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

August 21, 2007

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

Dear Chairman Klein:

SUBJECT: SUMMARY REPORT–544th MEETING OF THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS, JULY 11-13, 2007, AND OTHER RELATED ACTIVITIES OF THE COMMITTEE

During its 544th meeting, July 11-13, 2007, the Advisory Committee on Reactor Safeguards (ACRS) discussed several matters and completed the following reports and letter:

REPORTS

Reports to Dale E. Klein, Chairman, NRC, from William J. Shack, Chairman, ACRS:

- Staff's Approach to Verifying the Closure of Inspections, Tests, Analyses, and Acceptance Criteria Through a Sample-Based Inspection Program, dated July 24, 2007
- Draft NUREG/CR, Review of NUREG-0654, Supplement 3, "Criteria for Protective Action Recommendations for Severe Accidents," dated July 27, 2007

LETTER

Letter to Luis A. Reyes, Executive Director for Operations, NRC, from William J. Shack, Chairman, ACRS:

- Revisions to Draft Final NUREG-1852, "Demonstrating the Feasibility and Reliability of Operator Manual Actions in Response to Fire," dated July 13, 2007

HIGHLIGHTS OF KEY ISSUES

1. Sampling Methodology and Statistical Thresholds for Selecting ITAAC for Inspection

The Committee met with representatives of the NRC staff to discuss the staff's approach to verify closure of Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) using a sample-based inspection process. ITAAC provide reasonable assurance that the facility has been constructed and will be operated in conformity with the license, the provisions of the Atomic Energy Act, and the Commission's rules and regulations. The staff will verify closure of all ITAAC prior to plant operation through documentation review. Closure of some ITAAC will be verified by direct inspection. ITAAC inspections (Inspection Manual Chapter-2503) are a significant portion of the staff's overall construction inspection program (CIP).

The staff explained why ITAAC grouping and prioritization was chosen as an alternative to statistical acceptance sampling. "Families" of ITAAC were identified that have common characteristics and which will involve similar inspection activities. Observing performance of ITAAC activities within a family will provide insights that are applicable to the remainder of the family. Multi-attribute utility theory was used to rank-order ITAAC for inspection. This rank-ordering was based on five ITAAC attributes (safety significance, licensee oversight attention, opportunity to verify by other means, construction and testing experience, and propensity for errors) and the significance of not inspecting the ITAAC in order to optimize resources and minimize the possibility of a significant flaw going undetected. Safety significance was the most heavily weighted attribute. The staff used a threshold value of 0.4 when ranking the ITAAC associated with the ABWR and AP1000 and included at least one ITAAC from each family. This resulted in between 35% to 45% of ITAAC being identified for inspection. The staff also noted that there are additional site-specific ITAAC. The staff explained to the Committee why it would be difficult for licensees to know which ITAAC, and when ITAAC, would be inspected. The licensee's performance will be monitored as part of the CIP Assessment Process (Inspection Manual Chapter-2505) and NRC can expand the sample of ITAAC to be inspected based on poor performance.

Committee Action

The Committee issued a report to the NRC Chairman on this matter, dated July 24, 2007, concurring with the staff's ITAAC closure verification process using sample-based inspections as described in SECY-07-0047. The Committee concluded that the threshold value that was used to select the ITAAC to be inspected should result in adequate samples for the ABWR and AP1000.

2. Dissimilar Metal Weld Issue

The Committee met with representatives of the NRC staff, Exelon, and Dominion Engineering, Inc., to discuss the ongoing NRC staff and industry activities for addressing dissimilar metal weld issues resulting from the October 2006 inservice inspection of the Wolf Creek pressurizer nozzles. Analyses performed by the NRC staff in late 2006 and early 2007 indicated that large flaws, similar to those found at Wolf Creek, may lead to rupture before any measurable leakage occurs. As a result, the staff has determined that inspections or mitigation activities on these welds at nine plants should be completed by the end of 2007 rather than the spring of 2008. All other plants either do not have these types of welds or will have inspected or performed mitigation activities by December 2007.

Representatives from Exelon and Dominion Engineering, Inc., described recent advanced finite element analyses being performed to demonstrate that piping is not expected to rupture prior to leakage. The NRC staff is performing its own analyses of cases representative of those at the plants of interest, using an independently developed analysis method to verify the industry results. The industry is expected to submit the results of its analyses to the staff by July 31, 2007. The staff is planning to issue a safety evaluation by August 31, 2007, regarding whether the affected plants will be allowed to extend inspection and mitigation activities into 2008.

Committee Action

This was an information briefing. No Committee action was necessary. The Committee plans to review the results of the industry study and the associated staff's evaluation during a future meeting.

3. Activities in the Safeguards and Security Areas

The Committee met with representatives of the NRC staff to discuss ongoing and planned activities in the safeguards and securities areas. The staff described the status of the changes in nuclear power plant security as a result of the September 11, 2001, terrorist attack. This included the issuance of orders to nuclear power plant licensees, completed and ongoing rulemaking activities, the issuance of regulatory guidance documents, enhanced coordination with other federal agencies, and the development of lessons learned from the implementation of the orders. The staff also described the nuclear security program requirements contained in the Energy Policy Act of 2005. All of these issues are being incorporated into the development of NRC rules and guidance documents. The staff identified specific topics that will be sent to the ACRS for review.

Committee Action

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

4. Revisions to Draft Final NUREG-1852, "Demonstrating the Feasibility and Reliability of Operator Manual Actions in Response to Fire"

The Committee met with representatives of the NRC staff and a member of the public to discuss revisions to draft final NUREG-1852, "Demonstrating the Feasibility and Reliability of Operator Manual Actions in Response to Fire." In a letter dated June 18, 2007, the Committee recommended that NUREG-1852 be published after revision to address the ACRS concerns discussed in the letter. To address the ACRS concerns, the staff revised the NUREG to (a) include a section in the report describing its intended use in context, (b) provide advice as to the skills of the team that determines the time margin, and (c) mention the potential use of other existing methods to facilitate the search for scenarios initiated by fires. A member of the public described a concern that operator manual actions may not be equivalent to passive physical fire barriers and result in a reduction in defense-in-depth.

Committee Action

The Committee issued a letter to the Executive Director for Operations on this matter, dated July 13, 2007, stating that the revisions made by the staff to NUREG-1852 addressed the Committee's concerns satisfactorily. The Committee recommended that revised NUREG-1852 be published as final.

5. Draft NUREG/CR, Review of NUREG-0654, Supplement 3, "Criteria for Protective Action Recommendations for Severe Accidents"

The Committee met with representatives of the NRC staff and industry to discuss offsite protective action recommendations (PAR). The staff described the findings and recommendations of a study performed by the Sandia National Laboratories and documented in a draft NUREG/CR entitled, "Review of NUREG-0654, Supplement 3, 'Criteria for Protective Action Recommendations for Severe Accidents'." The study examined the benefits of alternative protective actions compared to the baseline case of radial evacuation following the declaration of a general emergency at a nuclear power plant. The study considered both "fast-evolving" and "slow-evolving" accident scenarios. Various evacuation times and protective action strategies, including radial evacuation, lateral evacuation, shelter-in-place, and preferred sheltering were considered. The study recommended that under certain scenarios and estimated evacuation times, alternative protective actions may provide better protection than the baseline case of radial evacuation. The staff also considered PAR implementation issues such as possible public response to following the directives of the emergency response organization.

