECHNICAL REQUIREMENTS IN 10 CFR PART 50</u></b>  <a href="http://www/nrc.gov/RES/riskinfreg.htm">http://www/nrc.gov/RES/riskinfreg.htm</a></p>
<p><b>W4</b></p>	<p><b>Safeguards Rulemaking</b>                  Federal A/B Rooms</p> <p><b>Frank P. Gillespie, Chair</b>                  DD, DIPM/NRR/NRC</p> <p><b>Panelists:</b>                  Glenn M. Tracy, Chief, Operator</p>	<p><b>Web-Links:</b>  <b><u>Rulemaking Plan. Physical Security Requirements for Exercising P Reactor Licensees' Capability to Respond to Safeguards Contingency Events (SRM 1999-241)</u></b></p>

Licensing, Human Performance & Plant Support Branch, DIPM/NRR/NRC  
 Michael F. Weber, D, Division of Fuel Cycle Safety and Safeguards, NMSS/NRC  
 Dr. Edwin Lyman, Scientific Director, Nuclear Control Institute  
 Lance Terry, SVP and Principal Nuclear Officer, TXU Electric

Session Coordination:  
 Richard P. Rosano, Senior Program Manager, IOLB/DIPM/NRR/NRC - (E-Mail [RPR@nrc.gov](mailto:RPR@nrc.gov) ; Telephone (301) 415-3282)

Sub-Topics:  
 Why is a security rule change needed? Applicable lessons from the past year of activity.  
 Approaches to dealing with radioactive sources other than the reactor at Part 50 licensees.  
 Oversight of performance approaches to requirements.  
 Design basis threat/adversary characteristic proposed process.

W5 Allegation Process/Safety Conscious Work Environment  
 South American A/B Rooms

Edward T. Baker III, Chair  
 Agency Allegations Advisor/NRR/NRC

Panelists:  
 Jay M. Gutierrez, Partner, Morgan, Lewis and Bockius  
 David Lochbaum, Nuclear Safety Engineer, Union of Concerned Scientists (UCS)  
 Dennis C. Dambly, Assistant General Counsel for Materials Litigation and Enforcement (OGC) NRC  
 R. William Borchardt, D, Office of Enforcement (OE), NRC

Session Coordination:  
 Elaine A. Raphael, Allegations Assistant, NRR/NRC - (E-Mail [EAR1@nrc.gov](mailto:EAR1@nrc.gov) ; Telephone (301) 415-2298)

Sub-Topics:  
 Commission Decision on Risk Informing Allegation Program  
 Status of OE Task Force on Discrimination  
 AHow should NRC assess the SCWE at a licensee=s facility?@

Web-links:  
[Reporting Safety Concerns - NRC's Allegation Program](#)  
 SRM - Implementing the Allegation Program under the Revised Reactor Oversight Process  
<http://www.nrc.gov/NRC/COMMISSION/SRM/2000-0177srm.htm>  
 Implementing the Allegation Program under the Revised Reactor Oversight Process  
<http://www.nrc.gov/NRC/COMMISSION/SECYS/2000-0177scv.htm>  
 OE web page on Task Group activities <http://www.nrc.gov/OE/>

Break 10:00 a.m. - 10:15 a.m.

Breakout Sessions 10:15 a.m. -11:30 a.m.

W6 Industry Initiatives  
 Presidential Ballroom

Ledyard ( Tad) B. Marsh, Chair  
 Chief, Events Assessment, Generic Communications & Non-Power Reactors Branch DRIP/NRR/NRC

Panelists:  
 Jack A. Bailey, Vice President, Engineering and Technical Services, TVA Nuclear  
 Alex Marion, D, Programs, Nuclear Generation, NEI  
 James Riccio, Senior Policy Analyst, Public Citizen

Web-links:  
 Development of Voluntary Industry Initiatives Home Page  
<http://www.nrc.gov/NRC/REACTOR/VII/index.html>

**Session Coordination:**  
Charles Petrone, DRIP/NRR, E-Mail  
[CDP@nrc.gov](mailto:CDP@nrc.gov), Telephone (301)  
415-1027

**Sub-Topics:**  
Guidelines  
Owners Group activities

W7

**License Renewal**  
Congressional/Senate Rooms

**Web-links:**  
[License Renewal Home Page](#)

Christopher I. Grimes, Chair  
Chief, License Renewal &  
Standardization Branch,  
DRIP/NRR/NRC  
Michael E. Mayfield, Co-Chair  
D, Division of Engineering Technology,  
RES/NRC

**Panelists:**  
James Lang, D, Power Productions,  
Electric Power Research Institute  
David Lochbaum, Nuclear Safety  
Engineer, UCS  
Dr. Edwin Lyman, Scientific Director,  
Nuclear Control Institute  
Garry G. Young, P.E., Manager,  
Business Development, Entergy  
Services, Inc.

**Session Coordination:**  
Steve T. Hoffman, Senior Project  
Manager, RLSB/DRIP/NRR/NRC -  
(E-Mail [STH@nrc.gov](mailto:STH@nrc.gov) ; Telephone  
(301) 415-3245)

**Sub-Topics:**  
Generic Aging Lessons Learned  
(GALL)  
Future renewal applications and  
workload  
Public interests and involvement  
Future aging research

W8

**Significance Determination and**  
Enforcement Issues  
Federal A/B Rooms

**Web-links:**  
[Office of Enforcement](#)  
<http://www.nrc.gov/NRR/OVERSIGHT/index.html>  
<http://www.nrc.gov/OE/>

Jon R. Johnson, Chair  
ADIP/NRR/NRC

**Panelists:**  
Steven Floyd, Senior Director,  
Regulatory Reform, NEI  
Dr. Jill Lipoti, Assistant Director for  
Radiation Protection Programs, New  
Jersey Department of Environmental  
Protection  
R. William Borchardt, D, OE/NRC  
Gene Grecheck, Vice President, Nuclear  
Operations, Millstone Nuclear Power  
Plant

**Session Coordination:**  
Terrence Reis, Senior Enforcement  
Coordinator/NRR, E-Mail  
[TXR@nrc.gov](mailto:TXR@nrc.gov), Telephone (301)  
415-3281

**Sub-Topics:**  
Regulatory Conferences  
Timeliness  
Assessment of Significance  
Notices of Violations  
Trends in escalated and non escalated  
enforcement  
Alternate Dispute Resolution Individual

	<p><b>Actions</b> Public availability of significance determination analysis</p>	
W9	<p><b>Risk Informed Technical Specifications South American A/B Rooms</b></p> <p><b>William D. Beckner, Chair</b> Chief, Technical Specifications Branch (RTSB) DRIP/NRR/NRC</p> <p><b>Panelists:</b> Rick Grantom, Administrator of Risk and Reliability Analysis, South Texas Project, STP Nuclear Operating Company Alan C. Rae, HM Principal Inspector of Nuclear Installations, HM Nuclear Installations Inspectorate, United Kingdom J.E. Dusty Rhoads, Principal Licensing Engineer, Energy Northwest F. Mark Reinhart, Section Chief, SPSB/DSSA/NRR/NRC</p> <p><b>Session Coordination:</b> Nanette V. Gilles, Senior Operations Engineer, RTSB/DRIP/NRR/NRC - (E-Mail <a href="mailto:NVG@nrc.gov">NVG@nrc.gov</a> ; Telephone (301) 415-1180)</p> <p><b>Sub-Topics:</b> Technical Specifications and the Maintenance Rule (a)(4) provisions Eight initial industry initiatives Long-term overall vision Views of a <i>foreign regulator</i></p>	<p><b>Web-links:</b> <a href="http://www.nrc.gov/NRC/RG/01/01-182.html">http://www.nrc.gov/NRC/RG/01/01-182.html</a> (RG 1.182, Assessing : Managing Risk Before Maintenance Activities at Nuclear Power Pl</p> <p><a href="http://www.nrc.gov/NRC/IM/71111-13.html">http://www.nrc.gov/NRC/IM/71111-13.html</a> (Inspection Procedure 71111.13, Maintenance Risk Assessments and Emergent Work Con</p> <p><a href="http://www.nrc.gov/NRC/RG/01/01-174.html">http://www.nrc.gov/NRC/RG/01/01-174.html</a> (REGULATORY GU 1.174, An Approach for Using Probabilistic Risk Assessment In Risk-Informed Decisions On Plant-Specific Changes to the Licensin Basis)</p> <p><a href="http://www.nrc.gov/NRC/RG/01/01-177.html">http://www.nrc.gov/NRC/RG/01/01-177.html</a> (REGULATORY GU 1.177, An Approach for Plant-Specific, Risk-Informed Decision mal Technical Specifications)</p>
<b>Break 11:30 a.m. - 12 noon</b>		
W10	<p><b>Plenary Session</b> 12 noon - 12:30 p.m. Presidential Ballroom NRC Commissioner Greta Joy Dicus</p>	
<b>Lunch 12:30 p.m. - 1:15 p.m.</b>		
W11	<p><b>Luncheon Speaker</b> 1:15 p.m. - 1:45 p.m. Congressional/Senate Rooms</p>	
<b>Break 1:45 p.m. - 2:15 p.m.</b>		
W12	<p><b>Plenary Session</b> 2:15 p.m. - 2:45 p.m. Presidential Ballroom NRC Commissioner Nils J. Diaz</p>	
<b>Break 2:45 p.m. - 3:00 p.m.</b>		
<b>Breakouts 3:00 p.m. - 4:30 p.m.</b>		
W13	<p><b>Deregulation</b> Presidential Ballroom</p> <p><b>David B. Matthews, Chair</b> D/DRIP/NRR/NRC</p> <p><b>Panelists:</b> Herbert N. Berkow, Director, Project Directorate II, DLPM/NRR/NRC Dan Kueter, Vice President Nuclear Business Development, Entergy Nuclear, Inc. Richard J. Myers, Senior Director, Business Policy and Programs, NEI John V. Vinqvist, President, MATS, Inc.</p> <p><b>Session Coordination:</b> Alex F. McKeigney, Financial Analyst, RGE/DRIP/NRR/NRC - (E-Mail <a href="mailto:AXM1@nrc.gov">AXM1@nrc.gov</a> ; Telephone (301) 415-1221)</p>	

	<p><b>Sub-Topics:</b>  <b>Industry Consolidation</b>  <b>A Non-operating Owner's Viewpoint of Deregulation</b>  <b>Consolidation and Acquisitin of Nuclear Plants</b></p>	
W14	<p><b>Public Confidence</b>  <b>Congressional/Senate Rooms</b></p> <p><b>Roy P. Zimmerman, Chair</b>  <b>DD/NRR/NRC</b></p> <p><b>Panelists:</b>  <b>Patricia G. Norry, Deputy Executive Director for Management Services (DEDM)/NRC</b>  <b>Lynn B. Scattolini, D, Information Management Division, Office of the Chief Information Officer (OCIO) NRC</b>  <b>Francine F. Goldberg, D, Planning and Resource Management Division, OCIO/NRC</b>  <b>George Lobsenz, Editor, The Energy Daily</b></p> <p><b>Session Coordination:</b>  <b>Juan Peralta, Acting Technical Assistant, NRR/NRC - (E-Mail <a href="mailto:JDP3@nrc.gov">JDP3@nrc.gov</a> ; Telephone (301)415-1052)</b></p> <p><b>Sub-Topics:</b>  <b>Public Perceptions of NRC</b>  <b>Ongoing NRC Initiatives NRC Website</b>  <b>Agencywide Documents Access and Management System (ADAMS)</b></p>	<p><b>Web-links:</b>  <b><u><a href="#">Update to the Implementation Plan for the Public Communications Initiative (DSI-14)</a></u></b>  <b><u><a href="#">Impact of Changes to The Inspection Program For Reactors on Implementing The Allegation Program (SRM 99-273)</a></u></b>  <b><u><a href="#">Policy Statement on Staff Meetings Open to the Public: Revision of Section D (SRM 99-251)</a></u></b></p>
W15	<p><b>50.59 Implementation &amp; Status/ Maintenance Rule</b>  <b>Federal A/B Rooms</b></p> <p><b>Cynthia A. Carpenter, Chair</b>  <b>Chief, RGEB/DRIP/NRR/NRC</b></p> <p><b>Panelists:</b>  <b>Eileen McKenna, Senior Reactor Engineer, RGEB/DRIP/NRR/NRC</b>  <b>J. D. Wilcox, Senior Operations Engineer, Equipment Quality &amp; Performance Branch (IQPB)</b>  <b>DIPM/NRR/NRC</b>  <b>David Nelson, Senior Enforcement Specialist, OE/NRC</b>  <b>Tony Pietrangelo, Director, Risk and Performance-based Regulation, NEI</b>  <b>James Kilpatrick, Senior Engineer, Constellation Nuclear</b></p> <p><b>Session Coordination:</b>  <b>Eileen M. McKenna, Senior Reactor Engineer, RGEB/DRIP/NRR/NRC - (E-Mail <a href="mailto:EMM@nrc.gov">EMM@nrc.gov</a> ; Telephone (301) 415-2189)</b></p> <p><b>Sub-Topics:</b>  <b>Under development</b></p>	<p><b>Web-links:</b>  <b><u><a href="http://www.nrc.gov/NRR/mrule/mrhome.htm">http://www.nrc.gov/NRR/mrule/mrhome.htm</a></u></b></p>
W16	<p><b>Session combined with Sessions TH1, Licensing Issues/Future Applications</b></p>	
W17	<p><b>Decommissioning</b></p>	<p><b>Web-links:</b></p>

**South American A/B Rooms**

**Stuart A. Richards, Chair**  
Project Director, LPD 4, Division of  
Licensing Project Management (DLPM)  
/NRR/NRC

**Panelists:**  
Timothy Collins, DD, DSSA/NRR/NRC  
Larry Camper, Chief, Decommissioning  
Branch, Division of Waste Management,  
Office of Nuclear Material Safety and  
Safeguards (NMSS)/NRC  
Michael Miesner, Chief Nuclear Officer  
, Maine Yankee Atomic Power  
Corporation  
Raymond G. Shadis, Staff Advisor, New  
England Coalition on Nuclear Pollution

**Session Coordination:**  
Joseph Donoghue,  
LPD4/DLPM/NRR/NRC, E-Mail  
[JED1@nrc.gov](mailto:JED1@nrc.gov), Telephone (301)  
415-1131

**Sub-Topics:**  
Regulatory oversight  
Radiation exposure/risk reduction  
License termination funding  
Early partial site release  
Spent fuel pool risk study results

**NRC Decommissioning web page**  
[www.nrc.gov/NMSS/DWM/DECOM/decomm.htm](http://www.nrc.gov/NMSS/DWM/DECOM/decomm.htm)

**Staff Responses to Frequently Asked Questions Concerning  
Decommissioning of Nuclear Power Reactors (NUREG-1628)**  
[www.nrc.gov/NRC/NUREGS/SR1628/index.html](http://www.nrc.gov/NRC/NUREGS/SR1628/index.html)

**Technical Study of Spent Fuel Pool Accident Risk at Decommission**

**Nuclear Power Plants**  
[www.nrc.gov/NRC/REACTOR/DECOMMISSIONING/SF/index.h](http://www.nrc.gov/NRC/REACTOR/DECOMMISSIONING/SF/index.h)

**W18**

**Fire Protection  
Pan American Room**

**Eric W. Weiss, Chair**  
P.E., Section Chief, Fire Protection  
Engineering & Special Projects Section,  
Plant Systems Branch (SPLB),  
DSSA/NRR/NRC

**Panelists:**  
Doug Brandes, P.E., Consulting  
Engineer, Duke Energy  
Edward A. Connell, Sr. P. E. , Senior  
Fire Protection Engineer,  
SPLB/DSSA/NRR/NRC  
Frederick Emerson, Senior Project  
Engineer, NEI  
Franklin D. Garrett, P.E., Program  
Manager, Loss Control and Insurance,  
Palo Verde Nuclear Generating Station  
Terrence Reis, NRR Senior  
Enforcement Coordinator,  
ADIP/NRR/NRC  
Nathan Siu, Senior Technical Advisor,  
DRAA/RES/NRC

**Session Coordination:**  
Daniele Oudinot, Reactor Systems  
Engineer, SPLB/DSSA/NRR/NRC,  
E-Mail, [DHO@nrc.gov](mailto:DHO@nrc.gov), Telephone (301)  
415-3731

**Sub-Topics:**  
The Regulatory Guide  
The Rulemaking Circuit Analysis  
Fire Protection Inspection

**Web-links:**  
**Fire Protection Home Page**  
[http://www.nrc.gov/NRC/REACTOR/FIRE\\_PROTECTION/index](http://www.nrc.gov/NRC/REACTOR/FIRE_PROTECTION/index)

**Break 4:30 p.m. - 4:45 p.m.**

**W19**

**Plenary Session**  
4:45 p.m. - 5:15 p.m.  
Presidential Ballroom  
NRC Commissioner Jeffrey S.  
Merrifield

**Wednesday, March 14, 2001 Conference Recess 5:15 p.m.**

**Thursday, March 15, 2001**

**Breakouts 8:00 a.m. - 9:45 a.m.**

TH1	<p><b>Licensing Issues/Future Applications Presidential Ballroom</b></p> <p>Suzanne C. Black, Chair DD, DLPM/NRR/NRC</p> <p><b>Licensing Issues</b> Panelists (8 -9:00 am): Robert S. Wood, Senior Licensee Financial Policy Advisor, RGE/DRIP/NRR/NRC William D. Reckley, Senior Project Manager, LPD4/DLPM/NRR/NRC Donald R. Woodlan, Docket Licensing Manager, TXU Electric</p> <p><b>Sub-Topics:</b> License Transfers Licensing Action Task Force Initiatives (i.e., CLIP, TS Bases control, amendment and SE formats, reducing reporting requirements)</p> <p><b>Future Applications</b> Panelists (9:00 9:45 am): Jerry N. Wilson, Senior Policy Analyst, RLSB/DRIP/NRR/NRC Thomas L. King, D, DRAA/RES/NRC Ron Simard, D, Business Services, NEI</p> <p><b>Sub-Topics:</b> Industry Initiatives (e.g., new plant licensing, early site permit) NRC preparations (e.g., licensing process, licensing process, design certification)</p> <p><b>Session Coordination:</b> Lawrence J. Burkhart, Project Manager, DLPM/NRR/NRC - (E-Mail <a href="mailto:LJB@nrc.gov">LJB@nrc.gov</a> ; Telephone (301) 415-3053)</p>	<p><b>Web-links:</b> <a href="#">Standard Review Plan on Power Reactor Licensee Financial Qualifications and Decommissioning Funding Assurance (NUREG-SR1577r1)</a> <a href="#">NRC Regulatory Issue Summary 2000-06 - Consolidated Line Item</a></p>
TH2	<p><b>Steam Generator Issues Congressional/Senate Rooms</b></p> <p>William H. Bateman, Chair Chief, Materials &amp; Chemical Engineering Branch (EMCB), Division of Engineering (DE) NRR/NRC</p> <p><b>Panelists:</b> James H. Riley, Senior Project Manager, NEI Kevin M. Sweeney, Senior Consulting Engineer, Steam Generator Projects, Arizona Public Service Edmund J. Sullivan, Chief, NDE &amp; Metallurgy Section, EMCB/DE/ NRR/NRC</p> <p><b>Session Coordination:</b> A. Louise Lund, Materials Engineer, EMCB, DE/NRR/NRC - (E-Mail <a href="mailto:LXL@nrc.gov">LXL@nrc.gov</a> ; Telephone (301)415-2786)</p> <p><b>Sub-Topics:</b> NRC Steam Generator Action Plan NEI 97-06 Generic License Change Package Industry actions to resolve lessons learned from Indian Point 2.</p>	<p><b>Web Links:</b> <a href="http://www.nrc.gov/NRC/REACTOR/VII/index.html">http://www.nrc.gov/NRC/REACTOR/VII/index.html</a> <a href="http://www.nrc.gov/NRC/REACTOR/SGAP/ML003684244.pdf">NEI 97-06 Generic License Change Package http://www.nrc.gov/NRC/REACTOR/SGAP/ML003684244.pdf</a> <a href="http://www.nrc.gov/NRC/REACTOR/SGAP/index.html">Steam Generator Action Plan http://www.nrc.gov/NRC/REACTOR/SGAP/index.html</a> <a href="http://www.nrc.gov/NRC/REACTOR/IP/index.html">Indian Point Unit 2 Event http://www.nrc.gov/NRC/REACTOR/IP/index.html</a> <a href="http://www.nrc.gov/NRC/REACTOR/SGAP/ML003762242.pdf">Indian Point 2 Steam Generator Tube Failure Lessons-Learned Report http://www.nrc.gov/NRC/REACTOR/SGAP/ML003762242.pdf</a></p>
TH3	<p><b>International Issues &amp; Perspectives Federal A Room</b></p> <p>Samuel J. Collins, Chair</p>	<p><b>Web-links:</b> <a href="http://www.nrc.gov/IP/index.html">International Activities http://www.nrc.gov/IP/index.html</a> <a href="http://www.nrc.gov/OPA/gmo/tip/tip27.htm">http://www.nrc.gov/OPA/gmo/tip/tip27.htm</a></p>

D/NRR/NRC  
Janice Dunn-Lee, Co-Chair  
D, Office of International  
Programs/NRC

Panelists:  
Michael C. Cullingford, Special  
Assistant, Technical Policy &  
International Liaison, NRR/NRC

Session Coordination:  
Terrence Reis, Senior Enforcement  
Coordinator/NRR, E-Mail  
[TXR@nrc.gov](mailto:TXR@nrc.gov), Telephone (301)  
415-3281

Sub-Topics:  
Status of Nuclear Power & Regulation  
Impact of Economic Deregulation on  
Safety Regulatory Issues

TH4	<p>High Level Waste Issues South American A/B Rooms</p> <p>Stuart A. Richards, Chair Project Director, LPD 4, DLPM /NRR /NRC John T. Greeves, Co-Chair, D, Division of Waste Management, NMSS</p> <p>Panelists: Robert R. Loux, Executive Director, Nevada Agency for Nuclear Projects Steven P. Kraft, Director, Fuel Supply and Used Fuel Management, NEI Lake Barrett, Deputy Director, Office of Civilian Radioactive Waste Management (OCWRM), Department of Energy (DOE) E. William Brach, D/Spent Fuel Project Office, Office of Nuclear Materials Safety &amp; Safeguards (NMSS)/NRC Bill Reamer, Chief, High-Level Waste Branch, NMSS/NRC</p> <p>Session Coordination: TBD</p> <p>Sub-Topics: Spent Fuel Management, Storage and Disposal Update of Yucca Mountain activities Nevada perspective on Spent Fuel management and disposal</p>	<p>Web-links: <a href="#">NRC's High Level Waste Program Storage and Transportation of Spent Nuclear Fuel</a> <a href="http://www.nrc.gov/OPA/drycask/">http://www.nrc.gov/OPA/drycask/</a> <a href="http://www.state.nv.us/nucwaste">http://www.state.nv.us/nucwaste</a> <a href="http://www.nei.org">http://www.nei.org</a></p>
TH5	<p>Process Improvement Activities Federal B Room</p> <p>Jacqueline E. Silber, Chair D, Program Management, Policy Development and Planning Staff (PMAS) NRR/NRC</p> <p>Panelists: David B. Matthews, D/DRIP/NRR/NRC Arnold E. (Moe) Levin, D, Application Development Division, OCIO/NRC John W. Craig, Assistant for Operations, Office of the Executive Director for Operations/ NRC</p> <p>Session Coordination: Michael L. Boyle, Technical Assistant, PMAS/ NRR/NRC - (E-mail <a href="mailto:MLB4@nrc.gov">MLB4@nrc.gov</a> ; Telephone (301-415-1401) Karen L. Olive, Staff Assistant, PMAS/NRR/ NRC - (E-Mail</p>	<p>Web-links: <b>Electronic Information Exchange:</b> <a href="http://www.nrc.gov/NRC/EIE/index/html">http://www.nrc.gov/NRC/EIE/index/html</a></p> <p><b>Planning and Financial Management:</b> <a href="http://www.nrc.gov/NRC/planning.html">http://www.nrc.gov/NRC/planning.html</a></p> <p><a href="#">FY 2000-2005 Strategic Plan (SR1614 Volume 2, Part 1 &amp; Volume 2 Part 2, Appendix) NRC Public Electronic Reading Room</a></p>

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KLO@nrc.gov ; Telephone  
(301-415-2064)

Sub-Topics:  
Planning & Budgeting and Performance  
Management (PBPM) Organizational  
Effectiveness Model  
Central work Planning  
Electronic Submittals  
Change Process

Break 9:45 a.m. - 10:15 a.m.