Industry representatives presented prelirninary results of an effort to develop a risk-informed methodology for quantifying the relative effectiveness of the PAR strategies. Since no documents regarding this work have been formally submitted to the NRC, neither the staff nor the ACRS had an opportunity to perform an adequate review of this effort.

Committee Action

The Committee issued a report to the NRC Chairman on this matter, dated July 27, 2007, recommending that the NUREG/CR report, which documents the results of the PAR study, be published. The Committee agreed with the staff that Supplement 3 to NUREG 0654, Revision 1, should be revised and recommended that these revisions take into consideration model uncertainties, complexity of decision making, and related industry work.

6. Browns Ferry Nuclear Plant Unit 1 Restart Activities

The Committee met with representatives of the NRC staff to discuss the findings and recommendations of the Browns Ferry Unit 1 Restart Panel, activities and problems associated with restart, and the current status of the plant. The staff presented a short history of the Browns Ferry Units up to and including the startup of Unit 1. The staff described the significant number of modifications made to the plant to return it to an operational status from a construction status, as well as the licensing actions and inspections necessary to support and review these modifications. The staff concluded its presentation with a discussion of minor issues that occurred during startup and the current status of the plant.

Committee Action

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

7. Subcommittee Report on the State-of-the-Art Reactor Consequence Analysis Project

The Chairman of the Regulatory Policies and Practices Subcommittee provided a report to the Committee, summarizing the results of the July 10, 2007, meeting with the NRC staff to discuss the status of staff's efforts associated with the State-of-the-Art Reactor Consequence Analysis (SOARCA) Project. During the meeting, the Subcommittee reviewed several topics including accident sequence selection, containment system states, MELCOR analysis, emergency preparedness, and MACCS2 analysis. As directed by the Commission, the staff has reduced the initial scope of the SOARCA Project. The staff is initially focusing on two sites: Peach Bottom in Pennsylvania and Surry in Virginia. During the closed portion of the Subcommittee meeting, the Subcommittee discussed the staff's initial findings of the accident sequence selection, preliminary MELCOR insights, containment performance, and emergency preparedness for these two plants. The Subcommittee also discussed the various options the staff is evaluating for assessment of dose thresholds for latent cancer fatalities. The Committee plans to continue its review of the SOARCA Project in a future meeting after the staff has made further progress in its analysis.

8. Status Report on the Quality Assessment of Selected NRC Research Projects

The Committee was briefed by the members of the ACRS panels regarding the status of their assessment of the quality of the NRC research projects on Cable Response to Live Fire (CAROLFIRE) Testing, Fatigue Crack Flaw Tolerance in Nuclear Power Plant Piping, and Technical Review of the Online Monitoring Techniques for Performance Assessment.

Committee Action

The Committee plans to discuss a draft report on the results of its assessment of the quality of the above NRC research projects during its September 2007 meeting.

RECONCILIATION OF ACRS COMMENTS AND RECOMMENDATIONS/EDO COMMITMENTS

- The Committee considered the EDO's response of May 31, 2007, to recommendations included in the April 20, 2007, ACRS report on the technology-neutral framework for future plant licensing. The Committee decided that it was satisfied with the EDO's response.

- The Committee considered the EDO's response of June 27, 2007, to recommendations included in the May 16, 2007, ACRS report on the draft Commission Paper on the staff plan regarding a risk-informed and performance-based revision to 10 CFR Part 50. The Committee decided that it was not satisfied with the EDO's response because it fails to address the Committee's comment that the technology-neutral regulatory framework "is still incomplete and needs modification" prior to publication. In addition, rather than continuing to work on the technology-neutral regulatory framework so it can help guide the development of the licensing strategy for the Next Generation Nuclear Plant (NGNP), the staff plans on developing the NGNP licensing strategy and then incorporate any lessons learned from that effort into future regulatory guidance that would be akin to the framework.

- The Committee considered the EDO's response of June 1, 2007, to comments and recommendations included in the February 14, 2007, ACRS letter on the draft final revision to the Regulatory Guide 1.189 (DG-1170), "Fire Protection for Nuclear Power Plants." The Committee decided that it was satisfied with the EDO's response.

- The Committee considered the EDO's response of June 1, 2007, to recommendations included in the December 18, 2006, ACRS letter regarding draft final Regulatory Guide 1.207 (DG-1144), "Guidelines for Evaluating Fatigue Analyses Incorporating the Life Reduction of Metal Components Due to the Effects of the Light-Water Reactor Environment for New Reactors." The Committee decided that it was satisfied with the EDO's response.

- The Committee considered the EDO's response of July 2, 2007, to comments and recommendations included in the May 18, 2007, ACRS report regarding activities related to digital instrumentation and control systems. The Committee decided that it was satisfied with the EDO's response.

- The Committee considered the EDO's response of June 1, 2007, to comments and recommendations included in the April 23, 2007, ACRS report on human reliability analysis models. The Committee decided that it was satisfied with the EDO's response.

- The Committee considered the EDO's response of June 13, 2007, to comments and recommendations included in the May 16, 2007, ACRS report on the development of an integrated long-term regulatory research plan. The Committee decided that it was satisfied with the EDO's response.

- The Committee considered the EDO's response of June 5, 2007, to comments and recommendations included in the October 23, 2006, ACRS letter on draft Revision 1 to Regulatory Guide 1.200 (DG-1161), "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-informed Activities," and Standard Review Plan Section 19.1, "Determining the Technical Adequacy of Probabilistic Risk Assessment Results of Risk-informed Activities." The Committee decided that it was satisfied with the EDO's response.

  **The staff committed to continue to interact with the Committee as Regulatory Guide 1.200 is revised in the future and as the staff proceeds with the development of a draft NUREG on the treatment of uncertainties and sensitivities.**

- The Committee considered the EDO's response of June 6, 2007, to comments and recommendations included in the November 17, 2006, ACRS letter on draft Revision 3 to Regulatory Guide 1.7, "Control of Combustible Gas Concentrations in Containment Following a Loss-of-Coolant Accident," and Standard Review Plan Section 6.2.5, "Combustible Gas Control in Containment." The Committee decided that it was satisfied with the EDO's response.

OTHER RELATED ACTIVITIES OF THE COMMITTEE

During the period from June 7, 2007, through July 10, 2007, the following Subcommittee meetings were held:

- Regulatory Policies and Practices – July 10, 2007

The Subcommittee discussed the staff's efforts associated with the State-of-the-Art Reactor Consequence Analysis (SOARCA) Project.

- Planning and Procedures – July 10, 2007

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

LIST OF MATTERS FOR THE ATTENTION OF THE EDO

- The Committee plans to continue its discussion on the technology-neutral regulatory framework during the September 2007 meeting.

- The Committee would like an opportunity to review the proposed revisions to NUREG-0654, Supplement 3, "Criteria for Protective Action Recommendations for Severe Accidents."

- The Committee plans to discuss a draft ACRS report on the results of its assessment of the quality of selected NRC research projects during its September 2007 meeting.

- The Committee plans to review revisions to Standard Review Plan Sections 19.0, "Probabilistic Risk Assessment and Severe Accident Evaluation for New Reactors," and 19.2, "Review of Risk Information Used to Support Permanent Plant-Specific Changes to the Licensing Basis: General Guidance," during its September 2007 meeting.