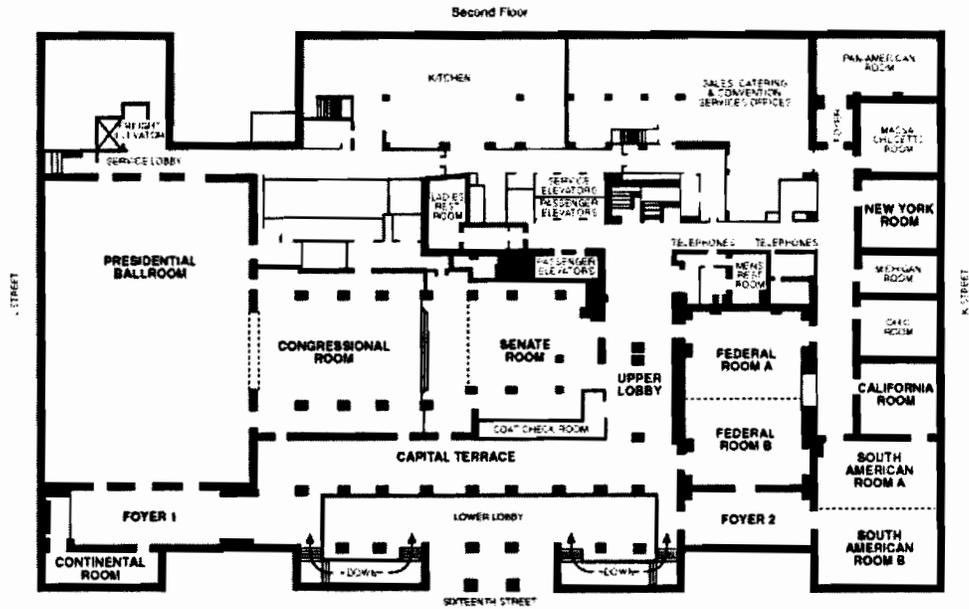
TH6  
Plenary Session  
10:15 a.m. - 10:45 a.m.  
Presidential Ballroom  
NRC Commissioner Edward  
McGaffigan, Jr.

Break 10:45 a.m. - 11:00 a.m.

TH7  
Plenary Session  
Conference Feedback Panel  
11:00 a.m. - 11:45 a.m.  
Presidential Ballroom  
Samuel J. Collins, Chair

TH8  
Conference Closing  
11:45 a.m. - 12 noon  
Presidential Ballroom

### Capitol Hilton Conference Room Map



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Send comments about this page to content [sabl@nrc.gov](mailto:sabl@nrc.gov)

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# ACRS MEETING HANDOUT

<b>Meeting No.</b>  <p style="text-align: center;">480th</p>	<b>Agenda Item</b>  <p style="text-align: center;">2.0</p>	<b>Handout No.:</b>  <p style="text-align: center;">2-1</p>
<b>Title: RETRAN-3D THERMAL-HYDRAULIC TRANSIENT ANALYSIS CODE</b>		
<b>Authors: G. WALLIS/ V. SCHROCK / P. BOEHNERT</b>		
<b>List of Documents Attached</b>  <ol style="list-style-type: none"> <li>1. G. Wallis Report: "Comments on EPRI Response To RAI's and Other Recent Submittals Concerning The RETRAN Code, dated February 25, 2001</li> <li>2. G. Wallis Report: "Tutorial on Momentum Equations", Dated 1/30, 2/10/ and 2/25/01</li> <li>3. Report from ACRS Consultant V. Schrock " T/H Subcommittee Meeting, February 20, 2001, EPRI RETRAN-3D/NRR Code Review Status", dated February 22, 2001 - (ACRS Internal Use Only)</li> <li>4. Working Copy, Minutes of February 20, 2001 T/H Phenomena Subcommittee Meeting, dated February 27, 2001 (Internal Use Only)</li> </ol>	<p style="font-size: 48pt; font-weight: bold;">2</p>	
	<b>From Staff Person</b>  <p style="text-align: center;">P. BOEHNERT</p>	

**ACRS INTERNAL USE ONLY MATERIAL ATTACHED**

## COMMENTS ON EPRI RESPONSE TO RAIs AND OTHER RECENT SUBMITTALS CONCERNING THE RETRAN CODE

February 25, 2001. Graham Wallis

ACRS reviewed the documentation of the RETRAN code in early 1999. On July 14, 1999, Dr. Wallis presented a critique of the momentum equations in RETRAN to the ACRS. At that time there was no technical response from EPRI. During 1999 and 2000 the staff raised several questions concerning the momentum equations, both informally and as formal requests for additional information (RAIs). EPRI submitted responses to these RAIs, on October 22, 1999 and March 6, 2000. Additional written material was submitted by EPRI on February 15, 2001. On February 20, 2001 representatives of EPRI and their contractors met with the ACRS Subcommittee on Thermal/Hydraulic Phenomena at NRC headquarters in White Flint. At this meeting EPRI acknowledged that the ACRS concerns had merit and agreed to reconsider the justifications of the momentum equations in RETRAN as well as the example problems illustrating their use for modeling specific components.

This document has been prepared to assist EPRI in identifying the major concerns of the ACRS and to facilitate their response. Since the uses of the momentum equations are pervasive in RETRAN, it is likely that some illustrations and derivations, resembling those cited in this report, have not been specifically identified. EPRI should therefore ensure that any proposed modifications or corrections to the RETRAN documentation and/or code content are comprehensively and consistently applied in any new versions.

Reference is made to the accompanying "Tutorial on the Momentum Equations" prepared by Dr. Wallis.

### REVISED DOCUMENTATION SUBMITTED WITH RAI RESPONSES

EPRI enclosed "Revision 5" of their RETRAN documentation. The momentum equations are described in Section 3.

Figure II.3-1 shows a straight pipe, about which there is little disagreement.

Figure II.3-2 shows a bend. It is described as “a slight generalization”. The bend looks rather gentle, but there is nothing in the text that says that the angle through which the flow is turned is small. No approximations seem to be made assuming that the angle is small, so it appears that the method should apply to any bend, including a 180 degree one, for example. Section 3.1.2.1 is entitled “Constant Area Channels”, yet the equations retain different areas  $A_k$  and  $A_{k+1}$  which appear later in the supposedly more general form (II.3-27) which is written down with no additional explanation.

(II.3-4) is the vector momentum balance. It should contain the resultant forces from normal and tangential stresses at the wall. Reference is made to (II.2-34) to explain how the wall forces are divided up, but this equation (in Revision 1, which is what we have as the original basic document) only gives a very general form and does not explain the three terms appearing in (II.3-4).  $F_{loc}$  later gets called the “form losses”. It is presumably the resultant of normal stress components, because it gets combined with the surface pressures on the fluid surfaces later down the page. This combination does not help, as the components are later separated again.

“Assuming a uniform pressure along the surface within each region” to get (II.3-7) is not useful because it throws out the important physics. If the fluid were subjected to uniform pressure, there would be no resultant force from that source. Even if true, it would not lead to the disappearance of the wall force due to normal stresses. In steady flow around a bend, the wall reaction is the force that turns the flow and enables the exit momentum to be in a different direction from the inlet momentum. This is especially evident for a 90 degree or 180 degree bend. When the flow accelerates, as in a transient, the wall force must also be considered. It is the only force providing the y-momentum change for a horizontal 180 degree bend with end faces in the x-direction, for example.

(II.3-7) appears to be the component of a momentum conservation equation in the direction “i” and  $\psi$  is the angle between the directions k and i. The momentum fluxes are resolved in this direction. None of the friction forces, the gravitational forces or the pressure forces are resolved in this direction, therefore this cannot be the scalar component of a vector equation. Also, if this were based on a vector equation, the inertia terms on the left-hand side would have to be resolved in the chosen direction, so that the L’s appearing in (II.3-9) would have to be projected in that direction or redefined somehow.

The momentum flux terms contain different areas with subscripts  $k$  and  $k+1$ . The pressure terms do not. This is either an inconsistency or a sign of conceptual confusion.

The resultant of normal forces from the walls is omitted, though playing a key role in all bends that turn a flow through a significant angle.

The equation at the bottom of the page defines "a component of the volume centered flow". Now,  $W$  is a scalar and does not have components. It is possible to define a variable by using the form at the bottom of the page, but it has to be used very carefully, as it has no direct physical interpretation and may well mislead (or itself be a symptom of misunderstanding).

(Many of these points were brought up in previous ACRS critiques of this work).

Section 3.1.2.2 is entitled "Variable Area Channels". Figure II.3-3 actually shows a very specific shape. It is analyzed in its one-dimensional form rather like the TP+J model discussed in the "Momentum Tutorial", though the figure should show two long pipes for this to be at all a good approximation. (II.3-12) differs from the TP+J model in that the exiting momentum is resolved in the (mysterious) direction  $\psi$  which does not appear in the figure and should not be there if this is really a TP+J model. If this is supposed to be a momentum balance then all other terms, such as the pressure forces on the ends, must be resolved in this direction too. The gravitational terms should be resolved in appropriate directions along the pipe axes, and they are not, even if this is to be a TP+J model. This is another inconsistency. The equation is neither a true momentum balance nor representative of a true TP+J model but some sort of unjustified hybrid. The same is true of (II.3-20), which is the more usual form of the RETRAN equation, containing those dangerous "resolved" flow rates.

The idealization shown in Figure II.3-5 to represent "any junction" is so abstract and unexplained that it is hard to tell why it should be useful or how to use it without reference to worked examples. It seems unlikely that all configurations of interest can be forced into such a framework. There seems to be a leap of faith required to use (II.3-27), which is merely a repetition of (II.3-26).

It is stated that flow velocities are not necessarily normal to junctions, but have

angles  $\phi$  to them. This leads to discussions on pp. II-84 and II-85 in which the flow rates seem to be being treated as vectors, which is unphysical. Figure II.3-5 is drawn with the end faces parallel to each other and normal to the direction "i" which seems to be defined by the junction around the middle of the picture. Are these features requirements of the model? What happens with less one-dimensional shapes? This figure is remarkably vague, and there is no derivation of the momentum equation for it, so there is really no way to check the validity of the result without looking at specific examples. However, it is probable that the momentum balance for a general control volume cannot always be idealized realistically in some arbitrary way like this.

### Tee Example

The noding in Revision 5 is quite different from that in Revision 1. Does this mean that the "rules" for noding have changed in the code? How sensitive are the answers to the actual noding employed?

(II.3-35a) is the x-direction momentum balance for the shaded volume in Figure II.3-7a. The contribution of  $W_4$  in taking x-momentum out of the volume is ignored, though significant in reality, presumably because this flow is assumed to be all in the y-direction.

It seems to be being assumed that the zetas in (II.3-28) are each 1/2.  $W_{1,x}(\text{bar})$  (I can't figure out how to put a bar on the variable using this computer program, so I'll have to write them in) is set equal to  $(W_1 + W_2)/2$ . Because some flow is diverted to the side branch, it seems better to use  $(W_1 + W_2 + W_4)/2$ .

The use of  $W_{1,y}(\text{bar})$  requires explanation as the flow appears to be perpendicular to the left-hand boundary of the control volume and not to have a y-component. Making it equal to  $W_4/2$  is arbitrary and appears dubious. If one is going to reason this way, it should be considered that if only one half of  $W_4$  comes in through the surface 1 (circled) then the other half must come in through the surface labeled 2 (circled) which is unlikely as flow is going out that way.

The arbitrary appeal to "applying the assumptions of steady-state conditions" is odd since the whole point is to develop methods for transients. Even more confusing is the expression for "volume centered flow" at the bottom of the page.

It doesn't appear later, but would it somehow be used in the transient term in the momentum balance if this were to be shown in (II.3-35b)?

Since  $A_1=A_2$  there is no need for two areas in (II.3-35b). The loss term is presumably quite small, if evaluated for the steady flow going straight through from 1 to 2. If some flow goes out the side branch, then it will influence the losses.  $e_2^*$  must depend on  $W_4$ .

The momentum flux term for area 1 is incorrect in (II.3-35b). If  $W_2=0$  and flow is steady, then  $W_1 = W_4$ . The flow coming into the control volume is  $W_1$ ; therefore the first momentum flux term should not have the 4 in the denominator. This would make  $p_2 = p_1 + W_1^2/\rho_1 A_1^2$ . But this answer defies Bernoulli's equation which states that the maximum pressure rise is one half of this at the stagnation point somewhere on surface 2. The average pressure at 2 must be less than this maximum. In reality a significant x-direction momentum is carried out of the cell by the flow  $W_4$ , reducing the predicted pressure rise at 2 to reasonable values. This important physical mechanism is ignored in (II.3-35b)

The sign of the term in square brackets in (II.3-35a) and (II.3-35b) is the opposite of what it is in the original general equation (II.3-26).

Equation (II.3-36a) is odd. It cannot be the y-component of a momentum balance because the pressure acting on surface 1 is in the x-direction while that on surface 4 acts in the y-direction. The subscript  $\psi$  is supposed to signify the component in some specified direction (here unspecified). If  $\psi$  is y, as implied, then we should be multiplying  $W_1$  by  $W_{1,y}$  in the first momentum flux term and not getting a factor of 4 in the denominator in (II.3-36b) but a factor 2. The second momentum flux term does seem to correspond to a y-direction flux, but it is unclear why the "assumption of steady-state conditions" can be used in a transient.

The sign of the term in square brackets is wrong.

If this were a real momentum equation in the y-direction,  $p_1$  would not appear, but the forces on the bottom and top walls in the y-direction would have to be evaluated. There is also flow out of the 2 face; presumably it is assumed to carry no y-momentum, though the flow across the 1 face was assumed to have this capability.

This cannot be an example of the TP+J approach because the control volume has three connections to the outside world and cannot be modeled by two pipes. In any case, the pipes are not “long” by any means, and that is the condition needed for this approximation to be good.

It is actually not easy to derive a valid transient motion equation for this control volume. It cannot be analyzed using the overall “momentum equation” because of wall forces, and it does not conform to a simplified model, such as the TP+J case. It really needs to be modeled by some special method, such as running CFD and/or experiments and fitting the results for a range of flow splits (main branch versus tee-branch) with an empirical “three-port” model. However, this does not excuse what appear to be conceptual errors in the RETRAN documentation.

### Elbow Example

At the bottom of page II-91 the “steady-state assumption” appears to be being used. This obscures the understanding of how the method is to be used to represent a transient. It would help if (II.3-37b) included the transient term so that we could see how it is to be evaluated (e.g. what L’s and W’s are to be used). This is not clear from any description in the text.

This solution has changed from the previous version in Revision 1. In that case the second momentum flux term was evaluated as the square of  $W_{2,x}$  so that the factor in the denominator in (II.3-37c) was 4 and not  $2\sqrt{2}$ . Neither version reflects the physics. If this is a TP+J model (how does that work for a bend?), then the factor should be 1. If it is a momentum balance in the x-direction, then the total flow,  $W_2$ , should be multiplied by the velocity component in the x-direction, giving a factor of  $\sqrt{2}$  in the denominator. In this latter case the pressure force on the surface 2 would have to be resolved in the x-direction and the reaction from the wall somehow determined and resolved in the x-direction too.

The “flow rates in the x- and y- directions” in the middle of the page II-93 appear contrary to any physical interpretation. If some sort of numerical interpolation is going on, it does not seem to correspond even to the simple situation in which the flow rate in the pipe is constant, as in steady flow. The “magnitude of the volume-averaged flow” likewise cannot be  $1/\sqrt{2}$  times the steady-state flow and there is no reason to make this the case in unsteady flow either.

Why are we retaining  $A_1$  and  $A_2$  when the pipe has a constant cross-section? If it does not, then the pressure forces need to be multiplied by different areas if a true momentum balance is being performed.

If (II.3-37c) is evaluated for constant area and steady frictionless flow it turns out that there is an artificial pressure recovery in the bend because the first term on the right-hand side is bigger than the second. One would expect the pressure to stay constant. At the presentation on February 20, 2001 it was claimed that this did not matter much as this pressure recovery was canceled out by the pressure loss in the second half of the bend. This is not necessarily so. If the angle  $\psi$  for the second part of the bend is chosen in the same way as for the first part of the bend, being in the direction of the inlet face, then the same artificial pressure recovery occurs. In a coil of several 360 degree bends, this pressure could be used to build up as much pressure as desired and create a "pump" with no energy input.

In the previous paragraph it was shown that the answer depended on the choice of the arbitrary angle  $\psi$ . This appears to be a general fault with the "vector" RETRAN momentum equation. One can change the momentum flux terms, without changing anything else in the equation, just by changing  $\psi$  and resolving them in a chosen direction. For frictionless steady flow in a bend, for example, the pressure difference can be made to take any value between some positive and negative limits, depending on the user's choice of  $\psi$ . This is a very undesirable feature of what should be a deterministic method.

### Wye-junction Example

Dr. Wallis' presentation to the ACRS in 1999 also included similar critiques of the way in which the wye-junction was analyzed in EPRI NP-1415, which is the twenty-year old report out of which the present RETRAN documentation evolved. The conceptual problems appear similar to those described above, though more extensive, partly because of the "cross-momentum" effects when flow crossing a surface introduces or removes momentum with a component in a direction parallel to the surface. If the documentation is to be modified to respond to the above points, then that example should probably also be corrected.

The Porsching Paper (The "old" one, dated October 15, 1999, that came with the

RAI responses)

This paper appears to be an attempt to justify the form of the RETRAN equation, such as (II.3-26), apart from the "loss" terms.

Perhaps the first thing to note is that Porsching's (10) is not compatible with (II.3-26). (10) is a momentum balance for the control volume, whereas the RETRAN equation is not. Dividing (10) by  $A_0$  we find that the momentum flux terms have  $A_1 A_0$  and  $A_2 A_0$  in their denominators and not  $A_1^2$  and  $A_2^2$  as in (II.3-26). The latter resembles the TP+J form, except for the (inappropriate) resolution of the momentum flux terms in the direction  $\psi$ . The RETRAN momentum flux terms are neither correct from the TP+J viewpoint nor from the "momentum balance resolved in a chosen direction" viewpoint. They are an invalid hybrid form.

The momentum flux terms in (II.3-10) only have the same denominators because for this example all the areas are the same. The form in (II.3-26) and (II.3-27) has no physical basis, nor is one provided in the text

Porsching's (4) is acceptable if one is careful about the integration that enables the volume integral of momentum to be expressed in terms of an average flow rate across slices perpendicular to  $\mathbf{n}_0$  throughout the volume. This is not spelled out in the paper. If the flow is incompressible or steady and the ends  $S_1$  and  $S_2$  are parallel to  $S_0$ ,  $W_0$  can be related to the flow rate across the particular surface  $S_0$ , but this is probably not possible in general. It is not correct that  $L_0$  in (4) is equal to  $V_\Omega/A_0$  for the incompressible or steady flow cases. It should be equal to the physical distance between  $S_1$  and  $S_2$  in the "0" direction, if the ends are perpendicular to this direction. Otherwise there are corrections for the pieces of volume that involve partial slices parallel to "0" that intersect the end faces. In a compressible or multiphase flow it is quite possible for the flow rate across other surfaces in the volume to be unrelated to that across  $S_0$  so that  $L_0$  in (4) becomes a variable that is dependent on all the details of the flow. In any case, something like (4) may be acceptable as an engineering approximation if careful definitions and restrictions are specified.