- The Committee plans to continue its review of the SOARCA Project after the staff has made further progress in its analysis.

- The Committee plans to review the results of the industry's advanced finite element study of dissimilar metal welds and the associated staff's evaluation during a future meeting.

PROPOSED SCHEDULE FOR THE 545th ACRS MEETING

The Committee agreed to consider the following topics during the 545th ACRS meeting, to be held on September 6-8, 2007:

- Final Review of the License Renewal Application for the Pilgrim Nuclear Power Station

- Revisions to Standard Review Plan Sections 19.0, "Probabilistic Risk Assessment and Severe Accident Evaluation for New Reactors," and 19.2, "Review of Risk Information Used to Support Permanent Plant-Specific Changes to the Licensing Basis: General Guidance"
- Proposed Recommendations for Resolving Generic Safety Issue 156.6.1, "Pipe Break Effects on Systems and Components Inside Containment"
- Status of NRR Activities in the Fire Protection Area
- Draft ACRS Report on the Quality Assessment of Selected NRC Research Projects
- Draft ACRS Report on the NRC Safety Research Program
- Draft ACRS Report on the Technology-Neutral Framework for Future Plant Licensing

Sincerely,

William J. Shack
Chairman

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Sincerely,

William J. Shack
Chairman

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| OFFICE | ACRS/ACNW | ACRS/SUNSI | ACRS/ACNW |
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| DATE | 08/10/07 | 08/15/07 | 8/21/07 |

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Chairman

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| NAME | CSantos | JFlack | FGillespier |
| DATE | 8/10/07 | 08/15/2007 | |

**From:** Carol Brown
**To:** Abdullahi, Zena; Banerjee, Maitri; Bates, Andrew; Bessette, David; Champ, Billie; Duraiswamy, Sam; Fischer, David; Flack, John; Hammer, Charles; Jaegers, Cathy; Junge, Michael; Lamb, John; McKelvin, Sheila; Mike, Linda; Nourbakhsh, Hossein; Perry , Jamila; RidsAslbpMailCenter; RidsEdoMailCenter; RidsFsmeOd; RidsNmssOd; RidsNroOd; RidsNrrOd@nrc.gov; RidsOcaaMailCenter; RidsOcaMailCenter; RidsOgcMailCenter; RidsOigMailCenter; RidsOpaMail; RidsRgn1MailCenter; RidsRgn2MailCenter; RidsRgn3MailCenter; RidsRgn4MailCenter; RidsSecyMailCenter; Santos, Cayetano; Shukla, Girija; Sosa, Belkys; Tressler, Patricia
**Date:** 08/21/2007 1:49:51 PM
**Subject:** Summary Report - 544th Meeting of the Advisory Committee on Reactor Safeguards, July 11 - 13, 2007

LETTER TO: The Honorable Dale E. Klein, Chairman, NRC

FROM: William J. Shack, Chairman, ACRS

SUBJECT: Summary Report - 544th Meeting of the Advisory Committee on Reactor Safeguards, July 11 - 13, 2007

DATED: May 23, 2007

ADAMS Accession: ML072250559

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Carol Anne Brown
Administrative Assistant
US Nuclear Regulatory Commission
Advisory Committee on Reactor Safeguards
Operations Support Branch
301-415-7998, MS T2-E26

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

October 9, 2007

MEMORANDUM TO: Carol A. Brown, Technical Secretary
Advisory Committee on Reactor Safeguards

FROM: William J. Shack
ACRS Chairman

SUBJECT: MINUTES OF THE 544th MEETING OF THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS (ACRS), July 11-13, 2007

I certify that based on my review of the minutes from the 544th 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.

NA
Comments

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

MEMORANDUM TO: Carol A. Brown, Technical Secretary
Advisory Committee on Reactor Safeguards

FROM: William J. Shack
ACRS Chairman

SUBJECT: MINUTES OF THE 544th MEETING OF THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS (ACRS), July 11-13, 2007

I certify that based on my review of the minutes from the 544th 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.

NA
Comments

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| **NAME** | JFlack | | |
| **DATE** | 10/01/2007 | | |

CERTIFIED

Date Issued: October 9, 2007
Date Certified: October 9, 2007

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**July 11-13, 2007**


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III. Dissimilar Metal Weld Issue

IV. Activities in the Safeguards and Security Area

V. Revisions to Draft Final NUREG-1852, "Demonstrating the Feasibility and Reliability of Operator Manual Actions in Response to Fire

VI. Draft NUREG-0654, Supplement 3, "Criteria for Protective Action Recommendations for Severe Accidents"

VII. Browns Ferry Nuclear Plant Unit 1 Restart Activities

VIII. Subcommittee Report on the State-of-the-Art Reactor Consequence Analysis Project

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B. Report on the Meeting of the Planning and Procedures Subcommittee Held on July 10, 2007

C. Future Meeting Agenda

REPORTS

Reports to Dale E. Klein, Chairman, NRC, from William J. Shack, Chairman, ACRS:

1. Staff's Approach to Verifying the Closure of Inspections, Tests, Analyses, and Acceptance Criteria Through a Sample-Based Inspection Program, **dated July 24, 2007**

2. Draft NUREG/CR, Review of NUREG-0654, Supplement 3, "Criteria for Protective Action Recommendations for Severe Accidents," **dated July 27, 2007**

LETTER

Letter to Luis A. Reyes, Executive Director for Operations, NRC, from William J. Shack, Chairman, ACRS:

1. Revisions to Draft Final NUREG-1852, "Demonstrating the Feasibility and Reliability of Operator Manual Actions in Response to Fire," dated July 13, 2007

APPENDICES

I. *Federal Register Notice*
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MINUTES OF THE 544th MEETING OF THE
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
**July 11-13, 2007**
ROCKVILLE, MARYLAND

The **544th** meeting of the Advisory Committee on Reactor Safeguards (ACRS) was held in Conference Room 2B3, Two White Flint North Building, Rockville, Maryland, on **July 11 - 13, 2007**. Notice of this meeting was published in the *Federal Register* on **June 21, 2007** (72 FR 34322 ) (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.

A transcript of selected portions of the meeting is available in the NRC's Public Document Room at One White Flint North, Room 1F-19, 11555 Rockville Pike, Rockville, Maryland. Copies of the transcript are available for purchase from Neal R. Gross and Co., Inc., 1323 Rhode Island Avenue, NW, Washington, DC 20005. Transcripts are also available at no cost to download from, or review on, the Internet at http://www.nrc.gov/ACRS/ACNW.

ATTENDEES

ACRS Members: Dr. William J. Shack (Chairman), Dr. Mario V. Bonaca (Vice-Chairman), Dr. Said Abdel-Khalik (Member-at-Large), Dr. George E. Apostolakis, Dr. Sanjoy Banerjee, Dr. Michael Corradini, Dr. Thomas S. Kress, Mr. Otto L. Maynard, and Dr. Dana A. Powers. For a list of other attendees, see Appendix III.

I. Chairman's Report (Open)

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

Dr. William J. Shack, Committee Chairman, convened the meeting at 8:30 A.M. He announced in his opening remarks that the meeting was being conducted in accordance with the provisions of the Federal Advisory Committee Act. In addition, he reviewed the agenda for the meeting and noted that no written comments or requests for time to make oral statements from members of the public had been received. Dr. Shack also noted that a transcript of the open portions of the meeting was being kept and speakers were requested to identify themselves and speak with clarity and volume. He discussed the items of current interest and administrative details for consideration by the full Committee.