Porsching's (5) is also in the form of a common engineering approximation. The final step in that equation is not exact, any more than the square of an average value of something is equal to the average of the square of something. This is

well known in fluid mechanics and is the basis of correction factors for the momentum flux in a pipe with a velocity profile, for example. However, (5) and the resulting (6) are usually acceptable as engineering approximations which might require reevaluation if the velocity profiles are far from uniform.

The major error, or at least misleading derivation, in the Porsching paper concerns the pressure term in (10). The integrals in (7) are over all the areas of surfaces to the left and right of  $S_0$ . They include the walls of the duct as well as the areas for flow,  $S_1$  and  $S_2$ . It is usual to separate out the net pressure forces on the flow areas, i.e. the ports or junctions connecting to other volumes, and the net pressure force on the walls. Porsching's mathematics in (7) defines  $p_1$  as the average pressure on components of surface in the "0" direction over both the area  $S_1$  and all the area of duct walls on the left hand side of  $S_0$ . Physically, this has the effect of combining the forces on the fluid area and on the wall area into one average pressure times a reference area  $A_0$ . The quantities  $p_1$  and  $p_2$  used in RETRAN are averages over the fluid areas alone and are quite different from Porsching's average pressures in his (8). Similarly, the pressures used by Bird, Stewart and Lightfoot in Porsching's (13) are averages over the fluid areas and are quite different from those in (8). It is strange that Porsching does not acknowledge the difference, in view of the final sentence of his paper.

#### New Material Submitted by EPRI on 2/15/01

This consists of a letter from Lance Agee in which he claims that the ACRS concerns have been answered, a "new" paper by Porsching (dated April 18, 2000), and a further revision (5b) to part of the RETRAN documentation.

The letter claims that the concerns were suitably addressed in the RAI responses and by the Porsching papers. As mentioned above, they do not remove ACRS concerns and rather serve to reinforce previous conclusions

The new version of the documentation addresses the momentum equation for a bend, illustrated in Figure II.3-2. There is nothing here about the bend being slight. Indeed the method is later applied to a 90 degree bend.

Here, for the first time, the authors admit that there is a resultant of normal forces on the wall (Actually also friction, if one wants to be exact. It is not true that the net friction and form forces are all taken care of by the steady state pressure

gradient, as claimed. A proper momentum balance for a general shape in steady flow will show that the net frictional force on the wall and the normal stresses associated with “form losses” do not just “balance the pressure difference” because the end forces have to be multiplied by the corresponding areas and resolved like vectors, while the pressure change does not. This is part of the continuing confusion in RETRAN between a true momentum balance and a “pressure difference” that crops up in a Bernoulli-like or “mechanical energy” or TP+J equation. To demonstrate this, consider a 180 degree bend of constant cross-section, with an incompressible fluid flowing through it in steady flow. The resultant of the wall shear stresses is in the diametral direction (0 degrees to 180 degrees) while the pressure forces on the ends reinforce each other (rather than being in opposition) and act in the 90 degree direction, being balanced by the wall forces in that direction. The idea that friction forces and form losses balance pressure drop in the momentum equation is naïve and based on extrapolation of experience with a straight pipe).

There is an  $S_{tot}$  on the integral in (II.3-5). (II.3-5a) breaks this down into forces from the end faces and from the walls. (II.3-6a) is similar to the derivation in the “old” Porsching paper. In this equation, the  $p_k$  and  $p_{k+1}$  are not average pressures over the junctions but are averages over the entire surface of the control volume including the walls. They are quite different from the average pressures over the ends. The math from (II.3-6b) to (II.3-6e) is essentially the same as was used by Porsching (“old” paper), except that in his, more general case, the  $A$  in (II.3-6e) would have the subscript 0. (II.3-7) is essentially Porsching’s (10) with no allowance for the different subscripts on the areas, which confuses its later modification to a form in which the areas of the inlet and outlet and some characteristic area ( $A_0$ ) of the volume are all different. (The earlier version of this derivation, Revision 1, contained an upstream area  $A_k$  and a downstream area  $A_{k+1}$ . These multiplied the corresponding pressures in the momentum balance, equation (II.3-9) but were not resolved in the direction  $\psi$ . These area factors were made to disappear in equation (II.3-10) of Revision 1, the “RETRAN equation”, by making the areas equal and dividing the equation by the area. When the areas are unequal this cannot be done and the RETRAN equation does not result. It is even stated in Revision 1, that “(II.3-10) is valid only for the case of flow in a channel of constant cross-sectional area”).

At the presentation on February 20 an argument was advanced that the pressures could be assumed to be uniform in the two regions before and after the “junction”.

In this case, there is no need to perform the integrations between (II.3-5a) and (II.3-6e). ACRS consultants opined that such sweeping assumptions in effect throw out the major physical phenomena and should not be made. In a more mathematical sense, there is no direct relationship between the average pressure over a volume and the average pressure over the surface area surrounding that volume. As an example, the force from the walls that turns the flow in a bend reflects the difference in the pressure forces on the inner and outer sides of the bend. If one applies the volume-average pressure over the whole surface, there is no force to prevent the flow from continuing straight ahead.

In sum, the critique of Porsching's "old" paper outlined above appears to apply equally well to the newest attempt to justify the RETRAN equation, albeit in a simplified form. Average pressures of various sorts should not be mixed up. There is also a sleight of hand in deriving a result in which all areas are equal and later generalizing it to cases where they are not.

The new Porsching paper (April 18,2000) is interesting because his thinking is evolving. He appears to recognize two of the basic problems outlined in the "Tutorial" but his resolution of them seems inconclusive, merely suggesting that some sort of engineering approximation might be found.

His Option 1 is the old story. (19) is the former (10) with all the previous faults. The pressures appearing there are averages over the entire surface and not just over the ports or ends.

Option 2 is a new variation that appears essentially the same, but seems to involve resolving the total areas on each side of  $A_0$  into two arbitrary directions. It is not clear how this helps to get rid of the net force from the wall (it is physically real and cannot be excluded from a macroscopic momentum balance by mathematical juggling).

It is unclear if there is a problem with the orientation of surfaces, as discussed under "Remarks". The area  $A_0$  is equal to the area of any closed surface built on it, to the right or left, as long as one keeps track of the vector nature of surface elements. These surfaces can have any number of folds and wrinkles. That is not the problem.

(26) seems to face up to the real problem. The total pressure force on one side is

made up of the contribution from the walls and that from the end. The average pressure on the end is defined in (27) as  $p_1$  with a bar on it, recognizing that it is distinct from the  $p_1$  that appeared in (19). The effort now becomes to make the wall force, the last term in (28), go away somehow. This is OK for a straight pipe, case (a), and perhaps as an approximation for a pipe with a slight bend or wrinkle in it (case b). But there is no justification for neglecting the term in general and none seems to be offered.

Section 2 of the "Remarks" admits another fundamental problem, how to relate the various  $W$ 's to each other. However, there appears to be nothing definite in this section that resolves the problem, just a discussion of how "averaging" might be the way to do it.

### RAI 1

This refers to Attachment 2 and is concerned with explaining how the RETRAN momentum equation applies to nodes of more complex shapes.

Figure 1 shows a straight pipe and is useful for defining the staggered grid approach and nomenclature.

Equation (3a) is said to be the "one-dimensional mixture momentum equation". As it involves two different areas, it cannot be a momentum balance equation because the pressure terms in (3a) do not multiply areas. It must apply to a different shape than in Figure 1, probably a tapered pipe or two pipes joined together. It resembles (9) in the tutorial, the "two-pipe plus junction" model, (TP+J), yet does not contain the  $1/2 \rho v^2$  terms and does not reduce to Bernoulli's equation (as it must) when there is no friction. So, this seems to be an equation that does not conform to any known pattern.

On page 5 about the middle of the page there is mention of "the component of the volume average flow which lies in the direction of the momentum cell". Now, there is no component of a scalar quantity like  $W$ , so it is unclear what this means. It is also uncertain what the "direction of a momentum cell" is when it has multiple inlets and exits or a complex shape.

The shapes shown in Figure 2 should be very useful for checking what the RETRAN momentum approach actually implies. "Junction 2 Cold Leg to

Downcomer" is a bend, a classical sticking point for use of momentum conservation. Equation (5) is to be applied. It more closely corresponds to the TP+J model mentioned in the "Tutorial" but (only) the momentum flux terms are resolved in a chosen direction.  $W_{k,\psi}$  is said to be the "component (of the flow) that lies in the direction of the junction". As  $W$  is a scalar, it is unclear what this means and one has to look at the examples to figure out how to interpret the concept.

Table 1 and Table 2 are intended to explain things. From (3) and (5) it appears that the  $W$ 's with bars over them describe the flows at the boundaries of the momentum cells and the  $W$ 's without bars are the flow rates in the cells that are part of the inertia term on the left hand side of the "momentum equation". What is meant by a "junction" is less clear, since the momentum and mass cells have different (staggered) boundaries. It looks as if the idea is that the numbers without circles on them in Figure 2 label "junctions" while the circled numbers label "volumes", so these must be the mass and energy nodes that are being described. (It looks as if the 1 above the cold leg in the lower figure should be circled). These roles are reversed for the momentum cells.

The sketches at the bottom of Figure 2 help to show how the momentum cell is drawn. It appears that one takes a junction, such as 3, and adds together about one half of the volumes 2 and 3 (circled) in each side of it. In this way a piece, such as the top of the lower plenum, forms part of more than one momentum cell, as in the central and right-hand figures. The bottom part of the lower plenum apparently forms part of nothing and might as well not be there as far as the momentum balances go. It is difficult to relate these cells to the "generalized control volumes" on page II-82 as that would seem to make the flow come out of the bottom of the volumes in Figure 2 and go into the bottom of the lower plenum with no way to get out. The specific examples do not seem compatible with the "generalized" approach.

Tables 1 and 2 are baffling, apart from the directions associated with the arrows drawn at junctions which appear in the second column in Table 1. Because the momentum cells are staggered from the others, the momentum flux terms at the boundaries of a momentum cell do not correspond to these "junctions" but should be evaluated at the boundaries of the shaded volumes in the lower figures, where the  $W$ 's have bars and the "junctions" have circles. The Table appears to contain a mixture of what appear to be  $W$ 's to be used to evaluate flux terms for the

uncircled junctions and  $W$ 's to be used to describe the average momentum in the circled ones. The text below the table says "The momentum flux terms are evaluated using the averaging model for the volume centered flows, where the volume centered flow is the arithmetic average of the inlet and exit flows". There is no explanation of how averaging led to the entries in Tables 1 or 2. "The actual equations implemented in RETRAN-3D to perform this task are given in Appendix A" which follows, but it is no help because it is not explained how the general equations are applied to the particular example. .

It would be very desirable to have the actual momentum equations deduced from these tables presented in full. This would make it clear what the specific values of all the terms actually are and might explain how they are evaluated. It would also help to clarify the procedures to be applied by a user and to remove ambiguities that remain in the present definitions and methods. It would additionally make it possible to evaluate the reasonableness of the results, as was done above for the bend and tee-junction.

Describing what appear to be some of the ambiguities and uncertainties with the existing documentation may help EPRI to respond more fully. For example, the  $W_k$  and  $W_{k+1}$  terms with bars are defined to be the flow rates into and out of a momentum cell. They seem to be resolved into a direction  $\psi$ , though scalars cannot be resolved. In Table 1 it seems that at junction 2  $W_2$  goes in and  $1/2W_2$  comes out. This does not correspond to any identifiable cell in the figure. One half of  $W_2$  is not the flow into or out of any region.  $1/2$  is not the cosine of any angle of relevance to the situation even if flows could be resolved. In the next line junction 3 has  $1/2 W_3$  going in and nothing coming out. This is probably another example of the "interpolation" that gave strange results that defied the concept of continuity in the bend example.

In any case, there is no indication of how these values might be incorporated into the momentum equation for the shaded region called "Junction 2, cold leg to downcomer" in Figure 2. There is also no discussion of how to evaluate the "L" factor in the transient term and what appropriate "W" to use there. Therefore this example does little to help the user understand the approach.

The text on page 10 does not help either. If steady state conditions are assumed so that " $W_1=W_2=W_3$ " then how is this compatible with a "transient: analysis? Why is  $W_1$  with a bar "simply  $W_2$ " and not something like  $(W_1+ W_2)/2$ . Flow rates do not

have components so how can x- and y- components be defined, and how can they be deduced to be  $1/2 W_2$  which seems physically unreasonable.

The average orientation of the shaded volume is called theta and said to be 315 degrees ( not a volume average) but this is not the same as  $\psi$  and anyway there is no theta in equation (5) so it is unclear what this is to be used for. At the end of the discussion of Junction 2 on page 10 it is said that the factor  $1/4$  arises because of angular effects. Now, remember that the TP+J model is a scalar model (see the Tutorial) and the  $\rho v^2$  terms do not have to be "resolved" any more than the pressure terms do, so there are really no "angular effects" if this model is being used. At the presentation on February 20 a few examples were given to show how these hypothesized "angular effects" could give rise to significantly different results, for example at the tee-junction between the surge line and the hot leg, that might influence flow distribution during a transient.

Looking briefly at the other examples involving the lower plenum, it is unclear why the junctions 5 and 6 are said to have no momentum flux when they have flows through them, why  $W_5$  plays no role, and how  $W_4$  can describe the momentum in the sum of the two shaded partial volumes for volume 4. In Table 2 it looks as if Volume 3, presumably the momentum cell around junction 3, has no momentum in it; why? What pressure terms are to be used to describe Junctions 3 and 4? They have four boundaries that connect to regions containing other fluid. Equation (5) only has two pressures in it.

In reality, the lower plenum part of the reactor vessel is like a turbine bucket that turns the flow coming down out of the downcomer around in the direction of the core. A momentum balance would have to include the force from this structure. If, on the other hand, this is to be modeled as a TP+J, so that (9) in the Tutorial can be used to describe it, then it is unclear how the shaded volumes as drawn can be forced into such a conceptual framework. The various sketches of "general" volumes such as Figures II.3-5 and II.3-6 do not help explain either the basis of the general RETRAN equation or how it is used to analyze a case like this.

## TUTORIAL ON MOMENTUM EQUATIONS.

G. Wallis 1/30/01, 2/10/01, 2/25/01

The momentum balance equation for a stationary control volume is (see any textbook)

$$d/dt \int (\rho \mathbf{v}) dv = - \int p \mathbf{dA} + \int \boldsymbol{\tau} \cdot \mathbf{dA} - \int \mathbf{v} (\rho \mathbf{v} \cdot \mathbf{dA}) \quad (1)$$

For engineering purposes this is usually reduced to the form

$$\mathbf{I} dW/dt = - \sum p_i \mathbf{A}_i + \mathbf{F}_w - \sum (\rho \mathbf{v}_i \cdot \mathbf{A}_i) \mathbf{v}_i \quad (2)$$

Which is a node/port description where the velocities at each port,  $i$ , are assumed to be uniform. The usual idea is to compute the rate of change in flow rate,  $dW/dt$ , across some internal surface in the node and step forward in time. The flow rates,  $W$ , throughout the system modeled by a set of such nodes will be solution variables that are updated as the numerical transient proceeds. The coefficient,  $\mathbf{I}$ , is the effective vector inertia of the fluid in the node, with units of length. It represents an approximation, particularly if the flow is not uniform. It is also a significant assumption that the momentum in the node is proportional to the flow rate,  $W$ , (which is a scalar quantity) across some defined surface in the node. This is not so bad for single phase incompressible flow with ports at the end of the nodal volume, because the flow is the same across any surface in the node that does not intersect the ports. For more general compressible or multiphase flows with many ports, the momentum in a nodal volume is not so easy to figure out.  $\mathbf{F}_w$  is the force from the walls. The shear stress contribution to the forces at the ports is usually neglected.

To illustrate the importance of the wall force, consider a couple of parallel similar pipes in the  $x$ -direction joined by a 180 degree bend in the horizontal  $x$ - $y$  plane and filled with an incompressible inviscid fluid. The momentum in the two pipes cancels and the total momentum in the system is all in the  $y$ -direction. The pressure and momentum flux terms on the right hand side of (2) all act in the  $x$ -direction, so it is only the net wall force acting in the  $y$ -direction that is available to change the net fluid momentum in the system. This force may actually be computed by first using mechanical energy conservation to get the acceleration and then using the  $y$ -component of the momentum balance to deduce the wall force.

There are several important features of (2) that present difficulties to the code developer:

It is a vector equation. It can only be reduced to one-dimensional form if the flows and forces all act in a single direction, which is not the case for flow around a bend, for instance. If it is resolved in some direction to obtain a scalar component, then all terms must be resolved in a consistent way.

2. The force from the walls is unknown and cannot be determined from known quantities without invoking some new information, except in trivial cases which are probably limited to a straight pipe. It is made up of resultants from both normal (pressure) and tangential (shear) components.

The pressures at the ports or junctions act on areas. These areas cannot be made to disappear except when the flow is in a straight pipe and the equation can be divided through by the area. No amount of algebra can make the areas disappear in the general case, though the "momentum" equations in some codes are written without areas multiplying pressures at the node boundaries (junctions). To get an equation like Bernoulli's in which the pressures do not multiply areas and the formulation is one-dimensional, you have to integrate a differential form of the momentum balance along a streamline. This is strictly invalid when streamlines get mixed up in nodes, through turbulence or flow separation, but such an approach has also been tried as an alternative way to get usable equations for codes.

The biggest problem is item 2. It is basically insurmountable in any general way. Attempts have been made to derive the force from the walls from another principle, such as conservation of mechanical energy. However, the forces from walls are usually imposed by stationary surfaces. They therefore do no work and do not contribute to the energy balance. Therefore there is no way that the energy balance can be manipulated to solve for the wall force.

Conservation of mechanical energy is sometimes used in place of the momentum balance in order to provide an expression for  $dW/dt$ . Bird, Stewart and Lightfoot discuss the conditions for validity of such a balance (e.g. constant density or constant temperature). They solve the example of oscillations of a manometer this way. This method has not been developed as a general derivation that might apply to two-phase flows of the type that occur in reactor systems.

The approach taken in all codes is to derive a momentum balance for an extremely simple geometry, such as a long straight pipe. The result is then usually applied with little or no explanation or justification to other shapes and situations. I think it is true that the (long) straight pipe is the only case in which it is possible to overcome the three difficulties listed previously. With some allowances for "averaging" (2) can then be expressed as

$$L \, dW/dt = p_1 A - p_2 A - \tau_w \pi D L + \rho_1 v_1^2 A - \rho_2 v_2^2 A \quad (3)$$

Where  $L$  is the length of the pipe, subscripts denote the inlet and exit,  $A$  is the cross-sectional area,  $D$  the diameter (or effective diameter), and the velocities are all in the direction of the pipe axis. The wall shear stress is computed from the steady-flow friction factor, though friction is strictly not the same in unsteady flow. If (3) is divided by  $A$  and the pipe is assumed to be circular, we get

$$L/A \, dW/dt = p_1 - p_2 - \tau_w 4L/D + \rho_1 v_1^2 - \rho_2 v_2^2 \quad (4)$$

If the fluid is incompressible or suffers no change of density, the last two terms cancel each other and disappear. Similar equations can be deduced for each phase in the two-fluid model.

Even when applying these methods to straight pipes, care may need to be taken near ends or junctions where flow is not one-dimensional. The lengths,  $L$ , of nodes must be chosen to correspond to regions where the properties do not change too rapidly.

It is not directly evident from the documentation, but presentations from proponents of the RELAP and TRAC codes lead me to conclude that most of the reactor system is modeled as a series of straight pipes connected by nodes of zero length that contribute frictional losses but no inertia. Bends, for example, are modeled as a series of these straight pipe segments and the additional losses contributed by the non-straight shape are added in between these segments. More complex nodes are modeled in an *ad hoc* manner that has evolved with time and experience.

RELAP and RETRAN also make use of a derivation for coaxial two straight pipes connected by a sudden change of area. The pressure difference across the junction

is taken as given by the steady flow loss coefficient and it is assumed that this all occurs in zero length. This is no different from the idea of joining two straight pipes with a valve or other "resistance" and there is no need for the pipes to be oriented in the same direction.

Denoting one pipe by the subscript "a" and the other by "b" we have two equations like (4) as follows:

$$L_a/A_a \, dW_a/dt = p_1 - p_2 - \tau_w 4L_a/D_a + \rho_1 v_1^2 - \rho_2 v_2^2 \quad (5)$$

$$L_b/A_b \, dW_b/dt = p_3 - p_4 - \tau_w 4L_b/D_b + \rho_3 v_3^2 - \rho_4 v_4^2 \quad (6)$$

(The nomenclature should be obvious).

The pressure change across the junction is assumed to be given by the steady-state correlation, which could take the form,

$$p_2 - p_3 = k \, 1/2 \, \rho_2 v_2^2 \quad (7)$$

with "k" being a loss coefficient for the junction.

There is nothing special going on here, just building up a composite piece of a circuit by combining two straight pipes and a junction.