II. Sampling Methodology and Statistical Thresholds for Selecting ITAAC for Inspection

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

The Committee met with representatives of the NRC staff to discuss the staff's approach to verify closure of Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) using a sample-based inspection process. ITAAC provide reasonable assurance that the facility has been constructed and will be operated in conformity with the license, the provisions of the

Atomic Energy Act, and the Commission's rules and regulations. The staff will verify closure of all ITAAC prior to plant operation through documentation review. Closure of some ITAAC will be verified by direct inspection. ITAAC inspections (Inspection Manual Chapter-2503) are a significant portion of the staff's overall construction inspection program (CIP).

The staff explained why ITAAC grouping and prioritization was chosen as an alternative to statistical acceptance sampling. "Families" of ITAAC were identified that have common characteristics and which will involve similar inspection activities. Observing performance of ITAAC activities within a family will provide insights that are applicable to the remainder of the family. Multi-attribute utility theory was used to rank-order ITAAC for inspection. This rank-ordering was based on five ITAAC attributes (safety significance, licensee oversight attention, opportunity to verify by other means, construction and testing experience, and propensity for errors) and the significance of not inspecting the ITAAC in order to optimize resources and minimize the possibility of a significant flaw going undetected. Safety significance was the most heavily weighted attribute. The staff used a threshold value of 0.4 when ranking the ITAAC associated with the ABWR and AP1000 and included at least one ITAAC from each family. This resulted in between 35% to 45% of ITAAC being identified for inspection. The staff also noted that there are additional site-specific ITAAC. The staff explained to the Committee why it would be difficult for licensees to know which ITAAC, and when ITAAC, would be inspected. The licensee's performance will be monitored as part of the CIP Assessment Process (Inspection Manual Chapter-2505) and NRC can expand the sample of ITAAC to be inspected based on poor performance.

III. Dissimilar Metal Weld Issue

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

The Committee met with representatives of the NRC staff, Exelon, and Dominion Engineering, Inc., to discuss the ongoing NRC staff and industry activities for addressing dissimilar metal weld issues resulting from the October 2006 inservice inspection of the Wolf Creek pressurizer nozzles. Analyses performed by the NRC staff in late 2006 and early 2007 indicated that large flaws, similar to those found at Wolf Creek, may lead to rupture before any measurable leakage occurs. As a result, the staff has determined that inspections or mitigation activities on these welds at nine plants should be completed by the end of 2007 rather than the spring of 2008. All other plants either do not have these types of welds or will have inspected or performed mitigation activities by December 2007.

Representatives from Exelon and Dominion Engineering, Inc., described recent advanced finite element analyses being performed to demonstrate that piping is not expected to rupture prior to leakage. The NRC staff is performing its own analyses of cases representative of those at the plants of interest, using an independently developed analysis method to verify the industry results. The industry is expected to submit the results of its analyses to the staff by July 31, 2007. The staff is planning to issue a safety evaluation by August 31, 2007, regarding whether the affected plants will be allowed to extend inspection and mitigation activities into 2008.

IV. Activities in the Safeguards and Security Areas

[Note: Ms. Maitri Banerjee was the Designated Federal Official for this portion of the meeting.]

The Committee met with representatives of the NRC staff to discuss ongoing and planned activities in the safeguards and securities areas. The staff described the status of the changes in nuclear power plant security as a result of the September 11, 2001, terrorist attack. This included the issuance of orders to nuclear power plant licensees, completed and ongoing rulemaking activities, the issuance of regulatory guidance documents, enhanced coordination with other federal agencies, and the development of lessons learned from the implementation of the orders. The staff also described the nuclear security program requirements contained in the Energy Policy Act of 2005. All of these issues are being incorporated into the development of NRC rules and guidance documents. The staff identified specific topics that will be sent to the ACRS for review.

V. Revisions to Draft Final NUREG-1852, "Demonstrating the Feasibility and Reliability of Operator Manual Actions in Response to Fire"

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

The Committee met with representatives of the NRC staff and a member of the public to discuss revisions to draft final NUREG-1852, "Demonstrating the Feasibility and Reliability of Operator Manual Actions in Response to Fire." In a letter dated June 18, 2007, the Committee recommended that NUREG-1852 be published after revision to address the ACRS concerns discussed in the letter. To address the ACRS concerns, the staff revised the NUREG to (a) include a section in the report describing its intended use in context, (b) provide advice as to the skills of the team that determines the time margin, and (c) mention the potential use of other existing methods to facilitate the search for scenarios initiated by fires. A member of the public described a concern that operator manual actions may not be equivalent to passive physical fire barriers and result in a reduction in defense-in-depth.

VI. Draft NUREG/CR, Review of NUREG-0654, Supplement 3, "Criteria for Protective Action Recommendations for Severe Accidents"

[Note: Ms. Maitri Banerjee was the Designated Federal Official for this portion of the meeting.]

The Committee met with representatives of the NRC staff and industry to discuss offsite protective action recommendations (PAR). The staff described the findings and recommendations of a study performed by the Sandia National Laboratories and documented in a draft NUREG/CR entitled, "Review of NUREG-0654, Supplement 3, 'Criteria for Protective Action Recommendations for Severe Accidents'." The study examined the benefits of alternative protective actions compared to the baseline case of radial evacuation following the declaration of a general emergency at a nuclear power plant. The study considered both "fast-evolving" and "slow-evolving" accident scenarios. Various evacuation times and protective action strategies, including radial evacuation, lateral evacuation, shelter-in-place, and preferred sheltering were considered. The study recommended that under certain scenarios and estimated evacuation times, alternative protective actions may provide better protection than the baseline case of radial evacuation. The staff also considered PAR implementation issues

such as possible public response to following the directives of the emergency response organization.

Industry representatives presented preliminary results of an effort to develop a risk-informed methodology for quantifying the relative effectiveness of the PAR strategies. Since no documents regarding this work have been formally submitted to the NRC, neither the staff nor the ACRS had an opportunity to perform an adequate review of this effort.

VII. Browns Ferry Nuclear Plant Unit 1 Restart Activities

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

The Committee met with representatives of the NRC staff to discuss the findings and recommendations of the Browns Ferry Unit 1 Restart Panel, activities and problems associated with restart, and the current status of the plant. The staff presented a short history of the Browns Ferry Units up to and including the startup of Unit 1. The staff described the significant number of modifications made to the plant to return it to an operational status from a construction status, as well as the licensing actions and inspections necessary to support and review these modifications. The staff concluded its presentation with a discussion of minor issues that occurred during startup and the current status of the plant.