Having read Bird, Stewart and Lightfoot, the RELAP folks decided to express the empirical losses across the junction another way. The pressure change is expressed in terms of mechanical energy losses, or as a loss in Bernoulli head. This is strictly only valid for an incompressible fluid, though some workable derivations might be possible for other conditions, such as isothermal flow, if done carefully. Then (7) is expressed as

$$p_2 - p_3 = -1/2 \, \rho_2 v_2^2 + 1/2 \, \rho_3 v_3^2 - k_e \, 1/2 \, \rho v^2 \quad (8)$$

where  $k_e$  is a coefficient of mechanical energy loss. I have left the velocity and density in the last term without subscripts as the appropriate conditions have to be defined. This, of course, is part of the definition of the empirical loss coefficient  $k_e$ . I've also used subscripts on the "kinetic energy" terms, adding to the definition

of the loss coefficient. I believe this loss coefficient is simply taken from single-phase flow tests, so it is something of a reach to apply it to an unsteady two-phase flow with density change.

If we use (8) to eliminate the intermediate pressures,  $p_2$  and  $p_3$ , from (6) plus (7) the result is

$$L_a/A_a \, dW_a/dt + L_b/A_b \, dW_b/dt = p_1 - p_4 + (-\tau_w 4L_a/D_a - \tau_w 4L_b/D_b - 1/2 \rho_2 v_2^2 + 1/2 \rho_3 v_3^2 - k_e 1/2 \rho v^2) + \rho_1 v_1^2 - \rho_4 v_4^2 \quad (9)$$

In RETRAN it is asserted that the two terms on the left hand side can be combined by assuming that both of the  $W$ 's are the same as some " $W$ " for the "junction". The term in parentheses is interpreted as some sort of total loss for the system, and the two last terms are interpreted as momentum fluxes in and out of the combined system. This is how the  $A$ 's are made to disappear from what would be an equation resembling (2) if written as the momentum equation for the whole works of two pipes plus junction. It then seems to be assumed, either without argument or by hand-waving, that a similar equation applies to any shape or component in the system, except when a special model is derived, as for a pump. RETRAN has sketches of more general shapes, but there is no proper derivation of a momentum balance for them, just an equation written down to look like the "two-pipe plus junction" (TP+J) case.

Note that (9) is a scalar equation, unlike (2). It does not represent a "momentum balance" for a control volume and it cannot be "resolved" in some direction. However, in RETRAN a modification is made to change the two final terms in (9) to  $\rho_1 v_1 v_{1,\psi} - \rho_4 v_4 v_{4,\psi}$  where the subscript is supposed to denote the "component that lies in the direction of the junction". I have yet to see a convincing derivation of this result. It seems to be a sort of hybrid between (2) and (9) in which the momentum flux terms are resolved in some chosen direction, as the ones in (2) would have to be to obtain a scalar result. Since the direction is arbitrary, different results can be achieved, over a limited range, at the will of the user.

If the fluid is incompressible, or of constant density, then  $v_1=v_2$  and  $v_3=v_4$  so that (9) reduces to a form of Bernoulli equation with losses (which the RETRAN version with "resolved" momentum fluxes does not, an indication that something is almost certainly wrong). This particular result can be deduced from the principle of mechanical energy conservation, as long as the density is constant, which is not

the case in a general two-phase flow.

The TP+J model can also handle some aspects of momentum addition from side branches, as in ECC injection into a cold leg. If a flow  $W_{sa}$  is injected from a connection to the side of pipe "a" with velocity component  $v_{sa}$  in the direction of the pipe axis, then an additional source of momentum equal to  $W_{sa}v_{sa}$  appears on the right hand sides of (5) and (9). RETRAN also has such a term, but the definition of the velocity component is ambivalent. The example of the WYE-junction in the RETRAN text (EPRI NP-1415) seems to indicate that this term was improperly evaluated in that case.

The RETRAN documentation at least acknowledges that there is a need to develop an equation describing a general shape with several connections to ports or junctions. There is just no good rationale for the result and a lack of examples showing how to use the method for the sorts of nodes, other than straight pipes, that occur in models of nuclear systems. There are some other features of the documentation, including:

1. Derivations of momentum equations in various forms that appear questionable.
1. Examples of applications to bends, tee-junctions, wye-junctions that appear wrong at an elementary level, even if one accepts the basic equation used.
1. Strange features, such as resolving the scalar flow rate in each coordinate direction as if it were a vector and interpolating these components in ways that seem to defy physical reality. This shows up also in the worked examples, where some odd terms are derived.
1. Misplaced appearance of rigor, when it would be better to explain and justify assumptions.
1. 5. A method of "resolving" the momentum flux terms that seems to be arbitrary and makes it possible to achieve a range of different results, depending on the user's choice of the angle  $\psi$ .
1. These points are examined in more detail in the accompanying document "Comments on EPRI Response to RAIs and other Recent Submittals concerning the RETRAN code".

Do these inadequacies or limitations or “assumptions” matter for the purposes of nuclear safety calculations? Perhaps. In some cases the transients are so slow that the momentum balance collapses to the steady flow result and correlations for “pressure drop” suffice. Some transients appear to be dominated by the mass and energy balances, which are much easier to compute, as they deal with scalar quantities and the transfer from walls can be evaluated. In other cases things may not be so simple. Because all the treatments of momentum balances are very rough approximations (you wouldn’t guess this from the way they are defended by their originators), it would seem a good idea to run sensitivity tests on all the coefficients, and perhaps on the structure itself, in these equations to explore if and when this makes any significant difference to safety conclusions and to provide explicit guidance for a user about possible problems or limitations.

In any case, it is not good for public confidence to have documentation that appears of doubtful validity to an informed observer.

**SUGGESTIONS FOR ENHANCING THE  
SPENT FUEL POOL RISK ASSESSMENT**

**Presented by:**

**Robert E. Henry  
Lynette Hendricks**

**Presented to:  
ACRS**

**March 1, 2001**

**ISSUES TO BE DISCUSSED**

- Likelihood of SFP failure given a cask drop.
- Fission product releases if the SFP is postulated to be rapidly drained.
- Peer review of the report.

## **STATUS**

- The draft study provides a good start for quantifying the risk of significant fission product releases from spent fuel pools.
- The study provides a good basis for evaluating the probability of losing cooling to the fuel pool.
- The study should incorporate the results of large scale spent fuel pool cask dropping experiments as well as those investigating large impact loads on reinforced concrete walls.
- The study currently represents the bounds of possible releases of ruthenium, we believe it should also provide a best estimate analysis consistent with relevant fission product release experiments.

## **-Assessing the Consequence of a Cask Drop – IMPORTANT EXPERIMENTS CHARACTERIZING CONCRETE TOUGHNESS**

- BNFL, 1984, "Full Scale Drop Test for Benchmarking Concrete Pads for Dry Spent Fuel Storage Casks: Tests 3 and 4," BNFL Commercial-In-Confidence Report AEA-D&W-0676 (work performed at AEA Technology, Winfrith).
- BNFL, 1993, "Full Scale Drop Test for Benchmarking Concrete Pads for Dry Spent Fuel Storage Casks," BNFL Commercial-In-Confidence Report AEA-D&W-0622 (work performed at Sandia National Laboratories).
- Witte, M. C. et al., 1998, "Summary of Evaluation of Low-Velocity Impact Test of Solid Steel Billet Onto Concrete Pads," NUREG/CR-6608, UCRL-ID-129211.
- Stephenson, A. E., 1977, "Full-Scale Tornado-Missile Impact Test," EPRI Report NP-440 (work performed at Sandia Laboratories).

**SIMPLIFIED APPROACH FOR ASSESSING  
DAMAGE (PENETRATION DEPTH)  
TO THE CONCRETE**

M	-	mass of the cask.
h	-	drop height.
U	-	impact velocity.
$\Delta P$	-	compressive strength of the concrete.
A	-	area of impact.
$\delta$	-	depth of penetration.
KE	=	$1/2 MU^2 = \Delta P A \delta$
$\delta$	=	$\frac{MU^2}{2 \Delta P A} = \frac{M g h}{\Delta P A}$

**RESULTS OF BNFL (AEA/SNL) CASK IMPACT TESTS**

Test Conditions

Mass of the test cask	64.5 tonnes
Average concrete compressive strength	22 MPa

Test #2

Drop height	18 in. (0.46 m)
Calculated free fall velocity at impact	3 m/sec
Kinetic energy of cask at impact	$2.9 \times 10^5$ J
Calculated compression of the concrete	8 mm
Measured compression (depression of surface)	4 mm

Test #3

Drop height	40 in (1.02 m)
Calculated free fall velocity at impact	4.5 m/sec
Kinetic energy of cask at impact	$6.5 \times 10^5$ J
Calculated compression of the concrete	17 mm
Measured compression (depression of surface)	6 mm

Test #4

Drop height	60 in (1.52 m)
Calculated free fall velocity at impact	5.5 m/sec
Kinetic energy of cask at impact	$9.8 \times 10^5$ J
Calculated compression of the concrete	26 mm
Measured compression (depression of surface)	8 mm

## RESULTS OF EPRI MISSILE TESTS

### Test #10 – 12" thick reinforced concrete

Missile: 12" pipe – 743 lbm (338 kg)

Velocity: 143 ft/sec (43.6 m/sec)

KE =  $3.2 \times 10^5$  J

$\Delta P = 3690$  psi (25.4 MPa)

F =  $A\Delta P = 1.8 \times 10^6$  N

$\delta = 0.2$  m;  $\delta_{\text{measured}} = \text{complete penetration}$

### Test #12 – 18" thick reinforced concrete

Missile: 12" pipe – 743 lbm (338 kg)

Velocity: 203 ft/sec (61.9 m/sec)

KE =  $6.5 \times 10^5$  J

$\Delta P = 4535$  psi (31.3 MPa)

F =  $A\Delta P = 2.2 \times 10^6$  N

$\delta = 0.29$ ;  $\delta_{\text{measured}} = 7.5$  in. (0.19 m)

(observed some spalling off the back face)

### Test #9 – 18" (0.45 m) thick reinforced concrete

Missile: 12" pipe – 743 lbm (338 kg)

Velocity: 143 ft/sec (43.6 m/sec)

KE =  $3.2 \times 10^5$  J

$\Delta P = 3545$  psi (24.4 MPa)

F =  $A\Delta P = 178E6$  N

$\delta = 0.18$  m;  $\delta_{\text{measured}} = 5$  in. (0.127 m)

(no spalling off the back face)

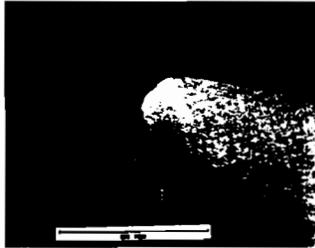


Figure 9-27. Frontface Damage, 12" Pipe, 143 Fps, 12" Panel



Figure 9-28. Backface Damage, 12" Pipe, 143 Fps, 12" Panel  
(Concrete appearing through hole in another test panel)

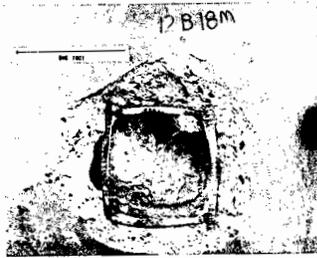


Figure B-31. Frontface Damage, 12" Pipe, 203 Eps, 18" Panel



Figure B-32. Backface Damage, 12" Pipe, 203 Eps, 18" Panel



Figure B-23. Frontface Damage, 12" Pipe, 143 Eps, 18" Panel

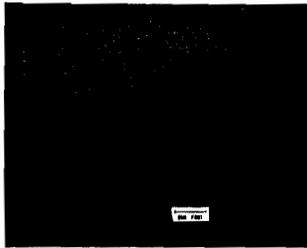


Figure B-24. Backface Damage, 12" Pipe, 143 Eps, 18" Panel

**SUMMARY OF THE EPRI 12" PIPE (743 lbm/388 kg)  
MISSILE IMPACT TESTS**

Test	Impact Velocity (ft/sec)(m/sec)	Concrete Strength (psi/MPa)	Concrete Thickness (in/cm)	Measured Penetration (in/cm)	Calculated Penetration cm	Ratio of Calculated to Total Thickness	Observation (Spalling)
14	92/28.1	3545/24.4	12/30.5	3.9/9.9	7.5	0.25	Slight
16	92/28.1	3350/23.1	12/30.5	3.5/8.9	7.5	0.25	Slight
11	98/30	3595/24.8	12/30.5	4.5/11.4	8.4	0.28	Some
9	143/43.6	4325/29.8	18/46	5/12.7	14.7	0.32	None
10	143/43.6	3690/25.4	12/30.5	Perforation	18	0.59	Perforation
15	152/46.4	4205/29	18/46	5.3/13.5	17	0.37	Slight
17	157/47.9	4255/29.3	18/46	4.1/10.4	18	0.39	Slight
4	198/60.4	3560/24.6	18/46	6.8/17.3	34	0.74	Extensive
3	202/61.1	3350/23.1	18/46	7.0/17.8	38	0.82	Extensive
12	202/61.6	3795/26.2	24/71	6.8/17.3	29	0.41	Some
18	213/65	4690/32.2	18/46	9.1/23.1	30	0.65	Hole Opened

**SUMMARY OF RESULTS FROM  
CONCRETE IMPACT TESTS**

- The large scale cask drop experiments demonstrate minimal damage associated with the cask drop events from 18 inches, 40 inches and 60 inches.
- The observations from high velocity missile impact experiments demonstrate results that are consistent with those observed in the cask drop test, i.e the depth of penetration is approximately ½ or less of the calculated value.
- Only relatively small cracks appear before "spalling" is observed in the back side of the concrete wall.
- The high velocity impact tests show that "spalling" on the back side of the concrete wall occurs when the calculated penetration depth is approximately half of the wall thickness.
- Without "spalling", there would be no large leakage path to rapidly drain the spent fuel pool.

### **APPLICATION OF THE CONCRETE IMPACT EXPERIMENTS TO A SPENT FUEL POOL**

- The height used here to evaluate for drops in a spent fuel pool is 9 meters.
- Evaluation of a cask drop should include the buoyancy and drag of the water.
- The impact velocity from a 9 m drop is approximately 12 m/sec, i.e. twice that in the BNFL/AEA 60 in. drop test.
- Hence the damage would be about 4 times that observed in the BNFL/AEA test, i.e. a depression of  $4 \times 8 \text{ mm} = 32 \text{ mm}$  (calculated value = 12.5 cm).
- This is much less than half of the pool floor thickness (pool floor thickness ~ 1.5 to 2 m).

#### Conclusion:

This would not be sufficient to cause "spalling" of the back face of the pool floor (liner strength has not been included). Hence, a cask drop event is much less than that required to cause a failure sufficient to rapidly drain the spent fuel pool.

### **IMPORTANT EXPERIMENTS CHARACTERIZING Ru FISSION PRODUCT RELEASES**

- Oak Ridge Test VI-7 – BWR irradiated fuel segment (6 in.) with Zr cladding – No significant ruthenium release until essentially complete oxidation of the Zircaloy cladding.
- CANDU experiments H02 and H05 – irradiated fuel segment (1 in.) with Zr cladding – No significant ruthenium release until complete oxidation of the cladding.

### **ANALYTICAL CONSIDERATIONS**

- The fuel assembly geometry and the special considerations for a spent fuel pool (boraflex, boral, etc.) influence the natural circulation flowpaths through the pool.
- If a partially drained fuel pool prevents natural circulation through the core, steam is the only significant oxygen source for cladding oxidation. Boildown calculations for this configuration shows that the cladding oxidation would be limited to 10 to 15%, i.e. there would be a large fraction of unreacted cladding.
- BWRs would have more zircaloy than PWRs.
- For those upper regions of the fuel, cladding could melt and drain away from the fuel. However this is limited by:
  - the tight pitch of the fuel pins,
  - melt relocation between the pellet and the cladding,
  - dissolution of the  $UO_2$  by the molten clad, and
  - freezing of the molten material as it drains..

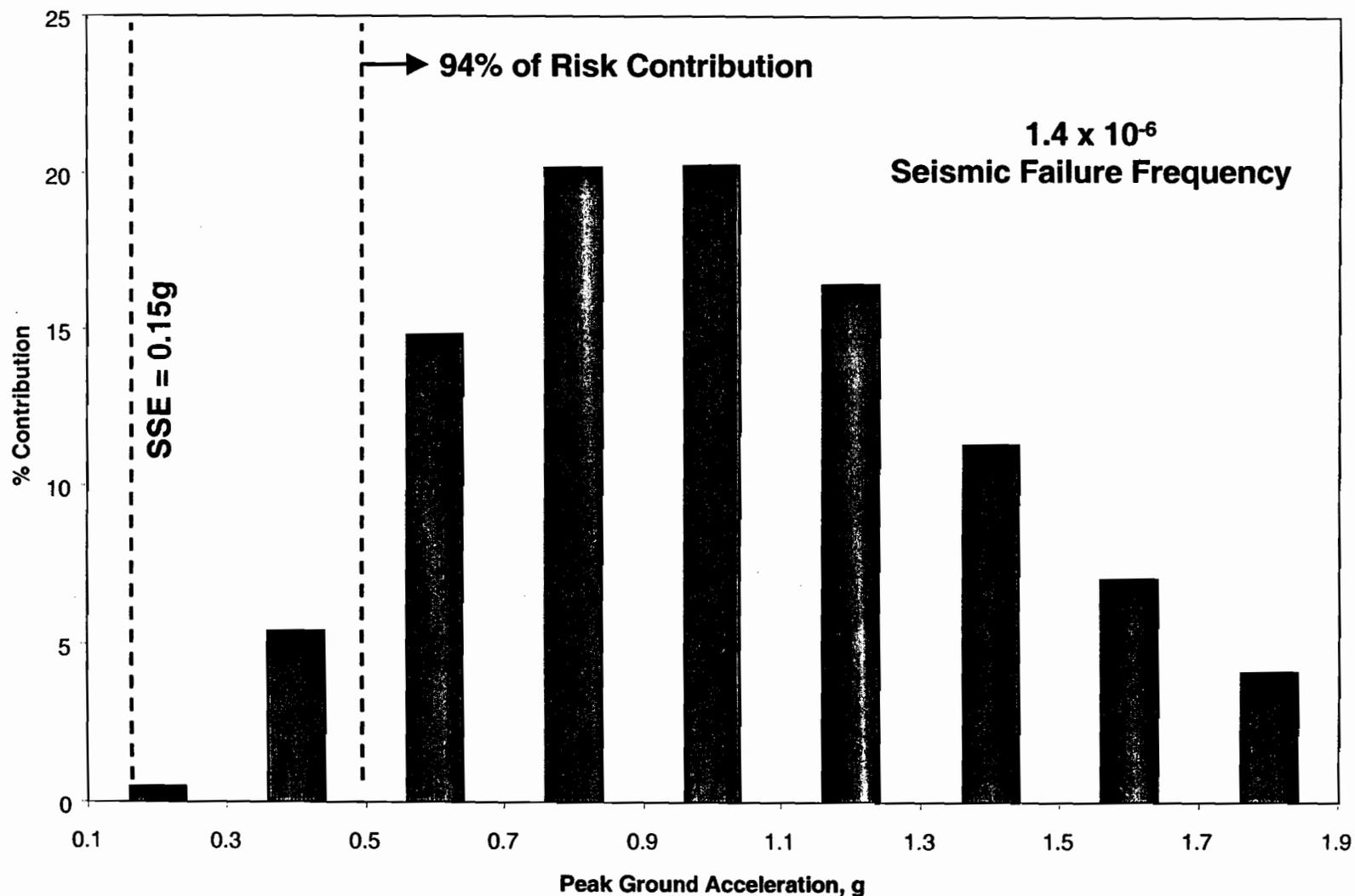
### **RECOMMENDED EXPANSION OF THE TECHNICAL BASIS**

- Provide estimates of the oxidation extent before the fuel slumps
  - CODEX,
  - TMI-2,
  - MELCOR calculations.
- Use the available experiments basis to estimate the Ru releases based on ZrO oxidation and debris temperature
  - ORNL tests (unclad pellets),
  - Chalk River experiments
    - unclad fuel,
    - with fuel cladding.
- Need to consider that some fuel from the top of the pins could be declad (exposed). However, this would also form a particle bed on the upper surface and would be at a lower temperature due to thermal radiation.

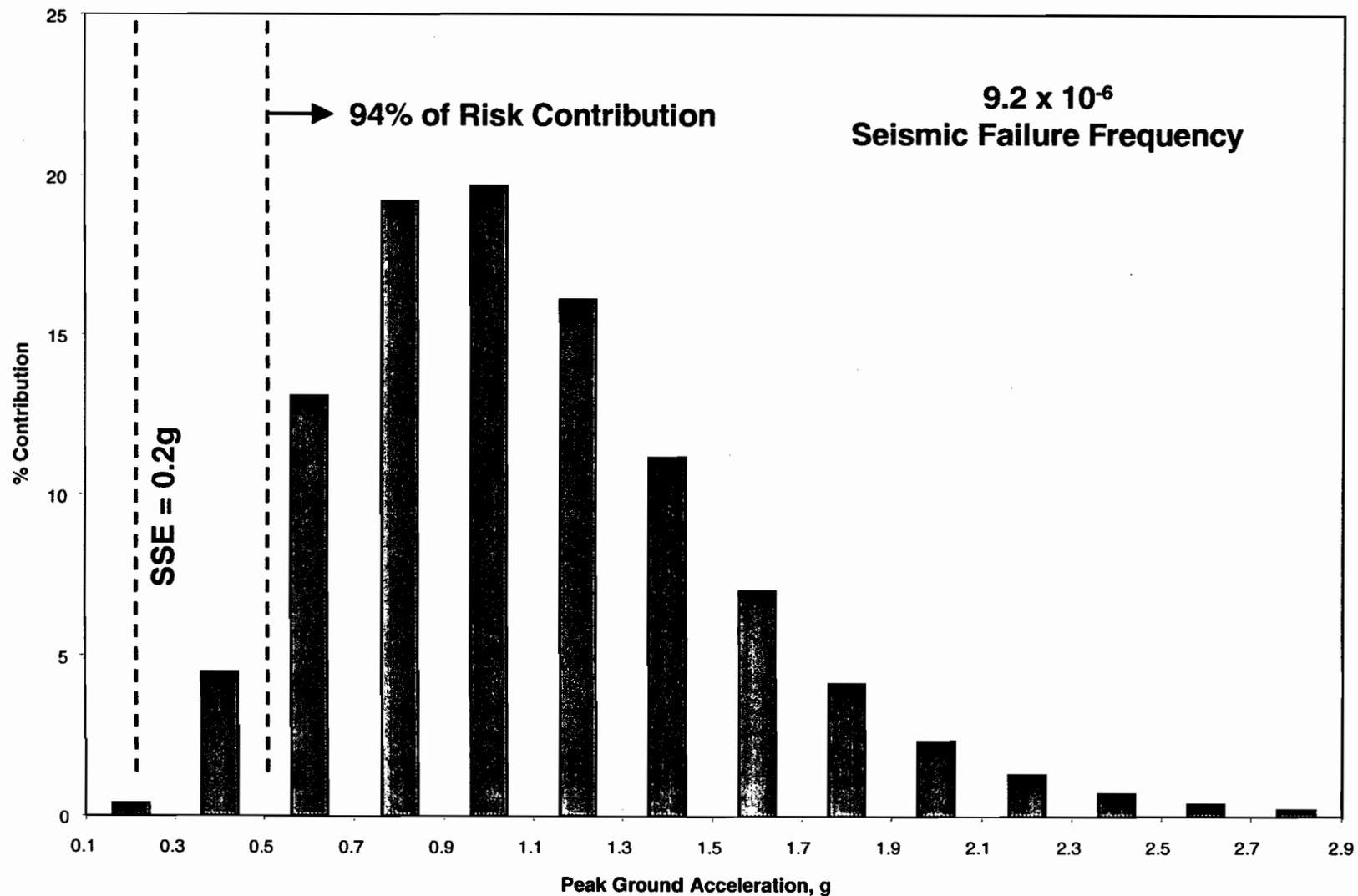
## CONCLUSIONS

1. Evaluations for the cask drop events need to incorporate the results of the experiments that have been performed for cask drops as well as other impact loadings on reinforced concrete. A quantitative failure condition should be used to assess the likelihood of such events causing rapid drainage of the spent fuel pool.
2. The risk evaluation should include a representation of a best estimate  $R_u$  source term based on the results from radiated fuel with Zircaloy cladding.
3. A peer review is recommended. This is an efficient manner to assure that the relevant experience and experimental insights have been incorporated.

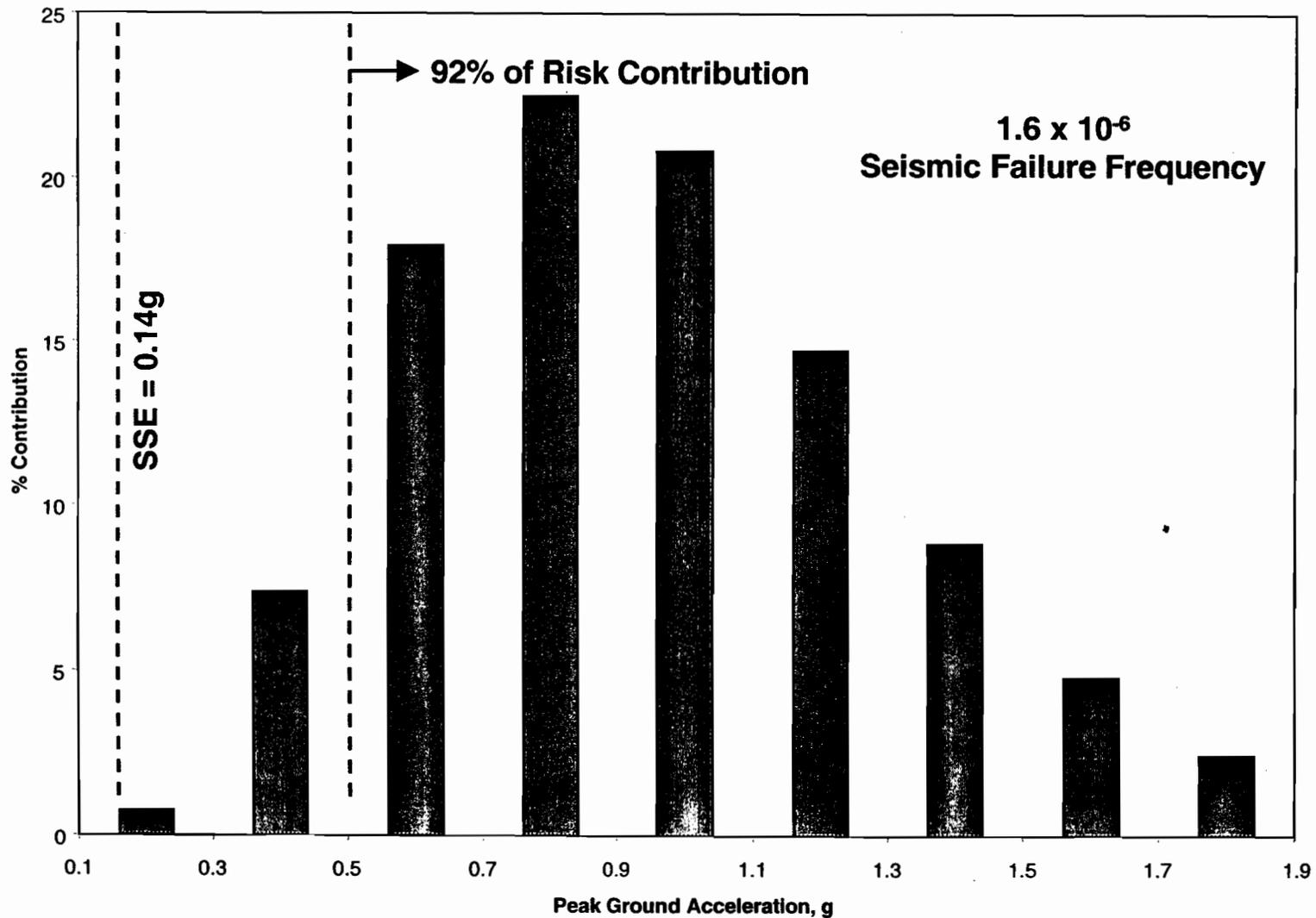
# Acceleration Range Contribution to Spent Fuel Pool Structural Failure Probability – Surry



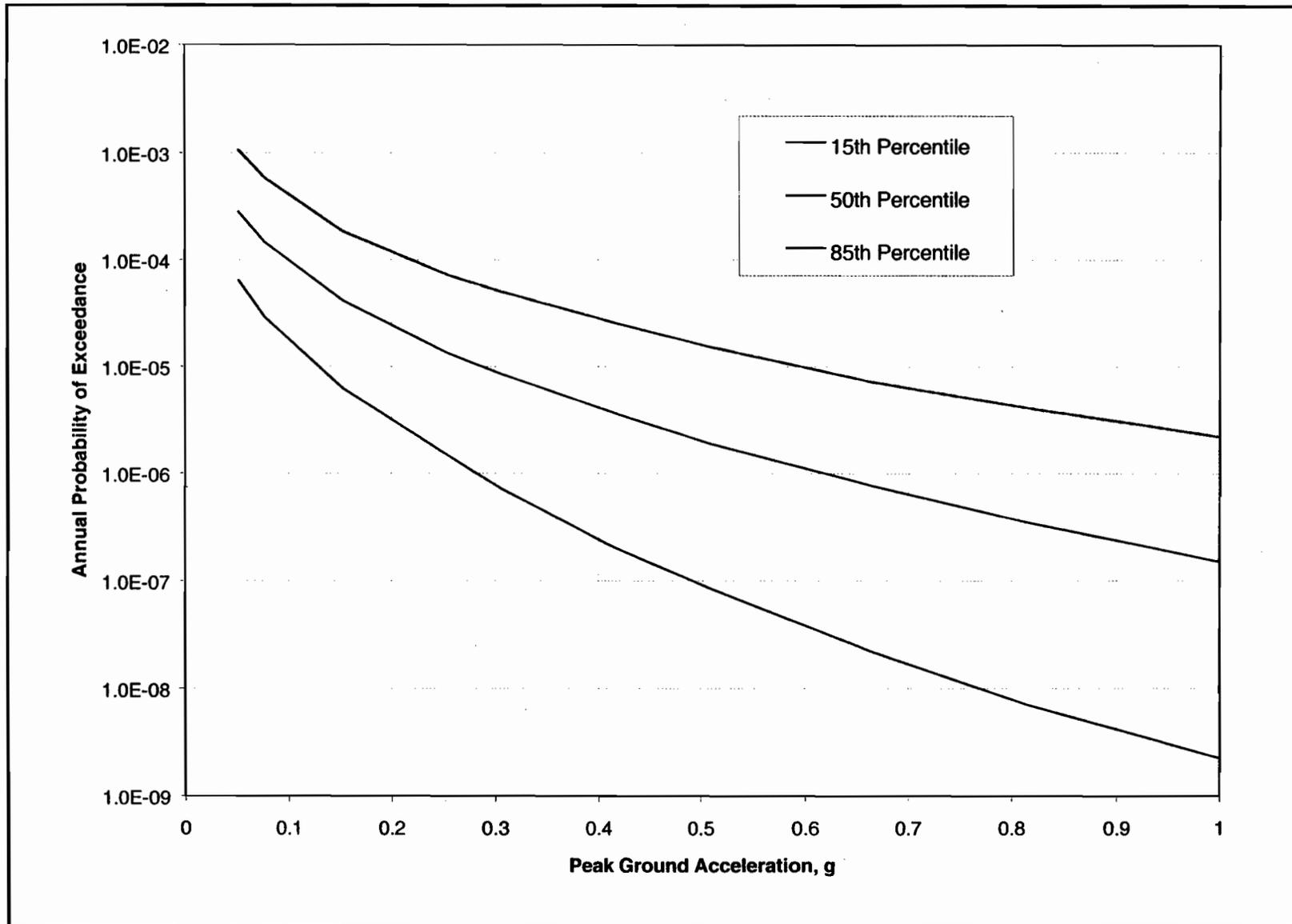
# Acceleration Range Contribution to Spent Fuel Pool Structural Failure Probability - Robinson



# Acceleration Range Contribution to Spent Fuel Pool Structural Failure Probability – Vermont Yankee



# Surry Uniform Hazard (PGA)



# Industry Observations and Recommendations on Seismic Risk

- Both Deterministic and Probabilistic Seismic Hazard should be considered with respect to any seismic decommissioning regulations
  - Maximum Credible Earthquake Concept should be utilized in this evaluation
  - Tails of random uncertainty term should be truncated at high ground motions
- Earthquake levels which drive the seismic risk should be evaluated for reasonableness
  - Seismic risk comes from extremely large (and correspondingly low probability) earthquakes
  - Increasing the Seismic Capacity (to meet NRC proposed criteria) would translate to redesigning the SFP to an earthquake level several times the SSE

## **Tentative Schedule for Issuance of MD 6.4**

- **Make Revisions to MD 6.4 Based on Lessons Learned:** **March 30, 2001**
- **Distribute MD 6.4 for Peer Review Within the Agency:** **April 10, 2001**
- **Notify the EDO Concerning Pilot Study for Generic Issue Program:** **April 10, 2001**
- **Obtain Final Peer Review Comments on MD 6.4:** **May 11, 2001**
- **Issue Final Version of MD 6.4 for Publication:** **June 29, 2001**



*United States  
Nuclear Regulatory Commission*

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**Trial Use of Management Directive 6.4,  
*Generic Issue Program***

**Harold VanderMolen  
Ronald Lloyd**

**Division of Systems Analysis  
and Regulatory Effectiveness  
Office of Nuclear Regulatory Research**

**480<sup>th</sup> ACRS Meeting  
March 1, 2001**

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## **Status of Reevaluation of the Generic Issue Process**

- April 9, 1999:** **Incomplete Draft MD 6.4 Issued for Peer Review**
- April 19, 1999:** **ACRS Recommends the Staff Conduct a Pilot Study to Evaluate the Effectiveness of Using a Draft MD for Implementing the Revised Generic Issue Process Prior to Developing a Final Version of MD 6.4 and its Associated Handbook**
- July 21, 1999:** **Issued a Complete Version of the Draft MD**
- October 21, 1999:** **Revision 1 to the Draft MD Issued to Address OGC Comment Clarifying Its Nature and Purpose**
- March 1, 2001:** **(1) Provide an Update to the ACRS Concerning Lessons Learned During the Trial Use of MD 6.4 in Addressing Candidate Reactor and Materials Generic Issues, and  
(2) Request Approval to Revise the Draft MD and Issue a Final MD**

## Comparison of Draft MD and RES Office Letter Generic Issue Processes

<b>Draft Management Directive 6.4</b>	<b>RES Office Letter No. 7</b>
<b>1. Identification</b> <b>2. Initial Screening</b> <b>3. Technical Screening</b> <b>4. Technical Assessment</b> <b>5. Regulation and Guidance Development</b> <b>6. Regulation and Guidance Issuance</b> <b>7. Implementation, and</b> <b>8. Verification</b>	<b>1. Identification</b> <b>2. Prioritization</b> <b>3. Resolution</b>

## Generic Issue Processing Using Draft MD 6.4

<b>Type</b>	<b>Title</b>	<b>Lead Office</b>	<b>Date Initiated</b>	<b>Current Status</b>
Reactor	<i>Potential Risk and Consequences of Heavy Load Drops in Nuclear Power Plants (GI-186)</i>	RES	5/1999	Technical Screening Ongoing
Reactor	<i>Potential Impact of Postulated Cesium Concentration on Equipment Qualification in the Containment Sump (GI-187)</i>	RES	12/1999	Initial Screening Ongoing
Reactor	<i>Steam Generator Tube Leaks/Ruptures Concurrent With Containment Bypass (GI-188)</i>	RES	6/2000	Initial Screening Ongoing
Materials	<i>Leaking Pools (i.e., BWX Technologies, wet storage irradiators, ISFSIs, others containing radioactive materials)</i>	NMSS	10/2000	Dropped (1/26/2001)
Materials	<i>Unlikely Events (inappropriate use of “unlikely events” in support of the double contingency principle of ANSI/ANS- 8.1-1983, “Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors”)</i>	NMSS	10/2000	Dropped (1/26/2001)
Materials	<i>Gamma Stereotactic Radiosurgery (Misadministrations, NMSS-0020)</i>	NMSS	10/2000	Dropped (2/12/2001)

## **Control Candidate Generic Safety Issue**

- **For Comparison with MD 6.4, GI-185 *Control of Recriticality Following Small-break LOCAs in PWRs* Was Screened Using the “Old” Generic Safety Issue Process (RES Office Letter No. 7: *Procedures for Identification, Prioritization, Resolution, and Tracking of Generic Issues*)**

## MD 6.4 Trial Period Experience:

### Candidate Reactor Generic Safety Issues:

- **GI-186**    ***Potential Risk and Consequences of Heavy Load Drops in Nuclear Power Plants (Now in Technical Screening Stage)***
  - Panel Met Successfully and Determined That the Issue Would Be Classified as a “Compliance Issue” and Dropped
  - NRR Requested That the Risk Significance of the Issue Be Reviewed More In-depth
  - NRR Became Concerned about the Number of Staff Hours Being Consumed to Support Panel Meetings
  - RES Visited Eight Facilities to Obtain Operating Experience Data and Load Drop Studies
  
- **GI-187**    ***Potential Impact of Postulated Cesium Concentration on Equipment Qualification in the Containment Sump (Now in Initial Screening Stage)***
  - Difficulty Encountered in Arranging Panel Meetings
  - Panel Agreed on the Conclusion to Drop the Issue, but Disagreed on Specifics of Justifying the Conclusion

## **MD 6.4 Trial Period Experience (Continued):**

### **Candidate Reactor Generic Safety Issues (Continued):**

- **GI-188    *Resonance Vibrations of Steam Generator Tubes Following MSLB Event*  
(Now in Initial Screening Stage)**
  - **Technically, a Very Complex Issue Involving a Spectrum of Disciplines**
  - **Difficult to Get an Expert Panel Together**
  - **Delays Occurred Due to Unavailability of the Staff Member Who Raised the Issue**
  - **Significant Amount of Briefing Material**

## **MD 6.4 Trial Period Experience (Continued):**

### **Control Issue Processed under the “Old” System:**

- **GI-185    *Control of Recriticality following Small-Break LOCAs in PWRs***
  - **A Complex Technical Issue Requiring an In-depth Review**
  - **Prioritization Completed in Six Weeks, but Concurrence Review Lasted 197 Days**

## **MD 6.4 Trial Period Experience (Continued):**

### **Candidate Materials Generic Safety Issues:**

- **No Candidate-specific Generic Safety Issue Comments**
- **All Three Candidate Issues Were Dropped Following Panel Review**
- **General MD 6.4 Comments Have Been Included in the Summary Observation Slide**

## **Summary Observations During Trial Use of Draft MD 6.4**

### **Positive Draft Process Observations:**

- **Opportunity to Save Staff Resources for Those Issues That Are Clearly of Low Risk Significance and Are Dropped from the Generic Issue Program**
- **Opportunity to Save Staff Resources for Compliance Issues**
- **Formality of the Process Gives it Visibility at All Levels**
- **Flexibility in Use of Handbook Guidance Especially Useful**
- **Generic Issue Processing Time May Be Shortened by Eliminating Unnecessary Analysis**
- **Consensus on Scope of the Candidate Generic Issue Achieved Early in the Process**

## **Summary Observations During Trial Use of Draft MD 6.4 (Continued)**

### **Shortcomings and Limitations in Process:**

- **In Some Instances, the Panel Concept Has Been Administratively Cumbersome**
- **Initial Screening Stage May Not Provide Sufficient Technical Basis for Decisionmaking**
- **Threshold for Processing Candidate Issues Not Clearly Defined for Materials Issues**
- **Documentation of “Closed” Issues for Materials Issues Could Be Enhanced**
- **A Clear Link Between MD 6.4 and GIMCS Needs to Be Established**

## **Summary Observations During Trial Use of Draft MD 6.4 (Continued)**

### **Administrative Draft Process Observations:**

- **Issues Are Often Complex, Resulting in a Significant Amount of Review Time, and Conflicts with Other Priorities**
- **Issues Can Involve Several Disciplines Resulting in a Large Number of Panel Members**
- **Greater Commitment from NRC Staff Will Be Required to Establish Panels, Set Aside Time to Review and Process Candidate Generic Issues in a Timely Manner**
- **Difficult to Establish a Panel and Complete the Initial Screening Stage Within the Required 30 Days**
- **There Is Still a Desire by NRR for a More In-depth Risk-based Evaluation Prior to Dropping an Issue from the Generic Issue Program**
- **Similarly, Those Who must Enforce “Compliance” Issues Have Expressed a Desire for a Risk Assessment**

**Other Observations:**

- **The Previous Generic Issue Process Did Not Work Well During this Trial Period in Addressing GI-185**

**Caution:**

- **Lessons Learned Are Not All Inclusive; in That MD 6.4 Guidance Currently Includes 8 Stages, No Candidate Generic Issue Has Been Processed Beyond Stage 3 of the MD**

## Recommendations

- **Add Clarifying Information to Appendix A (Candidate Generic Issue Submittal Form) to Better Focus the Generic Issue Review Panel**
- **Clarify the Requirements of the “Initial Screening Stage” to Limit the Scope of the Panel**
- **Combine the Technical Screening and Technical Assessment Stages to Provide a Better Technical Basis for Decisionmaking; OR Combine the Initial Screening and Technical Screening Stages to simplify the process**
- **Provide Clearer Guidance on the Distinction Between “Adequate Protection” and “Substantial Safety Enhancement”**
- **Delay the Generic Issue Classification into “Adequate Protection,” “Substantial Safety Enhancement,” or “Burden Reduction” to the Technical Screening/Assessment Stage when additional technical analysis results are available**

## **Recommendations (Continued)**

- **Threshold Requirements for Processing Candidate Issues Should be Clarified for Materials Issues**
- **Documentation Requirements for “Closed” Issues Should be Enhanced**
- **A Clear Link Between MD 6.4 and GIMCS Should be established**
- **Consider Greater Sharing of Other Forms of “Generic Communication Issues” Between Offices**
- **Clarify the Level of Technical Analysis That Would Be Done Within the Scope of the MD**

# **V. C. Summer Reactor Coolant System “A” Hot Leg Crack**

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ACRS Meeting  
March 2, 2001

# V. C. Summer

ACRS Meeting  
March 2, 2001

- V. C. Summer Background -- Karen Cotton
- Discussion of Technical Review and future activities -- Gene Carpenter
- Materials Reliability Program -- Larry Matthews
- Billy Crowley -- Special Inspection Team Leader
- Steve Doctor, Ph.D -- Special Inspection Team Member

# History

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- **October 7:** Discovery of boron deposits
- **October 13:** Liquid penetrant test revealed (PT) 4-inch indication on the “A” hot leg (later determined to be surface only)
- **November 6:** Ultrasonic testing (UT) and eddy current testing (ECT) revealed an axial crack approximately 2½” long with a “weep hole” exit point

# V. C. Summer Activities

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- Designated an evaluation and repair team
- Assembled a team of industry experts
  - ▶ Initiated Root Cause analysis
  - ▶ Researched Repair alternatives

# V.C. Summer Activities Cont'd

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- **Established Completion Goals**
  - ▶ Plant will be safe for start up:
    - Pipe and weld(s) meet code requirements
    - Repair will bound probable failure scenarios
    - Commonalities are addressed in the other welds
      - ECT indications found in 5 of 6 nozzle welds
- **Developed a Communications Plan**
- **Licensee Commitments**
  - ▶ To enhance their leak detection procedures
  - ▶ To inspect the 'B' and 'C' hot leg welds in Refueling Outage 13
  - ▶ To inspect all nozzle-to-pipe welds in Refueling Outage 14

# NRC Activities

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- Special Inspection Team (SIT) chartered
- Communication Plan developed
- Communication Team formed
- Summer Event Website developed
- Issued
  - ▶ Information Notice 2000-17 -- October 18, 2000
  - ▶ Supplement 1 -- November 16, 2000
  - ▶ Supplement 2 -- February 28, 2001
- Safety Evaluation of WCAP issued 02/20/01
  - ▶ Evaluation of the 'B' and 'C' hot leg welds

# NRC Activities (Cont'd)

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- Held five public meetings:
  - Atlanta - October 25, 2000
  - Washington - November 21, 2000
  - Atlanta - December 20, 2000
  - V. C. Summer Site - January 18, 2001
  - V. C. Summer Site - February 15, 2001 (public SIT Exit meeting)

# Licensee's Root Cause Determination

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- The construction weld process of grinding out the inside of the weld with a bridge pass in place created high welding residual stresses in the material (Alloy 182/82) susceptible to primary water stress corrosion cracking (PWSCC)

# Special Inspection Team (SIT)

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- **Inspection Objectives:**

- ▶ To verify that the corrective actions activities were appropriate.