VIII. Subcommittee Report on the State-of-the-Art Reactor Consequence Analysis Project

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

The Chairman of the Regulatory Policies and Practices Subcommittee provided a report to the Committee, summarizing the results of the July 10, 2007, meeting with the NRC staff to discuss the status of staff's efforts associated with the State-of-the-Art Reactor Consequence Analysis (SOARCA) Project. During the meeting, the Subcommittee reviewed several topics including accident sequence selection, containment system states, MELCOR analysis, emergency preparedness, and MACCS2 analysis. As directed by the Commission, the staff has reduced the initial scope of the SOARCA Project. The staff is initially focusing on two sites: Peach Bottom in Pennsylvania and Surry in Virginia. During the closed portion of the Subcommittee meeting, the Subcommittee discussed the staff's initial findings of the accident sequence selection, preliminary MELCOR insights, containment performance, and emergency preparedness for these two plants. The Subcommittee also discussed the various options the staff is evaluating for assessment of dose thresholds for latent cancer fatalities. The Committee plans to continue its review of the SOARCA Project in a future meeting after the staff has made further progress in its analysis.

IX. Status Report on the Quality Assessment of Selected NRC Research Projects

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

The Committee was briefed by the members of the ACRS panels regarding the status of their assessment of the quality of the NRC research projects on Cable Response to Live Fire (CAROLFIRE) Testing, Fatigue Crack Flaw Tolerance in Nuclear Power Plant Piping, and Technical Review of the Online Monitoring Techniques for Performance Assessment.

X. Executive Session

A. RECONCILIATION OF ACRS COMMENTS AND RECOMMENDATIONS/EDO COMMITMENTS

- The Committee considered the EDO's response of May 31, 2007, to recommendations included in the April 20, 2007, ACRS report on the technology-neutral framework for future plant licensing. The Committee decided that it was satisfied with the EDO's response.

- The Committee considered the EDO's response of June 27, 2007, to recommendations included in the May 16, 2007, ACRS report on the draft Commission Paper on the staff plan regarding a risk-informed and performance-based revision to 10 CFR Part 50. The Committee decided that it was not satisfied with the EDO's response because it fails to address the Committee's comment that the technology-neutral regulatory framework "is still incomplete and needs modification" prior to publication. In addition, rather than continuing to work on the technology-neutral regulatory framework so it can help guide the development of the licensing strategy for the Next Generation Nuclear Plant (NGNP), the staff plans on developing the NGNP licensing strategy and then incorporate any lessons learned from that effort into future regulatory guidance that would be akin to the framework.

- The Committee considered the EDO's response of June 1, 2007, to comments and recommendations included in the February 14, 2007, ACRS letter on the draft final revision to the Regulatory Guide 1.189 (DG-1170), "Fire Protection for Nuclear Power Plants." The Committee decided that it was satisfied with the EDO's response.

- The Committee considered the EDO's response of June 1, 2007, to recommendations included in the December 18, 2006, ACRS letter regarding draft final Regulatory Guide 1.207 (DG-1144), "Guidelines for Evaluating Fatigue Analyses Incorporating the Life Reduction of Metal Components Due to the Effects of the Light-Water Reactor Environment for New Reactors." The Committee decided that it was satisfied with the EDO's response.

- The Committee considered the EDO's response of July 2, 2007, to comments and recommendations included in the May 18, 2007, ACRS report regarding activities related to digital instrumentation and control systems. The Committee decided that it was satisfied with the EDO's response.

- The Committee considered the EDO's response of June 1, 2007, to comments and recommendations included in the April 23, 2007, ACRS report on human reliability analysis models. The Committee decided that it was satisfied with the EDO's response.

- The Committee considered the EDO's response of June 13, 2007, to comments and recommendations included in the May 16, 2007, ACRS report on the development of an integrated long-term regulatory research plan. The Committee decided that it was satisfied with the EDO's response.

- The Committee considered the EDO's response of June 5, 2007, to comments and recommendations included in the October 23, 2006, ACRS letter on draft Revision 1 to Regulatory Guide 1.200 (DG-1161), "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-informed Activities," and Standard Review Plan Section 19.1, "Determining the Technical Adequacy of Probabilistic Risk Assessment Results of Risk-informed Activities." The Committee decided that it was satisfied with the EDO's response.

  **The staff committed to continue to interact with the Committee as Regulatory Guide 1.200 is revised in the future and as the staff proceeds with the development of a draft NUREG on the treatment of uncertainties and sensitivities.**

- The Committee considered the EDO's response of June 6, 2007, to comments and recommendations included in the November 17, 2006, ACRS letter on draft Revision 3 to Regulatory Guide 1.7, "Control of Combustible Gas Concentrations in Containment Following a Loss-of-Coolant Accident," and Standard Review Plan Section 6.2.5, "Combustible Gas Control in Containment." The Committee decided that it was satisfied with the EDO's response.

OTHER RELATED ACTIVITIES OF THE COMMITTEE

During the period from June 7, 2007, through July 10, 2007, the following Subcommittee meetings were held:

- Regulatory Policies and Practices — July 10, 2007

The Subcommittee discussed the staff's efforts associated with the State-of-the-Art Reactor Consequence Analysis (SOARCA) Project.

- Planning and Procedures — July 10, 2007

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

B. Report on the Meeting of the Planning and Procedures Subcommittee Held on July 10, 2007

**Review of the Member Assignments and Priorities for ACRS Reports and Letters for the July ACRS meeting**

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

**Anticipated Workload for ACRS Members**

The anticipated workload for ACRS members through October 2007 was discussed. 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 also discussed and developed recommendations

**Appointment of New Members**

In a Staff Requirements Memorandum (SRM), dated June 15, 2007, the Commission states the following:

> The Commission has approved the appointment of Mr. John W. Statkar, Mr. Lew W. Myers, and Dr. Dennis C. Bley to the ACRS.

The Commission expressed the need for urgency in securing expertise in digital instrumentation and control for the ACRS.

The Commission also supported solicitation of additional candidates with expertise in materials engineering and seismic and structural engineering.

On June 27, 2007, Mr. Myers declined the offer to become an ACRS member due to personal issues. Also, Mr. Sieber offered his resignation from the Committee on June 27, 2007, but he has agreed to become a consultant. Mr. Sieber's resignation will become effective upon his conversion to a consultant. As a result of these developments, the Committee needs to have members with operating experience.

The ACRS staff is in the process of preparing draft Federal Register Notice and Press Release soliciting candidates with expertise in the areas of Digital I&C, Materials Engineering, and Plant Operations. The draft Federal Register Notice and Press Release will be sent to the Commission for approval after review by the Planning and Procedures Subcommittee.

**SRM Resulting from the ACRS Meeting with the Commission**

In an SRM dated June 22, 2007, resulting from the ACRS meeting with the Commission on June 7, 2007, the Commission states the following:

The Commission supports the Committee's recommendations in its letter dated May 18, 2007 concerning digital I&C systems. In response, prior to the July 18, 2007 Commission meeting, the staff should assure that the following actions are included in the Digital I&C Project Plan with appropriate completion dates to support development of the final regulatory guidance on diversity and defense in depth:

Develop an inventory and classification (e.g., by function or other characteristics) of the various types of digital hardware and software systems that are being used and are likely to be used in nuclear power plants.

Evaluate the operating experience with digital systems in the nuclear and other industries to obtain insights regarding potential failure modes.

The staff should continue to evaluate digital I&C designs against current or interim guidance, as applicable, including the requirement for backup features. The staff should provide the interim guidance to the Commission by September 30, 2007.

The Commission values ACRS' biennial review of NRC's Safety Research Program. In its next report, due March 2008, the Committee should identify any gaps it perceives in the research program and provide recommendations on

redirecting funding to high priority areas. In addition, the Committee should identify areas where the research needs are considered to have been satisfied.