- **Inspection Scope:**

- ▶ To review and/or observe licensee activities relative to root cause determination and corrective action.

# SIT Cont'd

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## ■ Inspection Activities

- ▶ Reviewed the licensee overall corrective actions
- ▶ Reviewed original construction records, previous PSI and ISI records
- ▶ Observed current welding and NDE activities
- ▶ Two trips to Westinghouse to review metallurgical analysis of the spool piece removed from the 'A' hot leg weld

# SIT Findings

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- Root Cause analysis was found acceptable
- All welding and NDE activities met Code requirements

**DISCUSSION OF V.C. SUMMER  
TECHNICAL REVIEW  
AND  
GENERIC ACTIVITIES**

ACRS MEETING  
MARCH 2, 2001

C. E. CARPENTER  
NRR:DE:EMCB

# STAFF'S REVIEW

- Staff Performed Independent Evaluation of Licensee's Assessment of "B" and "C" Nozzle Welds
  - "Integrity Evaluation for Future Operation: Virgil C. Summer Nuclear Plant Reactor Vessel Nozzle to Pipe Weld Regions," dated December 26, 2000 (WCAP-15615, Revision 1)
  - Provided Results of Westinghouse's UT & ET Examinations of Nozzle to Pipe Welds for Loops "A," "B," and "C"
  - Provided Flaw Evaluation Proposing That Summer Could Be Operated for Two Fuel Cycles Without Repair of Existing ET Indications on "B" & "C" Hot Leg Nozzle Welds

## **STAFF'S REVIEW** (con't)

- Staff's Review Found Summer Could Be Operated with ET Indications in "B" and "C" Hot Leg Welds for 1 Cycle
  - Used Bounding PWSCC Crack Growth Rate and Flow Stress for Weld Material, and Initial ET Indication Length & Inferred Depth
  - Used Bounding CGR Due to Limited Crack Growth Rate Data for Alloy 82/182 Material
  - Evaluation Issued February 20, 2001

# ONGOING ACTIVITIES

- Staff Is Reviewing Similar Cracking in Foreign Reactors
  - Root Cause of Summer and Ringhals Cracking is PWSCC
  - Investigating Reports of Other Foreign Cracking

## **ONGOING ACTIVITIES** (con't)

- **Staff Assessing:**
  - Generic Implications and Industry Activities
  - Implications on Leak-Before-Break (LBB) Analyses
  - Implications on ISI (Deterministic and Risk-Based) Programs
  - Ability of ASME Code-Required NDE to Detect and Size Small ID Stress Corrosion Cracks (Effect of Surface Condition)
  - Appropriateness of ASME Code Standards Allowing Flaws up to 10% of Wall Thickness Without Evaluations Given Apparent High CGR
  - Effectiveness of RCS Leak Detection Systems

# GENERIC ACTIVITIES

- Staff Proposing Confirmatory Research into PWSCC Cracking Issue to Include:
  - NDE / ISI Issues
  - Determination of Bounding CGR and Residual Stresses
  - Development of Susceptibility Model
  - Assessment of Possible Repair / Mitigation Methods
  - Following Industry Activities

## **GENERIC ACTIVITIES** (con't)

- PWROGs Have Proposed Industry Initiative to Respond to PWSCC Cracking Issue
  - PWR Materials Reliability Program (MRP) Alloy 600 Issue Task Group (ITG) Addressing Assessment, Inspections and Repair/Mitigation
  - Met with Staff (January 25 & February 16) to Discuss Industry Plans to Respond to Cracking Issue
  - Staff Observed Inspection Mock-up at MRP Vendor Site
  - Future Technical & Management Meetings Planned

# STAFF EXPECTATIONS

- **Staff Expectations of Generic Activities**
  - **MRP Assessment of Generic Susceptibilities**
  - **NDE Methodologies / Tooling Should Make Use of Best Practices and Capabilities to Address Potential Weaknesses**
  - **Potential Code Cases**
  - **Implication for ISI & LBB**
  - **Long Term Assessment of Alloy 82/182 Applications**
  - **Review of Repair/Mitigation Methods**

EPRI

**Industry Response  
Alloy 82/182 Weld Cracking**

**ACRS Briefing – March 2, 2001**

**Materials Reliability Program  
Alloy 600 Issue Task Group (ITG)**

**Larry Mathews, SNC, Chairman  
Al McIlree, EPRI Project Manager**

1 MRP- A600 ITG

EPRI

**Industry Response to Generic  
Implications**

- **MRP A600 ITG has taken the lead in developing the industry plan**
  - VC Summer event Oct, 2000
  - Root Cause information early Dec, 2000
  - IIG Recommended Industry Program mid Dec.
- **Executive approval early Jan, 2001**
  - Developed organization
  - Developed detailed plan and budget
- **ITG organized 1/19/01 to address key focus areas**
  - Assessment Committee
  - Inspection Committee
  - Repair/Mitigation Committee

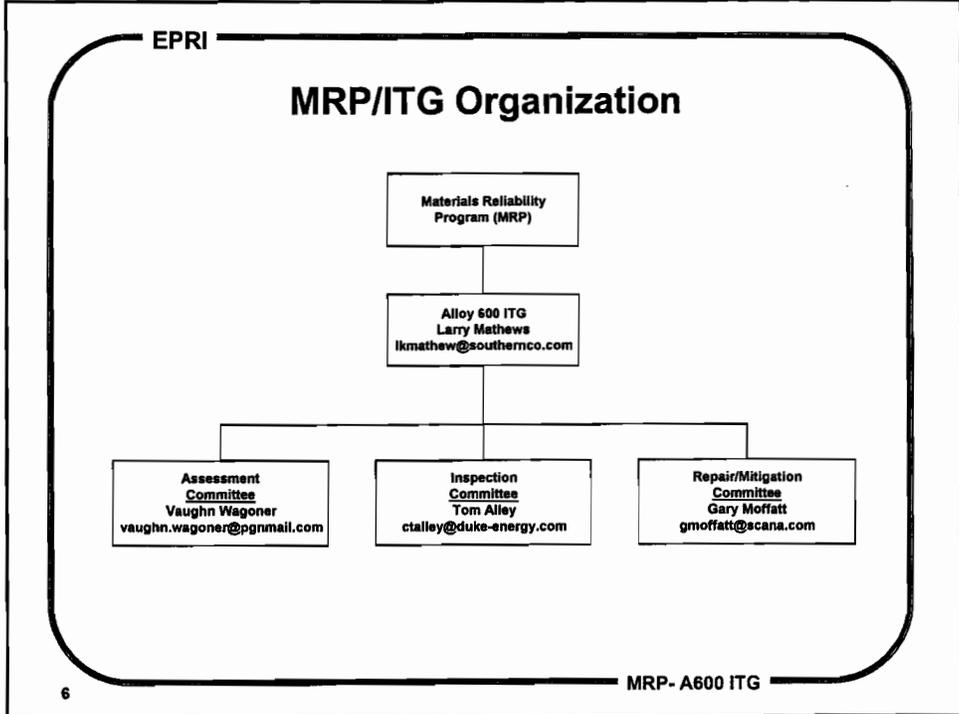
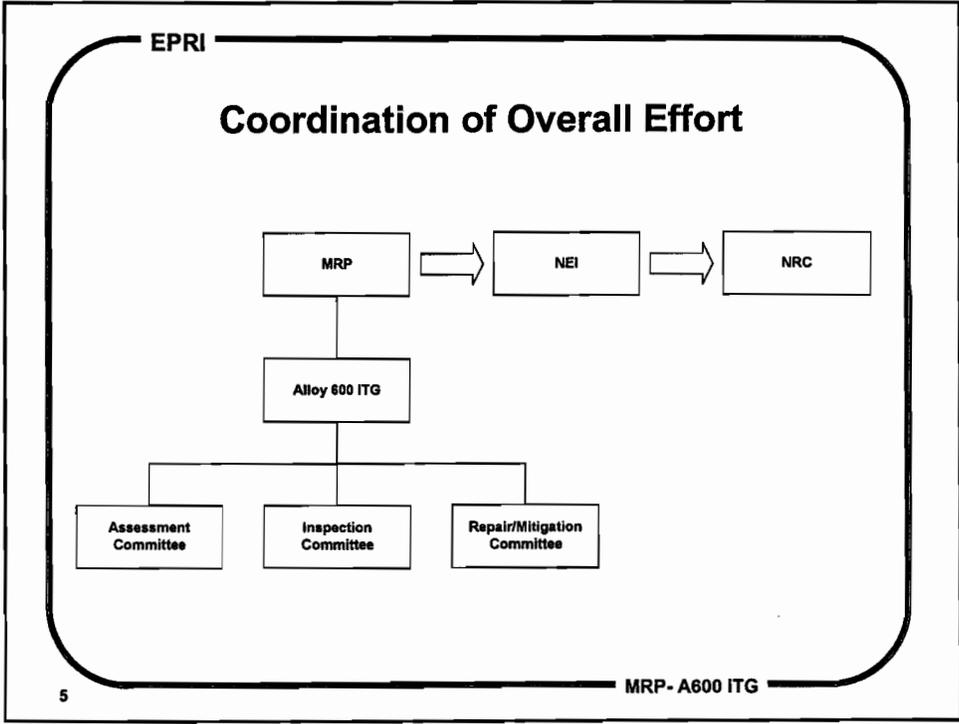
2 MRP- A600 ITG

## Industry Response to Generic Implications

- **1/25/01 Meeting with NRC**
  - Outline approach
  - Solicit feedback
- **2/1/01 Initial meetings of Inspection and Assessment Committees**
  - develop plan, schedule, and budget
- **2/16/01 MRP/NRC Executive Management Meeting**
- **3/23/01 Technical meeting with NRC staff - scheduled**

## MRP Status March 2, 2001

- **The industry plan includes:**
  - **Short term assessment to demonstrate that continued operation with Alloy 82/182 welds is acceptable, by late March.**
  - **Interim inspection guidance for near term outage plants - Complete**
  - **Longer term assessment of all Alloy 82/182 applications in PWR primary systems**
  - **Review and improvement of inspection technology**
  - **Review of repair/mitigation methods and improvement if necessary**
- **Endorsement of plan by Senior Representatives is anticipated at their meeting on 03/09/01**



## Assessment Committee Activities

- **Short Term Safety Assessment**
  - **Identify areas likely to be most susceptible**
    - » Evaluate size, temperature, and weld materials
    - » W and CE – likely to be hot leg pipe welds
    - » B&W – likely to be CRDM nozzle welds
  - **Demonstrate that most cracks will be axial, or axial-radial in case of CRDM nozzle welds**
    - » Domestic and international experience with similar welds
    - » Finite element stress analysis including welding residual and operating stresses

## Assessment Committee Activities (cont.)

- **Short term Safety Assessment (cont'd)**
  - **Demonstrate large tolerance for axial flaws**
    - » Stress analyses indicate preference for axial cracking
    - » Flaw limited to axial length of pipe weld
    - » Flaw limited to J-groove and nozzle thickness for CRDM welds
    - » Limit load and fracture mechanics analyses will show large margin
  - **Demonstrate large tolerance for circumferential flaws**
    - » Leakage will be detected from partial-arc flaws while there is still large margin on limit load

## Weld Assessment Technical Approach (cont.)

- **Short term Safety Assessment (cont'd)**
  - Pipe weld failures are covered by Defense-in-Depth (pipe failure has been analyzed in the SARs)
  - Visual inspections for boric acid have been effective in identifying leaks well before any structural margins are affected

## Weld Assessment Technical Approach (cont.)

- **Longer Term Action**
  - Complete scope definition
  - Evaluate generic applicability
    - » Finite element analyses, including operating and residual stresses
  - Assess safety significance
  - Prioritize locations based on safety significance, NDE capabilities, and actual experiences
  - Determine inspection requirements
  - Develop consistent flaw evaluation guidelines
  - Assess research needs and oversee tasks
    - » Coordination with ongoing CGR work

## Inspection Committee Activities

- **Short Term Inspection Guidance**
  - **Develop consistent inspection approach**
    - » ID UT still considered best available technique
    - » Considered adequate for upcoming spring outages
    - » Demonstrations on EPRI mockup
  - **Enhanced awareness of inspectors to signal anomalies**
  - **Review previous inspection data for geometry, signal quality, etc.**
  - **Enhanced sensitivity for boric acid walkdown**
    - » Visual inspections are effective
  - **Enhanced awareness of Operations/Chemistry personnel during operation**

## Inspection Committee Activities (cont'd)

- **Longer Term Actions**
  - **Evaluate need for alternate/new techniques**
    - » Evolving Vendor capabilities
    - » International capabilities
    - » Geometry concerns
  - **Evaluate Spring Inspection results/feedback to Fall plants**
  - **Define additional mockup needs**
  - **Work with vendors on delivery systems**
  - **Coordination of demonstrations with current App. VIII actions**
  - **Provide training/expert help to utilities**
  - **Evaluate impact on Risk Informed ISI**

## Repair/Mitigation Committee

- **Need for repair/mitigation improvements depends on Assessment and Inspection Committee findings**
- **Prioritize from repair/mitigation/inspection perspective**
  - **Likelihood/consequence of failure**
  - **Implementation difficulty**
  - **Cost and dose**
  - **Material availability**
- **Create a repair/mitigation matrix**
  - **Assess existing technology**
  - **Qualification and demonstration**
  - **Code and regulatory compliance/involvement**

## Schedule

- **Technical working meeting with NRC, March 23, 2001**
  - **Describe detailed approach**
  - **Discuss preliminary findings**
  - **Solicit feedback**
- **Arrange NRC visit to NDE Center**
- **Short term Assessment/Inspection effort completed in March**
  - **Safety Assessment of Alloy 82/182 welds**
  - **Inspection guidance for Spring 2001 outages**
- **Longer Term**
  - **Assessment/Inspection efforts for June**
    - » **Evaluation of Spring 2001 inspections**
    - » **Assessment of all Alloy 82/182 welds**
  - **Continued assessment of all Alloy 600 applications, inspection and repair/mitigation technology, research efforts**

## CONCLUSIONS

- MRP A600 ITG has taken the lead in developing the industry plan
- Not a near term safety issue
  - Visual inspections for boric acid are effective
  - Pipe weld failures are covered by Defense-in-Depth (pipe failure has been analyzed in the SARs)
  - Short term assessment to demonstrate that continued operation with Alloy 82/182 welds is acceptable, by late March
- Interim inspection guidance for near term outage plants - Complete
- Longer term assessment of all Alloy 600 and Alloy 82/182 applications in PWR primary systems, including inspection, repair, and mitigation
- Will continue to keep NRC informed

BRIEFING TO THE  
ADVISORY COMMITTEE ON REACTOR  
SAFEGUARDS  
ON THE  
NEI FIRE PROTECTION  
INFORMATION FORUM  
March 2, 2001

**ACRS Member**  
**Dana A. Powers**  
**Cognizant Staff Engineer**  
**Amarjit Singh**

# Fire Protection Information Forum

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- ACRS Member(s) and Staff attend NEI's Fire Protection Forum as part of the ACRS effort to ensure that ACRS is adequately informed of industry issues and concerns
- Since 1998 the ACRS Member(s) and Staff has attended six of NEI forums

# Fire Protection Information Forum (Continued)

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- Forum Agenda Focused on the Fire Protection Oversight Inspections
- Current Inspection Procedures
- Significance Determination Process

# Fire Protection Information Forum (Continued)

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- Fire Protection Performance Indicators
- NRC research activities
- Comprehensive Regulatory Guide
- NFPA 805 Rulemaking

# Fire Protection Information Forum (Continued)

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- Current Licensing Issues and Fire Protection: 50.59, License Renewal, and Maintenance Rule
- Fire Induced Circuit Failures
- EPRI Circuit Failure Testing



# Schedule

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- The NEI Fire Protection Information Forum will held on October 22-25, 2001 at the Sheraton Sand Key in Clearwater Beach, Florida



**ANTICIPATED WORKLOAD**  
**March 1-3, 2001**

LEAD MEMBER	BACKUP	ENGINEER	ISSUE	FULL COMM. REPORT	SUBC. MTG.	
					CHAIR.	MEMBER
Bonaca	Leitch	Dudley/Duraiswamy	ANO, Unit 1 License Renewal Application- <b>Subcommittee Report</b>	--	PLR 2/22	PO/RPRA 2/21 P&P 2/28-10 AM
Kress	--	Singh	Management Directive 6.4 & related handbook associated with the revised Generic Issue Process	Report	--	THP 2/20 PO/RPRA 2/21 PLR 2/22 P&P 2/28-10 AM
	Powers	Weston	Regulatory Effectiveness of the ATWS Rule ( <b>Presentation completed in Feburary</b> )	Report		
		El-Zeftawy	Spent Fuel Pool Accident Risk at Decommissioning nuclear plants	Report (Tentative)		
Powers	--	El-Zeftawy	NRC Safety Research Program	Final Report	--	Commission mtg. On Spent Fuel Fire Risk 2/20
		Singh	Trip report on NEI Fire Protection Forum	--		
Sieber	Apostolakis	Weston	Subcommittee report on South Texas Project Exemption Request	--	PO/RPRA 2/21	--
Shack	Sieber	Markley	Degraded RCS pressure boundary event at V.C. Summer plant	--	--	THP 2/20 PO/RPRA 2/21 PLR 2/22
Leitch	--	Boehnert	British Nuclear Powered Submarine Incident ( <b>CLASSIFIED</b> )	--	--	--

**ANTICIPATED WORKLOAD**  
**March 1-3, 2001**

LEAD MEMBER	BACKUP	ENGINEER	ISSUE	FULL COMM. REPORT	SUBC. MTG.	
					CHAIR.	MEMBER
Wallis	--	Boehnert	RETRAN-3D Transient Analysis Code- <b>Subcommittee Report</b>	--	THP 2/20	--

**ANTICIPATED WORKLOAD**  
**April 5-7, 2001**

LEAD MEMBER	BACKUP	ENGINEER	ISSUE	FULL COMM. REPORT	SUBC. MTG.	
					CHAIR.	MEMBER
Bonaca	Leitch	Duraiswamy	Hatch License Renewal Application/SERs on Selected BWRVIP Documents	Interim Report	PLR 3/27-28	THP 3/15 M&M/THP/RPRA 3/16 P&P 4/4 RF 4/4
	Leitch	Duraiswamy/ Boehnert	Proposed Final License Renewal Documents (SRP, Reg. Guide, & GALL)	Report	--	PLR 3/27-28
Powers	--	El-Zeftawy	High Burn-up & MOX Fuel Issues	Report	RF 4/4	M&M/THP/RPRA 3/16
		Singh	Proposed Resolution of GSI-170, "Reactivity Transients and Fuel Damage Criteria for High Burnup Fuel."	Report*	--	
Shack	Wallis	Markley	Risk-Informing 10 CFR 50.46 (Subcommittee Report)	--	M&M/THP/RPR A 3/16	PLR 3/27-28 RF 4/4
Sieber	Apostolakis	Weston	South Texas Project Exemption Request	Report (Tentative)	--	--
		Singh	Proposed Final Reg. Guide DG-1097, Fire Protection for Operating Plants	--		
Wallis	Kress	Boehnert/El-Zeftawy	Thermal-Hydraulic Issues Associated with AP1000	Report	THP 3/15	M&M/THP/RPRA 3/16

\*Possible Larkinsgram

**ANTICIPATED WORKLOAD  
May 10-12, 2001**

LEAD MEMBER	BACKUP	ENGINEER	ISSUE	FULL COMM. REPORT	SUBC. MTG.	
					CHAIR.	MEMBER
Apostolakis	--	Markley	Risk-Based Performance Indicators	Report	RPRA 4/17 P&P 5/9	PO 5/9
	All Members	Larkins	Meeting with the Commission	--		
Sieber	Apostolakis	Weston	South Texas Project Exemption Request	Report	PO 5/9	
	Apostolakis	Weston	Initial Implementation of the Revised Reactor Oversight Process (Performance Indicators and Significance Determination Process)	--		
Uhrig	--	Duraiswamy	Proposed Revisions to 10CFR Part 52	--	--	RPRA 4/17
Wallis	--	Boehnert	TRACG Best-Estimate Thermal-Hydraulic Code	Report	THP 4/19-20	--

## II. ITEMS REQUIRING COMMITTEE ACTION

1. ACRS Meeting with the NRC Commissioners (Open) (GEA, et.al/JTL,et.al)  
ESTIMATED TIME: 2 hours

Purpose: Periodic Meeting

The ACRS is tentatively scheduled to meet with the NRC Commissioners on Friday, May 11, 2001. Topics proposed by the Planning and Procedures Subcommittee are as follows:

- Proposed framework for risk-informed changes to 10 CRF Part 50
- South Texas Project Exemption request
- Thermal-Hydraulic Codes
- Status report on ACRS review of license renewal applications and related matters

### RECOMMENDATION

The Planning and Procedures Subcommittee recommends that the Committee approve a list of topics during the March meeting for discussion during the meeting with the NRC Commissioners.

2. Draft ANS Standard on Low-Power and Shutdown Operations PRA (Open)  
(GA/MTM) ESTIMATED TIME: 2 hours

Purpose: Determine a Course of Action

**Review schedule specified in CTM [B. Budnitz/M. Drouin, RES].** The NRC staff previously requested the American Society of Mechanical Engineers (ASME) and American Nuclear Society (ANS) to develop Standards for use by industry in standardizing and upgrading their PRAs to facilitate risk-informed decisionmaking. ASME developed a Standard on internal events which the Committee reviewed and provided comments in letters dated March 25, 1999, and July 20, 2000. The Committee reviewed the draft ANS Standard on external-events PRA and provided comments in a letter dated February 9, 2001.

ANS is preparing its draft Standard on low-power and shutdown operations (LPSD) PRA and plans to issue it for a 60-day public comment period in early May 2001. ANS has offered to brief the Committee on the LPSD PRA Standard during June 2001 ACRS meeting.

**The Planning and Procedures Subcommittee recommends that this item be scheduled for the June ACRS meeting.**

3. Proposed Final Version of Regulatory Guide DG-1097, "Fire Protection for Operating Nuclear Power Plants." (Open) (JDS/AS) ESTIMATED TIME: 1 hour

Purpose: Determine a course of Action

**Briefing requested by NRC staff [Edward Connell, NRR].** During 471<sup>st</sup> meeting of the Advisory Committee on Reactor Safeguards, the Committee decided not to review the draft regulatory guide and stated that it plans to review the proposed final version of this Guide. By note to James E. Lyons dated February 14, 2001, the staff provided a copy of the proposed final version of this Guide and has requested to brief the Committee at the April ACRS meeting. The staff plans to issue this Guide for industry use on April 15, 2001.

**The Planning and Procedures Subcommittee recommends that Mr. Sieber propose a course of action.**

4. Closure of Generic Safety Issue-170, "Reactivity Transients and Fuel Damage Criteria for High Burnup Fuel" (Open) (DAP/AS) ESTIMATED TIME: 1 hour

Purpose: Determine a Course of Action

**Review requested by the NRC Staff [F. Eltawila, RES].** During the 455<sup>th</sup> and 456<sup>th</sup> meetings of the Advisory Committee on Reactor Safeguards, the Committee reviewed priority rankings proposed by the NRC staff for several Generic Safety Issues (GSIs), including, GSI-170. The Committee agreed with the staff's proposed priority ranking for GSI-170 with comments. The Committee stated that the research program needs to develop plans to examine high burnup fuel behavior during anticipated transients without scram (ATWS) events and ATWS recovery processes. This generic issue as originally defined was broad and does not involve safety concerns requiring immediate regulatory action. By subsequent actions, the issues comprising GSI-170 have been clarified and well defined research programs have been put in place to address this issue. The staff has proposed to closeout GSI-170 and each of its subissues will be resolved within ongoing research programs. The staff plans to brief the Committee on the proposed resolution of GSI-170 during the April or May ACRS meeting.

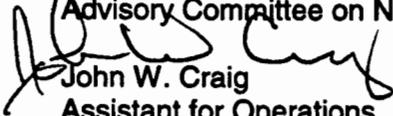
**The Planning and Procedures Subcommittee recommends that Dr. Powers propose a course of action.**



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

February 27, 2001

MEMORANDUM TO: John T. Larkins, Executive Director  
Advisory Committee on Reactor Safeguards  
Advisory Committee on Nuclear Waste

FROM:   
John W. Craig  
Assistant for Operations  
Office of the Executive Director for Operations

SUBJECT: PROPOSED AGENDA ITEMS FOR THE ACRS AND THE ACNW MEETINGS

Attached is a list of proposed agenda items for the ACRS (March 2001 - May 2001) and the ACNW (March 2001 - May 2001). This list was compiled based upon information received from (1) NRR, NMSS, RES, and IRO in response to the EDO request for the monthly update of proposed agenda items, and (2) the ACRS/ACNW staffs at a meeting held on February 21, 2001 with the OEDO, NRR, and NMSS ACRS/ACNW coordinators.

A copy of the Work Items Tracking System (WITS) list for April 2001 - July 2001 is also attached. This list includes a projection of office originated Commission papers that may be of interest to the ACRS/ACNW. Please provide timely feedback on your interest for briefings on particular items identified from the projected Commission papers that were not planned for formal review or information briefings but that are of interest to the Committees.

Attachments: As stated

ML01580193

**PROPOSED AGENDA FOR  
ACRS MEETINGS  
(March 2001 -June 2001)**

<b>ACRS MEETING — MARCH 1-3, 2001</b>				
<b>Item #</b>	<b>Title/Issue</b>	<b>Purpose</b>	<b>Priority</b>	<b>Documents</b>
1	ANO-1 License Renewal Contact: S. Hoffman, DRIP/NRR	Review and Comment	Medium	SER with open items provided in January.
2	Generic Implications of Reactor Coolant System "A" Hot Leg Crack at VA Summer Contact: E. Benner, DRIP/NRR	Information Briefing	Medium	All documents are currently available at <a href="http://www.nrc.gov/NRC/REACTORS/SUMMER/index.htm">www.nrc.gov/NRC/REACTORS/SUMMER/index.htm</a>
3	Status of MD 6.4, "Generic Issues Program" Contact: H. Vandermolen, DSARE/RES	Review and Comment	Medium	None
4	Spent Fuel Pool Accident at Decommissioning Nuclear Power Plants Contact: G. Holahan, T. Collins, DSSA/NRR	Information Briefing	Low	None

**ACRS MEETING — APRIL 5-7, 2001**

<b>Item #</b>	<b>Title/Issue</b>	<b>Purpose</b>	<b>Priority</b>	<b>Documents</b>
1	Hatch License Renewal and Selected BWRVIP Documents	Review and Comment	High	SE's have been continuously provided.
	Contact: S. Hoffman, C. Carpenter DRIP/NRR			
2	License Renewal Implementation Documents	Review and Comment	High	Final SRP, GALL Report, RG, and NEI 95-10 provided by 3/1/01.
	Contact: S. Lee, DRIP/NRR			
3	Thermal Hydraulic Issues Associated with the AP-1000 Design	Review and Comment	High	WCAP-15612 (Plant Description), dated 12/12/00 and WCAP-15613 (Scaling Assessment) provided in Feb. '01.
	Contact: J. Wilson, DRIP/NRR			
4	Safety Issues Associated with the Use of High Burn-Up and Mixed Oxide Fuel	Review and Comment	High	Draft Phenomena Identification and Ranking Table (PIRT) Reports
	Contact: R. Meyer, DSARE/RES; M. Chatterton, DSSA/NRR			

<b>ACRS MEETING ---- APRIL 5-7, 2001</b>				
<b>Item #</b>	<b>Title/Issue</b>	<b>Purpose</b>	<b>Priority</b>	<b>Documents</b>
5	Draft Final SER for the South Texas Project Exemption Request to Exclude Certain Components from the Scope of Special Treatment Requirements Required by Regulations	Review and Comment	High	STP responses to open and confirmatory items from the draft SER. 1/15/01 response provided to ACRS via e-mail on 1/16/01. 1/18 and 1/24 responses provided to ACRS via e-mail on 1/25/01.
	Contact: J. Nakoski, DLPM/NRR			

<b>ACRS MEETING --- MAY 10-12, 2001</b>				
<b>Item #</b>	<b>Title/Issue</b>	<b>Purpose</b>	<b>Priority</b>	<b>Documents</b>
1	Risk-Based Performance Indicators	Review and Comment	High	ACRS received the draft report on the results of Phase 1 development of risk-based indicators on October 16, 2000.
	Contact: S. Mays, DRAA/RES			
2	Proposed Update to 10CFR Part 52	Review and Comment	Medium	Draft rule will be provided 30 days prior to meeting.
	Contact: J. Wilson, DRIP/NRR			

<b>ACRS MEETING — MAY 10-12, 2001</b>				
<b>Item #</b>	<b>Title/Issue</b>	<b>Purpose</b>	<b>Priority</b>	<b>Documents</b>
3	TRACG Best-Estimate Thermal-Hydraulic Code	Review and Comment	Medium	Draft SER to be provided by 4/5/01
	Contact: R. Caruso, DSSA/NRR			
4	Closure of Generic Safety Issue-170, "Reactivity Transients and Fuel Damage Criteria for High Burn-up Fuel"	Determine a Course of Action	High	Draft closure letter to EDO
	Contact: F. Eltawila, DSARE/RES			

<b>ACRS MEETING — JUNE 6-8, 2001</b>				
<b>Item #</b>	<b>Title/Issue</b>	<b>Purpose</b>	<b>Priority</b>	<b>Documents</b>
1	Proposed Framework for Risk-Informing the Technical Requirements of 10CFRPart50 and Proposed Revisions to 10CFR50.46, "Acceptance Criteria for Emergency Core Cooling Systems for Light-Water Power Reactors Documents"	Review and Comment	High	Draft Commission paper to be provided by May 2001.
	Contact: M. Drouin, DRAA/RES			
2	EPRI RETRAN-3d Code	Review and Comment	Medium	SER on Code provided in December
	Contact: R. Caruso/R. Landry, DSSA/NRR			

# ACRS MEETING HANDOUT

<b>Meeting No.</b>  <b>480th</b>	<b>Agenda Item</b>  <b>12</b>	<b>Handout No:</b>  <b>12.1-</b>
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**Title**    **MINUTES OF PLANNING & PROCEDURES  
SUBCOMMITTEE MEETING - FEBRUARY 28,  
2001**

**Authors**                    **JOHN T. LARKINS**

**List of Documents Attached**

# 12

- Instructions to Preparer**
1. Punch holes
  2. Paginate attachments
  3. Place covv in file box

From Staff Person  
**JOHN T. LARKINS**

**SUMMARY MINUTES OF THE  
PLANNING AND PROCEDURES SUBCOMMITTEE MEETING  
WEDNESDAY, FEBRUARY 28, 2001**

The ACRS Subcommittee on Planning and Procedures held a meeting on February 28, 2001, in Room 2B1, Two White Flint North Building, Rockville, Maryland. The purpose of the meeting was to discuss matters related to the conduct of ACRS business. The meeting was convened at 10:00 a.m. and adjourned at 12:15 p.m.

**ATTENDEES**

G. E. Apostolakis, Chairman  
M. Bonasa  
T. Kress

**ACRS STAFF**

J. T. Larkins  
R. P. Savio  
S. Duraiswamy  
M. El-Zeftawy (part-time)  
C. Harris  
S. Meador

**NRC STAFF**

I. Schoenfeld

**DISCUSSION**

- 1) **Review of the Member Assignments and Priorities for ACRS Reports and Letters for the March ACRS Meeting**

Member assignments and priorities for ACRS reports and letters for the March ACRS meeting are included in a separate handout. Reports and letters that would benefit from additional consideration at a future ACRS meeting were discussed.

**RECOMMENDATION**

The Subcommittee recommends that the assignments and priorities for the March 2001 ACRS meeting be as shown in the handout.

2) Anticipated Workload for ACRS Members

The anticipated workload of the ACRS members through May 2001 is included in a separate handout. The objectives are to:

- Review the reasons for the scheduling of each activity and the expected work product and to make changes, as appropriate
- Manage the members' workload for these meetings
- Plan and schedule items for ACRS discussion of topical and emerging issues

During this session, the Subcommittee discussed and developed recommendations on the items that require Committee decision, which are included in Section II of the Future Activities list.

RECOMMENDATION

The Subcommittee recommends that the members provide comments on the anticipated workload. Changes will be made, as appropriate. The Committee needs to consider the Subcommittee's recommendations on items listed in Section II of the Future Activities.

3) ACRS Action Plan for CY 2001

During the December 2000 ACRS meeting, the Committee approved the ACRS Action Plan for CY 2001. The Action Plan has been sent to all Commissioners. We expect to receive comments from the NRC. After reconciliation of the comments, the Action Plan will be published.

RECOMMENDATION

The Subcommittee recommends that the ACRS Executive Director keep the Committee informed of any feedback from the Commissioners and/or the staff.

4) Assignments for Reviewing the Safety Evaluation Report (SER) Associated with Edwin I. Hatch Units 1 and 2 License Renewal Application

The ACRS is scheduled to review the Hatch Units 1 and 2 license renewal application and the associated staff SER during the April 2001 ACRS meeting. Since this is the first BWR plant license renewal application, the Committee will consider issuing an interim report at the April meeting. The ACRS Subcommittee on Plant License Renewal plans to hold a meeting on March 28, 2001 to review this matter. Proposed assignments for reviewing various chapters of the staff SER are included in Attachment (pp. 1-7). Copies of the staff SER have been sent to the members on February 27, 2001.

### RECOMMENDATION

The Subcommittee recommends that members review the SER chapters and/or sections assigned to them as well as the corresponding chapters and/or sections of the Hatch License Renewal application and provide comments to Dr. Bonaca by March 23, 2001. The members should identify inconsistencies, if any, between the application and the staff's SER. Issues identified by the reviewers should be discussed during the March 28 Subcommittee meeting.

5) Assignments for Reviewing Selected Reports of the Boiling Water Reactor Vessel and Internals Project (BWRVIP) Reports Associated with Hatch License Renewal, and License Renewal Guidance Documents

The Plant License Renewal Subcommittee plans to review selected BWRVIP reports pertinent to the Hatch license renewal application and the proposed final revisions to license renewal guidance documents (SRP, GALL, Regulatory Guide, and NEI 95-10) on March 27, 2001.

A list of BWRVIP documents for review along with the Hatch license renewal application and the ACRS member assignments for reviewing these documents are included in the Attachment (p. 8). Assignments for reviewing the license renewal guidance documents are also included in the attachment (p. 9). The selected BWRVIP documents, associated staff safety evaluation, and the proposed final license renewal guidance documents have been sent to the members on March 1, 2001.

### RECOMMENDATION

The Subcommittee recommends that the members review the BWRVIP documents and sections of the proposed final license renewal guidance documents assigned to them and provide comments to Dr. Bonasa by March 23, 2001. Issues identified by the reviewers should be discussed during the Subcommittee meeting. The staff should be requested to summarize, during ACRS meetings, the significant changes made to these documents to reflect consideration of public comments.

6) Commitments Resulting From the ACRS Retreat

The Committee held a retreat on January 22-24, 2001 to discuss various matters, including ACRS self assessment, stakeholders' comments on ACRS performance, selected key ACRS products, and other issues pertinent to ACRS operation. An updated list of commitments resulting from the retreat is included in the Attachment (pp. 10-16). During its January 31, 2001 meeting, the Subcommittee discussed Item 4 and recommended several actions, which are included in the attachment. The Subcommittee discussed other commitments and proposed appropriate actions. The commitments will be included (in part) in the ACRS/ACNW Self Assessment paper to the Commission. A draft Self Assessment paper should be available for P&P Subcommittee review at the April 2001 meeting.

RECOMMENDATION

The Subcommittee recommends that the Committee discuss and approve the commitments/recommendations proposed by the Subcommittee.

7) Commission Meeting on the NRC Safety Research Program

The Commission plans to hold a meeting on May 10, 2001 to discuss the NRC Safety Research Program with two Panels. The first Panel consists of former Commissioner Rogers and the ACRS members who have the lead responsibility in preparing CY 2001 report to the Commission on the NRC Safety Research Program. The second Panel consists of representatives of RES. This meeting falls on the first day of the May 2001 ACRS meeting. The Committee is tentatively scheduled to meet with the Commission on May 11, 2001 (see Item 8).

RECOMMENDATION

The Subcommittee recommends that Drs. Powers, Shack, and Wallis attend this meeting.

8) ACRS Meeting with the NRC Commissioners

The ACRS is tentatively scheduled to meet with the NRC Commissioners on Friday, May 11, 2001 to discuss items of mutual interest. Topics proposed by the Planning and Procedures Subcommittee are as follows:

- Proposed framework for risk-informed changes to 10 CFR Part 50
- South Texas Project exemption request
- Thermal-hydraulic codes
- Status report on ACRS review of license renewal applications and related matters

RECOMMENDATION

The Subcommittee recommends that the Committee approve a list of topics during the March ACRS meeting.

9) New Nuclear Plant Construction and the Pebble Bed Modular (PBM) Reactor Design

The ACRS Subcommittee on Advanced Reactor Designs is scheduled to hold a meeting on June 4-5, 2001 to discuss the status of NRC and industry activities associated with future reactor designs such as PBM reactor design and the International Reactor Innovative and Secure (IRIS) design.

In a Staff Requirements Memorandum (SRM) dated February 13, 2001 (Attachment pp. 17-18), the Commission instructed the staff to assess its technical, licensing, and inspection capabilities and identify enhancements, if any, that could be necessary to ensure the agency can effectively carry out its responsibilities associated with an early site permit application, license application, and the construction of a new nuclear power plant. The Commission asked the staff to submit an integrated plan for advanced reactor activities by April 30, 2001.

In that SRM, the Commission also directed the staff to incorporate into the staff planning the need for early interactions with the ACRS so as to ensure that important technical and regulatory issues receive appropriate consideration by the ACRS.

#### RECOMMENDATION

The Subcommittee recommends that subsequent to the June 4-5, 2001 Advanced Reactor Designs Subcommittee meeting, Dr. Kress, in coordination with the cognizant ACRS staff engineer, develop a proposed plan for ACRS review of the activities associated with the advanced reactor designs.

#### 10) Member Submission of Travel Voucher and Compensation Claim Information

Members are reminded to submit their travel and compensation claims timely. NRC travel rules direct travelers to submit travel vouchers within five working days after completing a trip. While we recognize that this deadline is not normally practical for members, travel voucher information should normally be submitted no later than 2 weeks after completion of a trip. Compensation claims should be submitted monthly if possible. Timely submission of travel information and compensation claims will assist us in keeping abreast of Committee expenditures and in the tracking of time expended for work on specific topics.

#### RECOMMENDATION

The Subcommittee recommends that the members submit their travel and compensation claims in a timely manner.

#### 11) Research Report

Dr. Powers has provided a draft copy of the proposed ACRS report on research for Committee review and comment. Dr. Powers has proposed recommendations in the Materials and Metallurgy area which differ from those of the cognizant Subcommittee Chairman. It is suggested that the Planning and Procedures Subcommittee propose a course of action to reconcile this difference.

#### RECOMMENDATION

The Subcommittee recommends the following:

- The ACRS staff should provide the latest draft of the research report to the members on Thursday, March 1, 2001.
- The members who provided input to the research report should review their sections as well as other Sections of the report and be prepared to provide their views during the discussion of the report.
- The Committee should reconcile the differing views on certain research areas (e.g., materials and metallurgy and digital I&C) noted in the report.

12) Member Issues

Dr. Powers has requested to attend the Nuclear Control Institute's 20<sup>th</sup> Anniversary Conference, Nuclear Power & Nuclear Proliferation: Can We Have One Without the Other? It will be held Monday, April 9, 2001 in Washington, D.C. (See pp. 19-20)

RECOMMENDATION

The Subcommittee recommends that the Committee approve the request by Dr. Powers to attend the Nuclear Control Institute's Conference.

**PROPOSED ASSIGNMENTS FOR REVIEWING STAFF SER ASSOCIATED WITH  
HATCH UNITS 1 AND 2 LICENSE RENEWAL APPLICATION**

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**PROPOSED LEAD REVIEWER ASSIGNMENTS FOR  
BWRVIP TOPICAL REPORTS ASSOCIATED WITH  
HATCH LICENSE RENEWAL APPLICATION**

<b>LEAD REVIEWER</b>	<b>BWRVIP TOPICAL REPORTS</b>
W. Shack	<b>BWRVIP - 26: Top Guide Inspection and Flaw Evaluation Guideline</b>
G. Leitch	<b>BWRVIP - 41: BWR Jet Pump Assembly Inspection and Flaw Evaluation Guidelines</b>
W. Shack	<b>BWRVIP - 75: Technical Basis for Revisions to Generic Letter 88-01 Inspection Schedule (NUREG-0313)</b>
J. Barton	<b>BWRVIP - 76: BWR Core Shroud Inspection and Flaw Evaluation Guidelines</b>

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**ASSIGNMENTS FOR REVIEWING CHANGES TO THE  
PROPOSED FINAL LICENSE RENEWAL GUIDANCE DOCUMENTS**

REVIEW ITEMS	Assigned Member	Standard Review Plan Sections			GALL Report	NEI 95-10 Chapters
Introduction	ALL	1.0			Vol.1	1.0
Scoping and Screening Methodology	MVB ALL	2.1				3.0
Plant Level Scoping	JDS DAP	2.2				4.0
Reactor Coolant System	GML WJS	2.3	3.1	4.3	Vol 2 Chaps. I and IV (C)+(D)	6.0
Engineered Safety Features	TSK JJB	2.3	3.2		Vol. 2 Chaps. I + V	6.0
Auxiliary Systems	JDS JJB	2.3	3.3		Vol. 2 Chap. VII	6.0
Steam and Power Conversion	JDS JJB	2.3	3.4		Vol. 2 Chap. VIII	6.0
Structures	JDS DAP	2.4	3.5		Vol. 2 Chaps. I and III	6.0
Electrical and I&C	REU GA	2.5	3.6	4.4	Vol. 2 Chap. VI	6.0
Time-Limited Aging Analyses	REU WJS			4.1 4.7	Vol. 2 Chap. X	5.0
Reactor Vessel	DAP GML		3.1	4.2	Vol. 2 Chap. IV (A)+(B)	6.0
Containment	TSK GBW		3.5	4.5 4.6	Vol. 2 Chap. II	6.0

## **SUMMARY-----COMMITMENTS FROM CY99 AND CY00 ACRS SELF ASSESSMENTS**

The attached document is the combined list of commitments and status of actions from the last two ACRS retreats. The items in bold font were added as a result of ACRS's January 2001 retreat. We discussed Items 1 through 5 during the last ACRS meeting. We will be providing the Committee with a draft of our annual ACRS/ACNW self assessment SECY paper during the April meeting for comment and approval (ACNW will be provided with draft SECY during its March meeting). The attached commitments and actions status list will be incorporated as appropriate in this paper.