**SRM Related to Combined License Renewal Application Review**

In an SRM dated June 22, 2007, stemming from the Commission's review of the Combined License Review Task Force Report, the Commission states the following:

> The Advisory Committee on Reactor Safeguards (ACRS) should consider pursuing efficiencies and effectiveness in the review of subsequent COLs by adopting a "delta" review approach but only after the completion of the first COL of each design type. The ACRS, with staff input from an expanded acceptance review, could focus their reviews on the significant differences between the reference COLs and subsequent COLs. These differences would include the site-specific design features of the facility, including security design features and emergency plans.

It should be noted that several members have already discussed the use of the "delta" review approach. The above Commission direction is consistent with the approach previously discussed by the members in reviewing COL applications.

**ACNW&M Meeting on Spent Nuclear Fuel Recycle White Paper**

In an SRM dated February 7, 2006, stemming from the Commission's review of the ACNW Action Plan for FY 2006 and 2007, the Commission stated that the ACNW should remain abreast of industry, technical and legal developments in the areas of spent fuel storage, disposal, and reprocessing to ensure that members will be ready to provide advice in these areas, should the need arise.

In response, the ACNW&M prepared a White Paper to:

> Capture the historical approaches to the development, design, and operation of spent nuclear fuel recycle facilities
>
> Summarize the potential advanced spent nuclear fuel recycle technologies
>
> Identify technical regulatory issues to be faced if advanced spent nuclear fuel recycle technologies are implemented

A draft of this White Paper had been issued for comment and also sent to the ACRS members on June 28, 2007. The ACNW&M plans to discuss the Paper and solicit comments during the meeting on Wednesday, July 18, 2007.

In an SRM dated June 28, 2007 related to Regulatory Options for Licensing Facilities Associated with the Global Nuclear Energy Partnership (GNEP) the Commission states:

The ACRS should be the lead advisory committee for the burner reactor and reprocessing facility and should work jointly with the ACNW&M on matters of common

interest. The staff should note the discussions the Commission had with the ACRS about the potential difficulties in coming up with a framework for licensing co-located closed fuel cycle facilities.

Interested members of the ACRS should consider attending the ACNW&M meeting on July 18, 2007.

**Quadripartite Working Group Meeting**

Germany's Reaktor-Sicherheitskommission (RSK) will host the first Quadripartite Working Group (WG) meeting on the topic of "Sump Screen Blockage" on October 17-18, 2007, in Erlangen, Germany. An agenda for this meeting is attached. During the April meeting, the Committee authorized Dr. Banerjee, Dr. Bonaca, Dr. Abdel-Khalik, and Dr. Wallis to attend this WG meeting. [Note: Drs. Bonaca and Abdel-Khalik will inform Mugeh within two weeks whether or not they will attend this meeting.]

The members who are scheduled to attend this WG meeting should identify topics for their papers and should also provide their travel plans.

RSK is considering hosting another WG meeting to be held concurrently with the first WG meeting on the topic of digital I&C. RSK is requesting feedback.

**Scheduling Subcommittee Meetings**

During last month's meeting, Members discussed establishing the second week after each Full Committee meeting as preferred dates for Subcommittee meetings. The preferred meeting days would be Thursday and Friday of that week. Since ACNW&M meetings are usually held this week, ACRS Subcommittee meetings may have to be held in the Commissioner's Conference Room or the Subcommittee room. Currently, the day before each Full Committee meeting is used for Subcommittee meetings.

**ACRS/ACNW&M Self-Assessment**

Based on an August 6, 1999 SRM (Self Assessment of ACRS and ACNW Performance) the periodic Self-Assessment Report and the ACRS and ACNW Operating Plan can be combined into one annual report to the Commission. This report is due on November 1, 2007. As part of the Self-Assessment process, the ACRS and ACNW, by choice, have utilized surveys as a means of obtaining stakeholder input. At this time, this survey duplicates other methods (semiannual office assessments and stakeholder feedback forms) of obtaining stakeholder input. In addition, the survey does not seem to provide high level comments that would add value to the processes set forth by the Agency and utilizes the office's contract funds. The ACRS/ACNW&M staff recommends that the Committees eliminate the survey tool and use the other methods required by the Agency to obtain stakeholder input. These methods would be supplemented by quarterly meetings between the Committee Chairmen and Commissioners as well as follow-up meetings between the Executive Director and Office Directors.

Results of the 2007 self-assessment survey are attached. Internal and external stakeholders' comments in response to the survey will be discussed.

Member Issue

Dr. Sam Armijo requests Committee approval and support to attend the 2007 International LWR Fuel Performance meeting from September 30 to October 3, 2007 in San Francisco, California.

C. Future Meeting Agenda

Appendix IV summarizes the proposed items endorsed by the Committee for the **545th** ACRS Meeting, **September 6-8, 2007.**

The **544th** ACRS meeting was adjourned at **1:30 PM, July 13, 2007.**

impacts of the REU awards made by that Directorate, as well as lessons learned to improve the results of future REU awards. Two types of REU awards will be studied, REU sites and REU supplements. REU Site awards fund groups of undergraduates to work with faculty members at an institution. Half of the undergraduates in an REU site must come from other institutions. ENG also makes REU Supplement awards to NSF-funded Engineering Research Centers and to other NSF-funded researchers for comparable involvement of undergraduates.

The proposed study will be similar to the 2003 URO study. It will focus on undergraduate ENG REU participants and the faculty members who are responsible for the ENG REU awards during summer 2006 through spring 2007, and will examine in detail for the first time the activities, outcomes, and impacts of REU awards made in a single NSF directorate—ENG. The study will evaluate the longer-term effects of REU experiences with a follow-up survey of the students approximately two years later. The REU program officers in the NSF's Division of Engineering Education and Centers (EEC) particularly want to learn in depth about the EEC REU Site and ERC REU Supplement awards from former REU students and awardees, any differences between the Sites and ERC Supplements, and lessons learned for subsequent proposal review and advising prospective PIs. Information will also be used for ENG Program reporting requirements. The study will examine (1) the role of the REU program in aiding participating undergraduates in a decision to pursue graduate education or careers in engineering; and (2) the relationship between how REU activities are structured and managed and participants' subsequent education and career decisions and actions.

The survey data collection will be done on the World Wide Web.

*Estimate of Burden:* Public reporting burden for this collection of information is estimated to average 30 minutes per response.

*Respondents:* Individuals.

*Estimated Number of Respondents:* 10,529.

*Estimated Total Annual Burden on Respondents:* 5,094 hours.

*Frequency of Response:* One time for faculty, two times for students.

Dated: June 15, 2007.

**Suzanne H. Plimpton,**

*Reports Clearance Officer, National Science Foundation.*

[FR Doc. 07-3054 Filed 6-20-07; 8:45 am]

BILLING CODE 7555-01-M

## 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 (ACRS) will hold a meeting on July 11–13, 2007, 11545 Rockville Pike, Rockville, Maryland. The date of this meeting was previously published in the **Federal Register** on Wednesday, November 15, 2006 (71 FR 66561).

**Wednesday, July 11, 2007, Conference Room T-2B3, Two White Flint North, Rockville, Maryland**

*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.–10:15 a.m.: Sampling Methodology and Statistical Thresholds for Selecting ITAACs for Inspection* (Open)—The Committee will hear presentations by and hold discussions with representatives of the NRC staff regarding the feasibility of the ACRS review of the sampling methodology and statistical thresholds proposed by the NRC staff for selecting Inspections, Tests, Analyses, and Acceptance Criteria (ITAACs) for inspection, and related matters.

*10:30 a.m.–12:15 p.m.: Dissimilar Metal Weld Issue* (Open)—The Committee will hear presentations by and hold discussions with representatives of the NRC staff and nuclear industry regarding the preliminary results of the advanced finite element analysis performed by the industry to provide basis for leak-before-break.

*1:15 p.m.–2:15 p.m.: Activities in the Safeguards and Security Areas* (Open/Closed)—The Committee will hear presentations by and hold discussions with representatives of the NRC staff regarding ongoing and planned activities in the safeguards and security areas, items that are expected to be submitted to the ACRS for review, and the associated schedule.

Note: A portion of this session may be closed to protect information classified as National Security Information as well as Safeguards Information pursuant to 5 U.S.C. 552b(c)(1) and (3).

*2:30 p.m.–3:30 p.m.: Revisions to Draft Final NUREG–1852, "Demonstrating the Feasibility and Reliability of Operator Manual Actions in Response to Fire"* (Open)—The Committee will hear presentations by and hold discussions with representatives of the NRC staff regarding the changes made to draft final NUREG–1852 to address ACRS Comments and recommendations.

*3:45 p.m.–6 p.m.: Preparation of ACRS Reports* (Open)—The Committee will discuss proposed ACRS reports on matters considered during this meeting, as well as a proposed ACRS report on Technology-Neutral Framework for Future Plant Licensing.

**Thursday, July 12, 2007, Conference Room T-2B3, Two White Flint North, Rockville, Maryland**

*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.–10:30 a.m.: Draft NUREG–0654, Supplement 3, "Criteria for Protective Action Recommendations for Severe Accidents"* (Open)—The Committee will hear presentations by and hold discussions with representatives of the NRC staff regarding draft NUREG–0654, Supplement 3, "Criteria for Protective Action Recommendations for Severe Accidents".

*10:45 a.m.–12:15 p.m.: Browns Ferry Nuclear Plant Unit 1 Restart Activities* (Open)—The Committee will hear presentations by and hold discussions with representatives of the NRC staff regarding the findings and recommendations of the Browns Ferry Unit 1 Restart Panel, activities associated with restart, any problems encountered prior to, during, and after restart as well as current status of the plant.

*1:15 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, including anticipated workload and member assignments.

*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 to comments and recommendations included in recent ACRS reports and letters.

*2:15 p.m.–2:30 p.m.: Subcommittee Report on State-of-the-Art Reactor Consequence Analysis (SOARCA) Project)* (Open)—The Committee will hear a report by and hold discussions with the Chairman of the ACRS Subcommittee on Regulatory Policies and Practices regarding the SOARCA Project that was discussed by the Subcommittee on July 10, 2007.

*2:45 p.m.–3:45 p.m.: Status Report on the Quality Assessment of Selected NRC Research Projects* (Open)—The Committee will hold discussions with the members of the ACRS Panels regarding the status of the quality assessment of selected NRC research projects.

*3:45 p.m.–7 p.m.: Preparation of ACRS Reports* (Open)—The Committee will discuss proposed ACRS reports.

**Friday, July 13, 2007, Conference Room T-2B3, Two White Flint North, Rockville, Maryland**

*8:30 a.m.–1 p.m.: Preparation of ACRS Reports* (Open)—The Committee will continue discussion of proposed ACRS reports.

*1 p.m.–1:30 p.m.: Miscellaneous* (Open)—The Committee will discuss matters related to the conduct of Committee activities and matters and specific issues that were not

Appendix I

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 2, 2006 (71 FR 58015). In accordance with those 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. Persons desiring to make oral statements should notify the Cognizant ACRS staff named below 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 the Cognizant ACRS staff 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 the Cognizant ACRS staff if such rescheduling would result in major inconvenience.

In accordance with Subsection 10(d) Pub. L. 92–463, I have determined that it may be necessary to close a portion of this meeting to protect information classified as National Security Information as well as Safeguards Information pursuant to 5 U.S.C. 552b ( c) (1) and (3).

Further information regarding topics to be discussed, whether the meeting has been canceled or rescheduled, as well as the Chairman's ruling on requests for the opportunity to present oral statements and the time allotted therefor can be obtained by contacting Mr. Sam Duraiswamy, Cognizant ACRS staff (301–415–7364), between 7:30 a.m. and 4 p.m., (ET). ACRS meeting agenda, meeting transcripts, and letter reports are available through the NRC Public Document Room at *pdr@nrc.gov*, or by calling the PDR at 1–800–397–4209, or from the Publicly Available Records System (PARS) component of NRC's document system (ADAMS) which is accessible from the NRC Web site at *http://www.nrc.gov/reading-rm/adams.html* or *http://www.nrc.gov/reading-rm/doc-collections/* (ACRS & ACNW Mtg schedules/agendas).

Video teleconferencing 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., (ET), 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 and facilities that they use to establish the video teleconferencing link. The availability of video teleconferencing services is not guaranteed.

Dated: June 15, 2007.

**Andrew L. Bates,**

*Advisory Committee Management Officer.*

[FR Doc. E7–12016 Filed 6–20–07; 8:45 am]

BILLING CODE 7590–01–P

## POSTAL REGULATORY COMMISSION

### Facility Tours

**AGENCY:** Postal Regulatory Commission.

**ACTION:** Notice of Commission tours.

**SUMMARY:** On Thursday afternoon, June 22, 2007, Postal Rate Commission and advisory staff members will tour Hallmark Headquarters and Visitors Center in Kansas City, Missouri. On Friday afternoon, June 23, 2007, Commissioners and advisory staff members will tour a DST Systems, Inc. facility in Kansas City, Missouri. The purpose of the Hallmark tour is to discuss shape-based postage rates and to observe Hallmark operations. The purpose of the DST Systems, Inc tour is to observe company operations, including the interface with U.S. Postal Service operations.

**DATES:** June 22 (1 p.m.) and June 23, 2007 (2 p.m.).

**FOR FURTHER INFORMATION CONTACT:** Ann C. Fisher, Chief of Staff, Postal Regulatory Commission, at 202–789–6803 or *ann.fisher@prc.gov*.

**Steven W. Williams,**

*Secretary.*

[FR Doc. 07–3051 Filed 6–20–07; 8:45 am]

BILLING CODE 7710–FW–M

## SECURITIES AND EXCHANGE COMMISSION

**[Release No. 34–55913; File No. SR–Amex–2007–13]**

### Self-Regulatory Organizations; American Stock Exchange LLC; Order Approving Proposed Rule Change as Modified by Amendment No. 1 Relating to the Codification of Exchange Policy Regarding Specialist Commissions

June 15, 2007.

### I. Introduction

On January 29, 2007, the American Stock Exchange LLC ("Amex" or "Exchange") filed with the Securities and Exchange Commission ("Commission"), pursuant to Section 19(b)(1) of the Securities Exchange Act of 1934 ("Act")[1] and Rule 19b–4 thereunder,[2] a proposed rule change to amend Amex Rule 154—AEMI and Amex Rule 154—AEMI-One to expand the scope of its rules that specify when specialists may charge commissions. The proposed rule change was published for comment in the **Federal Register** on April 2, 2007.[3] The Commission received three comment letters regarding the proposal.[4] On May 29, 2007, Amex filed Amendment No. 1 to the proposed rule change.[5] This order approves the proposed rule change, as modified by Amendment No. 1.