We would appreciate if you would provide comments, if any, on the content of the commitments and status of actions list to either Richard Savio or John Larkins in the next two weeks. To summarize the highlights of Items 5 through 15:

- a) Item 5 is in essence a commitment to focus the Committee's effort on the most important technical issues and to have the P&P Subcommittee monitor this focus in its monthly review of Committee meetings and agendas. The list of important candidate technical issues has been expanded as the result of the January 2001 retreat discussions.
- b) Item 8 addresses stakeholder comments to the effect that ACRS needed to maintain and improve its awareness of plant operations issues. We have committed to continuing the actions that we took to address this issue in CY2000. The Chairman of the Plant Operations Subcommittee will provide recommendations as to plant operations events and experience to be discussed by the ACRS.
- c) Item 10 addresses stakeholder comments as to the importance of communications with the Commissioners and senior NRC management and commits to continuing the ACRS efforts to have and improve these interactions.
- d) Item 12 through 15 address a number of new process and planning improvements that are currently being implemented and monitored by the P&P Subcommittee.

Commitments from CY99and CY00 ACRS Self Assessment

1) Modify ACRS/ACNW Operating Plan in accordance with new NRC planning initiatives, draft FY2000-2005 Strategic Plan, and FY2001 Performance Plan, with incorporation of self assessment information and metrics. (Larkins/ Savio/ Gallo)

ACTIONS: A new Operating Plan is being developed as planned and is due to the Commission on 5/31/2001. Mag Weston and Sam Duraiswamy have developed a ACRS Action Plan which, as will the existing ACNW Action Plan, be incorporated into the content of the new Operating Plan. The current plan is to provide six month updates.

2) Develop action plan that will identify and allocate resources for ACRS and ACNW review of selected decommissioning issues. (Larkins/Savio/Larson)

ACTIONS: An action plan has been developed that identifies the decommissioning issues, schedules, ACRS, ACNW and Joint ACRS/ACNW Subcommittee assignments, and a general approach to the reviews. This information was has been provided to the Commission as per a request from their staff. Activities are being incorporated into ACRS (and ACNW) Future Activities scheduling using existing process. Priorities (ie, resource allocation were there is the expected competition with other activities) will be broadly addressed in the ACRS Action Plan and specifically in the Planning and Procedures Subcommittee process. The ACRS work on the SFP accidents analysis report falls in this category.

3) Maintain awareness of need to preserve independence, re. early involvement in the development of NRC staff positions. (P&P Subcommittee oversight)

ACTIONS: The Planning and Procedures Subcommittee has been doing this in its monthly meetings. No issues have been identified that could not be resolved by routine Subcommittee deliberation. This is an issue where there is likely to continue to be different stakeholder views as to how the ACRS should conduct its business.

4) Return to a mode of operation that will afford more in-depth review of issues when warranted. (P&P Subcommittee oversight)

ACTIONS: The Planning and Procedures has and will continue to address this issue in its monthly meetings. **Discussions related to new ACRS initiatives and key technical areas in which ACRS can focus its efforts were discussed during the January 2001 ACRS retreat. Areas identified that the ACRS will address in CY2001 are:**

- a) design margins (report by A. Cronenburg)
- b) 10CFR appendices A and B (report by J. Sorenson)
- c) adequacy of analysis used to support regulatory decisions (ie, when is a bounding analysis adequate, when will the existing knowledge base support a

- regulatory decision, when are experiments needed )--- to be addressed on a case by case basis and in the ACRS advice on particular regulatory decisions
- d) continue to define information needed for ACRS concurrence with the proposed AP 1000 design certification
- e) information needed for the licensing of new generation reactors
- f) response to the 3/2/2000 SRM on the Revised Reactor Oversight Process (Pis and SDP)

The Subcommittee discussed these commitments during the February 2001 Planning and Procedures Subcommittee meeting and recommended the following actions:

- 1) Dr Bonaca will meet with Dr Cronenburg to further develop the scope and approach to Dr Cronenburg's report on design margins.
- 2) Dr Powers, Dr Kress, and Dr Apostolakis will work with Mr. Sorenson to further develop the scope and approach to Mr Sorenson's report on 10 CFR Appendices A and B
- 3) The ACRS staff will present an action plan for the proposed ACRS workshop on the safety needs for Generation 4 reactors (currently planned for the afternoon (1:00pm) of June 4 and June 5, 2001) to the Subcommittee during its March meeting. Reactor types, possible participants, and discussion of the use of a risk-based licensing approach and licensing by test will be addressed in the action plan (GA/JTL/RPS/MME)
- 4) The ACRS staff will present an action plan to the Subcommittee during its March meeting for ACRS development of an response to the 3/2/2000 SRM on the Revised Reactor Oversight Process. (JTL/RPS)
- 5) Recruitment for a Fellow, with consideration for being brought onboard early in FY 2002, will be initiated.(JTL/CAH)
- 6) Use of the ACRS/ACNW web site as part of an effort to provide additional visibility in the international community will be explored and a proposal presented tp the Subcommittee during its March meeting. (JTL/RPS)

5) Look for more opportunities to increase involvement in important technical issues and minimize involvement in routine matters such as rules and regulatory guides addressing routine technical or process issues. The examples of important technical issues given in the CY99 self assessment SECY were:

- a) risk-informed initiatives for improving regulation ( 10 CFR Part 50, pressurized thermal shock, and decommissioning)
- b) future NRC research needs
- c) risk-based performance indicators
- d) PRA quality standards
- e) human performance
- f) digital I&C
- g) transient and accident analyses code certification
- h) emerging uses of mixed-oxide and high-burnup fuels

To conserve resources ACRS would end its review efforts when technical issues have been satisfactorily resolved and staff is addressing implementation. (P&P Subcommittee prioritization and scheduling of ACRS activities)

ACTIONS:

The Planning and Procedures Subcommittee will continue to address this issue in its monthly meetings. All of the examples of important technical issues identified in the CY99 self assessment SECY have been addressed in CY2000 ACRS activities. **Additional technical issues identified in the January 2001 ACRS retreat and not addressed in other parts of this commitments list are:**

- a) **ACRS review of the proposed MOX Fuel Fabrication Facility**
- b) **power uprates**
- c) **improvements in transient and accident analysis codes to support RI regulation and the AP 1000 review**
- d) **regulatory coherence**
- e) **impact of deregulation and burden reduction on operational safety and adequate protection**

**ACRS workload is expected to be high in the foreseeable future and will have to continue to be closely managed by the Planning and Procedures Subcommittee. ACRS will at times find itself pressed by schedule constraints. ACRS will focus on necessary work product quality when reviewing complex issues and will when necessary sacrifice timelessness when it is necessary to do so to produce necessary product quality. Planning will be used to minimize impact on NRC staff and Commission schedules.**

6) Systematically assess how ACRS, as a Commission-level advisory committee, can add value to an issue prior to agreeing to reviewing the issue. (P&P Subcommittee oversight of proposed ACRS activities, with increased use of identified review objectives and action plans providing an assessment of resource use)

**ACTIONS:** An ACRS Action Plan has been developed. The P&P Subcommittee has been culling and prioritizing proposed ACRS activities in its monthly reviews. The Chairman and Vice Chairman have been meeting with and communicating with individual Commissioners to obtain their input.

7) Test and refine streamlined process for ACRS review of license renewal application. (Plant License Renewal Subcommittee)

**ACTIONS:** A process has been developed and discussed with the Committee and the Commission and will be refined taking into account the experience gained in the ANO 1 and Hatch reviews.

8) Take actions to maintain and improve ACRS awareness of plant operations issues. (Larkins, Savio, and Plant Operations Subcommittee)

**ACTIONS:** The ACRS continues to have plant operating events briefings and to make a annual visit to a Region office and a operating plant. The ACRS met with a representative of UCS during the September 2000 and October 2000 ACRS meetings to discuss a recent UCS report on the impact of the current increased focus on the use of PRA on the safety of plant operations. The ACRS meet with NEI representatives and discussed issues of mutual interest (risk-informing 10CFR Part 50, license renewal, decommissioning, and the revised reactor oversight process) during the October 2000 ACRS meeting. The issues of mutual interest to be discussed

were selected by NEI from a longer list provided by the ACRS/ACNW office and were identified by NEI as being the four main elements of NEI's program of regulatory reform.

**The ACRS will continue to meet with NEI representatives about once a year to discuss issues of mutual interest. NEI and other non-NRC stakeholders will be invited to present their views at ACRS meetings as needed. ACRS members and staff will attend industry sponsored meetings and workshops to obtain additional insights into stakeholder views on plant operations issues as resources permit. The Chairman of the Plant Operations Subcommittee will provide recommendations as to plant operations events and experience to be discussed by the ACRS.**

9) Solicit and address feedback on how annual research report can be made more useful to Commission and staff. (Safety Research Subcommittee)

**ACTIONS: This was done and the feedback was used to structure the current annual ACRS review of NRC-sponsored research. The process for and resources allocated to this annual review will be accessed after completing and receiving feedback on the CY2001 ACRS research report.**

10) Maintain and improve current communications with Commissioners and senior NRC management. (P&P Subcommittee)

**ACTIONS: The ACRS Chairman and Vice Chairman will continue to meet with individual Commissioners, the EDO, the Deputy EDOs, and office directors. These individuals will be invited to ACRS meetings to discuss issues of mutual interest as needed.**

11) Consider the use of ACRS member task groups instead of established subcommittees to address particular issues before the ACRS. (P&P Subcommittee)

**ACTION: The Planning and Procedures Subcommittee will address in the assignment of the ACRS member responsibility for emerging work.**

12) Address issues of member preparation, focus on regulatory issues, and efficient conduct of ACRS and ACRS subcommittee discussion. (ACRS Chairman/ ACRS subcommittee chairmen/ Larkins/ Savio)

**ACTION: The actions to address these issues will be:**

a) Process and deadlines specified in the new ACRS/EDO MOU for the delivery of documents needed for a ACRS review will be enforced.

b) ACRS members participating in subcommittee meetings will reserve the necessary time to prepare for the subcommittee discussions.

c) Staff presenters at subcommittee meetings will be instructed to clearly outline what they believe is the regulatory issue that needs to be addressed, their proposed approach, why they believe that it is adequate, and how their presentations will support this belief.

d) When issues are brought to the ACRS for review, the responsible subcommittee chairmen will continue to provide a introduction that outlines the issues the

issues to be addressed by the Committee, the relevant regulatory issues, and issues related to the NRC staff's proposed approach. All ACRS members should at a minimum read the ACRS staff's status report and review any material in the ACRS briefing book necessary for them to participate efficiently in the ACRS discussions. Short informational summaries which highlight background information on key technical issues should be provided to the Chairman prior to the full Committee meetings. Existing materials like an executive summary may be used or the cognizant engineer may elect to write a paragraph.

e) The ACRS members responsible for particular Committee or subcommittee discussions will continue to assist in and lead discussions in a manner that is conducive to the efficient resolution of the issues. The Subcommittee Chairman will be responsible for evaluating the readiness of a matter for presentation to the Full Committee. If a subcommittee meeting scheduled prior to scheduled Full Committee presentations reveals that the Full Committee time will not be efficiently used in the discussion of the matter, the discussions will be deferred. The Subcommittee Chairman will instead summarize what was learned at the subcommittee meeting.

f) The ACRS staff will provide regular feedback to the responsible staff and the EDO coordinator as to the effectiveness of specific NRC staff presentations. The ACRS staff will at this time collect feedback from these individuals.

g) The Subcommittee assignments list will be updated (due at the March Planning and Procedures meeting) and used as a resource in managing the member's workload.

h) To the extent possible, draft ACRS letters should be circulated to Committee members and cognizant ACRS staff (that is Larkins, Savio, Lyons, the Special Assistant, and the cognizant ACRS staff engineer) for comment before the Full Committee meeting at which the letter is scheduled to be discussed. The ACRS having the lead responsibility for that letter will coordinate this process and when appropriate incorporate this input into the letter prior to the draft letter before the Full Committee.

13) Address issue of NRC staff sometimes not knowing how to respond to "embedded" recommendations. (ACRS Chairman/ Larkins/ Savio)

**ACTION:** The NRC staff will be told to contact ACRS/ACNW management when there is a question. ACRS/ACNW management will, in consultation with the ACRS Chairman, resolve the staff's questions.

14) ACRS members should attend PRA quality standard peer review group meetings.

**ACTION:** Arrangements will be made for ACRS member and staff attendance subject to the availability of resources and members time.

15) Address issues associated with the uniqueness of the ACRS review of the MOX Fuel Fabrication Facility. (Larkins/ Savio)

**ACTION: Development an action plan for this review after the staff briefing at the February ACRS meeting.**

REVISED

February 13, 2001

MEMORANDUM TO: William D. Travers  
Executive Director for Operations

FROM: Annette L. Vietti-Cook, Secretary */RA/*

SUBJECT: STAFF REQUIREMENTS - COMJSM-00-0003 - STAFF  
READINESS FOR NEW NUCLEAR PLANT CONSTRUCTION AND THE  
PEBBLE BED REACTOR

The Commission has agreed to the following actions:

The staff should assess its technical, licensing, and inspection capabilities and identify enhancements, if any, that would be necessary to ensure that the agency can effectively carry out its responsibilities associated with an early site permit application, a license application, and the construction of a new nuclear power plant. This effort should consider not only the nuclear power plant designs that have been certified by the NRC pursuant to 10 CFR Part 52, but also the Pebble Bed Modular Reactor and other generation 3+ or generation 4 light water reactors such as the AP-1000 and the International Reactor Innovative and Secure (IRIS) designs.

The staff should also critically assess the regulatory infrastructure supporting both Parts 50 and Part 52, and other applicable regulations, and identify where enhancements, if any, are necessary. Particular emphasis should be placed on the early identification of regulatory issues and potential process improvements. The staff should also incorporate into its planning the need for early interactions with the Advisory Committee on Reactor Safeguards so as to ensure that important technical and regulatory issues receive appropriate consideration by that group.

The staff should integrate these tasks with the various related activities that are underway and should provide the Commission a schedule for completing the tasks. Resource estimates should be included for the activities listed in the schedule. The staff should be thoughtful and judicious in committing resources. The staff may find that some items in the schedule may be best linked to milestones and not necessarily calendar dates.

(EDO) (SECY Suspense: (schedule) 4/30/01)

The staff should encourage the industry to be as specific as possible about its plans and schedules so that the agency can plan and budget for advanced reactor activities without disrupting other current important initiatives. The staff should work with our stakeholders to exercise, to the extent appropriate, the NRC's review process and identify potential policy issues

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that should be addressed by the Commission in a timely manner.

cc: Chairman Meserve  
Commissioner Dicus  
Commissioner Diaz  
Commissioner McGaffigan  
Commissioner Merrifield  
OGC  
CIO  
CFO  
OCA  
OIG  
OPA  
Office Directors, Regions, ACRS, ACNW, ASLBP (via E-Mail)  
PDR

11  
**Powers, Dana A**

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**From:** Nuclear Control Institute [nci@nci.org]  
**Sent:** February 15, 2001 4:18 PM  
**To:** NCI Conference Invitation List  
**Subject:** NCI 20th Anniversary Conference: Nuclear Power & Nuclear Proliferation

A Personal Invitation to

Nuclear Control Institute's 20th Anniversary Conference

**NUCLEAR POWER & NUCLEAR PROLIFERATION:  
CAN WE HAVE ONE WITHOUT THE OTHER?**

Monday, April 9, 2001

In the wake of the California energy crisis and amidst growing concerns about global warming, there is a rebirth of interest in nuclear power plants as the solution to meeting electricity needs in the United States and globally. For the past two decades, the Nuclear Control Institute has been dedicated to de-linking nuclear power and nuclear weapons by seeking a halt in commerce in plutonium and bomb-grade uranium. To mark its 20th anniversary year, NCI is convening a one-day conference to explore the need for nuclear power and its linkage with the proliferation of nuclear weapons.

A group of leading experts is being assembled to address tough questions and to use the answers to draw lessons-learned that can serve as a guide to the future.

Among the experts are Amory Lovins, CEO\Research of the Rocky Mountain Institute; Richard Rhodes, author of "The Making of the Atomic Bomb"; Richard Garwin, IBM Fellow Emeritus; Robert Williams of Princeton University; Marvin Miller of MIT; Ambassadors Robert Gallucci and Lawrence Scheinman, and George Perkovich, author of "India's Nuclear Bomb."

Among the questions are:

- Can we have nuclear power without nuclear proliferation?
- How essential is nuclear power? How viable are the advanced, non-nuclear alternatives?
- How realistic are the proposed technical fixes to make nuclear power proliferation-resistant, inherently safe and free of long-lived wastes?
- What role did nuclear power play in the acquisition of nuclear weapons, and what role is it playing now?
- Has the non-proliferation regime been an effective barrier against the spread of nuclear weapons?

CONFERENCE DETAILS:

**WHEN:** Monday, April 9, 2001, 8:30 AM - 6:30 PM  
**WHERE:** Carnegie Endowment for International Peace,  
1779 Massachusetts Ave. N.W., Washington, D.C.

**REGISTRATION FEE:** \$75 for industry, government, trade associations  
\$35 for NGOs, academia

Registration includes copy of proceedings, continental breakfast, luncheon

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and closing reception.

Please mail check to: Nuclear Control Institute  
1000 Connecticut Ave N.W.  
Suite 410  
Washington D.C. 20036

FURTHER DETAILS on the program and on hotel accommodations for out-of-town participants will follow.

SPACE IS LIMITED. To hold your place, please promptly fill out the registration form, below, and reply by e-mail (nci@nci.org) or by fax (202-452-0892). Please direct any inquiries to Sharon Tanzer (202-822-6625).

PLEASE ADVISE US IF YOU WANT TO TRANSFER THIS INVITATION.

Paul Leventhal  
President, Nuclear Control Institute

---

REGISTRATION

NCI 20TH ANNIVERSARY CONFERENCE

"NUCLEAR POWER AND NUCLEAR PROLIFERATION:  
CAN WE HAVE ONE WITHOUT THE OTHER?"

MONDAY, APRIL 9, 2001

NAME:

TITLE:

AFFILIATION:

ADDRESS:

PHONE:

FAX:

E-MAIL:

I WILL ATTEND THE:

- Continental breakfast
- Luncheon
- Reception (5:00-6:30)

March 2, 2001

NOTE TO:                   ACRS Members

FROM:                     P. Boehnert, Senior Staff Engineer

SUBJECT:                 DISCUSSION TOPICS FOR APRIL 18-19, 2001 T/H  
 PHENOMENA SUBCOMMITTEE MEETING -- CORE POWER  
 UPRATES

During last month's ACRS Meeting, the Committee agreed to hold a subcommittee meeting with representatives of the NRR staff in April. The purpose of this subcommittee meeting is to discuss issues of concern to the ACRS pertaining to pending applications for significant<sup>1</sup> core power uprates. The Committee will likely be reviewing two of these applications this fall (Duane Arnold and Dresden/Quad Cities plant licensees, respectively), if the staff holds to its current review schedule. The objective of this exercise is to get these concerns "on the record" so that the staff can address them, as necessary, during its review of the licensee's amendment requests. Accordingly, a meeting of the Thermal-Hydraulic Phenomena Subcommittee has been scheduled for April 19-20, 2001 to, in part, discuss these issues. Action on this matter by the Full Committee is expected during its May 2001 Meeting.

Attached is a list of discussion topics that I have compiled based on input from some of the Committee Members to date. I would appreciate your review of this list and welcome any additional suggestions regarding addition to/revision of the topics listed.

Please provide me your input by COB March 7, 2001.

Attachment: As Stated

cc: R. Savio

cc w/o attach (via E-mail):

- J. Larkins
- J. Lyons
- S. Duraiswamy
- ACRS Technical Staff & Fellows

---

<sup>1</sup> These uprates are in the range of 15-20% of nominal power.

## TOPICS FOR DISCUSSION REGARDING CORE POWER UPRATE REVIEWS

The following is a list of topics identified for discussion with the staff regarding the NRC's review of core power uprate license amendment requests:

- BWR ATWS
  - Recovery Procedures - including impact of hydrided cladding and use of high-burnup fuel
  - Impact of Uprate on Accident Parameters
- Flow Accelerated Corrosion
- Effects of Blowdown Forces During Depressurization of the RCS
  - BWRs - highlight impact on vessel internals and fuel
  - PWRs - highlight impact on steam generators
- Vessel Embrittlement
- Vessel Internals Embrittlement
- Electric Cables
- Comparison of times required and times available before and after power uprates for operator actions in response to DBAs.
- Risk-Informed Uprate Review Considerations
  - Need for Assessment of Operational Data for Uprated Plants
  - Evaluation of Leibstadt Risk Study for Uprated Plants
- Use of "Realistic" vs Conservative Codes for BWR Uprates
  - Understanding of and Impact on Plant Operating Margins