### II. Description

The Exchange proposes to adopt Amex Rule 154–AEMI(k) to prohibit specialists from charging a commission for orders or portions of orders that have not been executed. The proposed rule would extend the prohibitions on specialist commissions contained in Amex Rule 154(b) to Exchange-Traded Funds ("ETFs") and equities trading on the AEMI System. These restrictions prohibit specialists from (i) charging a commission on off floor orders that are electronically delivered to the specialist except in cases of orders that require special handling by the specialist or for which the specialist provides a service, and (ii) billing customers for electronically delivered orders that are executed automatically by the Exchange's order processing facilities upon receipt. In addition, proposed Rule 154–AEMI(k) would reference Rule 152–AEMI(c), which prohibits specialists from charging a commission where they act as principal in the execution of an order entrusted to them as agent. Lastly, the proposed rule sets forth the types of orders specialists would be allowed to bill a commission. These orders would include: (i) Limit orders that remain on the book for more than two minutes; (ii) tick sensitive orders (*e.g.*, an order to sell short in a security subject to the Commission's "tick-test"); (iii) stop or stop limit orders; (iv) fill-or-kill and immediate-or-

[1] 15 U.S.C. 78s(b)(1).

[2] 17 CFR 240.19b–4.

[3] *See* Securities Exchange Act Release No. 55533 (March 26, 2007), 72 FR 15733.

[4] *See* letters to Nancy M. Morris, Secretary, Commission, from Samuel F. Lek, Lek Securities Corporation, dated April 26, 2007 ("Lek Letter"); from Jonathan Q. Frey, Managing Partner, J. Streicher & Co. L.L.C., Brendan E. Cryan, Brendan E. Cryan and Company, LLC, Robert B. Nunn, Cohen Specialists LLC, and Michael Marchist, AIM Specialists, dated April 17, 2007 ("Equity Specialist Firms Letter"); and from Jerry O'Connell, Chief Regulatory Officer, Susquehanna Investment Group, llc, dated February 13, 2007 ("Susquehanna Letter").

[5] In Amendment No. 1, Amex removed all references to Amex Rule 154—AEMI-One in the proposed rule change because the AEMI-One rules have been replaced by the AEMI rules. This is a technical amendment and is not subject to notice and comment.

June 18, 2007

**REVISED**
**SCHEDULE AND OUTLINE FOR DISCUSSION**
**544th ACRS MEETING**
**JULY 11-13, 2007**

**WEDNESDAY, JULY 11, 2007, CONFERENCE ROOM T-2B3, TWO WHITE FLINT NORTH, ROCKVILLE, MARYLAND**

1) 8:30 - 8:35 A.M. Opening Remarks by the ACRS Chairman (Open) (WJS/CS/SD)
   1.1) Opening statement
   1.2) Items of current interest

2) 8:35 - 10:15 A.M. Sampling Methodology and Statistical Thresholds for Selecting ITAACs for Inspection (Open) (MLC/DCF)
   2.1) Remarks by the Subcommittee Chairman
   2.2) Briefing by and discussions with representatives of the NRC staff regarding the feasibility of the ACRS review of the sampling methodology and statistical thresholds proposed by the NRC staff for selecting Inspections, Tests, Analyses, and Acceptance Criteria (ITAACs) for inspection, and related matters.

   Representatives of the nuclear industry and members of the public may provide their views, as appropriate.

**10:15 - 10:30 A.M.** *****BREAK*****

3) 10:30 - 12:15 P.M. Dissimilar Metal Weld Issue (Open) (WJS/CGH)
   3.1) Remarks by the Subcommittee Chairman
   3.2) Briefing by and discussions with representatives of the NRC staff and nuclear industry regarding the preliminary results of the advanced finite element analysis performed by the industry to provide basis for leak-before-break.

   Members of the public may provide their views, as appropriate.

**~~12:15 - 1:15~~ P.M.** *****LUNCH*****
**12:23 – 1:15**

4) 1:15 - 2:15 P.M. Activities in the Safeguards and Security Areas (Open/Closed) (MVB/MB)
   4.1) Remarks by the Subcommittee Chairman
   4.2) Briefing by and discussions with representatives of the NRC staff regarding ongoing and planned activities in the safeguards and security areas, items that are expected to be submitted to the ACRS for review, and the associated schedule.

Appendix II

**[NOTE: A portion of this session may be closed to protect information classified as National Security Information as well as Safeguards Information pursuant to 5 U.S.C. 552b ( c) (1) and (3)].**

**2:15 - 2:30 P.M.** *****BREAK*****

5) 2:30 ~~- 3:30~~ P.M. - 3:12 PM

Revisions to Draft Final NUREG-1852, "Demonstrating the Feasibility and Reliability of Operator Manual Actions in Response to Fire" (Open) ( GEA/MAJ)

5.1) Remarks by the Subcommittee Chairman

5.2) Briefing by and discussions with representatives of the NRC staff regarding the changes made to draft final NUREG-1852 to address ACRS comments and recommendations.

Representatives of the nuclear industry and members of the public may provide their views, as appropriate.

**~~3:30~~ - 3:45 P.M.** 3:12 *****BREAK*****

6) 3:45 - 6:00 P.M.

Preparation of ACRS Reports (Open)

Discussion of proposed ACRS reports on:

6.1) Sampling Methodology and Statistical Thresholds for Selecting ITAACs for Inspection (MLC/DCF)

6.2) Dissimilar Metal Weld Issue (WJS/CGH) **(TENTATIVE)**

6.3) Revisions to NUREG-1852, "Demonstrating the Feasibility and Reliability of Operator Manual Actions in Response to Fire" (GEA/MAJ)

6.4) Technology-Neutral Framework for Future Plant Licensing (TSK/DCF)

**THURSDAY, JULY 12, 2007, CONFERENCE ROOM T-2B3, TWO WHITE FLINT NORTH, ROCKVILLE, MARYLAND**

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

Opening Remarks by the ACRS Chairman (Open) (WJS/CS/SD)

8) 8:35 - ~~10:30~~ A.M. - 10:47

Draft NUREG-0654, Supplement 3, "Criteria for Protective Action Recommendations for Severe Accidents" (Open) (MVB/MB)

8.1) Remarks by the Subcommittee Chairman

8.2) Briefing by and discussions with representatives of the NRC staff regarding draft NUREG-0654, Supplement 3, "Criteria for Protective Action Recommendations for Severe Accidents"

Representatives of the nuclear industry and members of the public may provide their views, as appropriate.

**~~10:30 - 10:45~~ A.M.** *****BREAK*****
**10:47 – 11:01 A.M.**

9) ~~10:45 - 12:15~~ P.M. Browns Ferry Nuclear Plant Unit 1 Restart Activities (Open)
11:01 – 11:48 P.M.

(OLM/MAJ)
9.1) Remarks by the Subcommittee Chairman
9.2) Briefing by and discussions with representatives of the NRC staff regarding the findings and recommendations of the Browns Ferry Unit 1 Restart Panel, activities associated with restart, any problems encountered prior to, during, and after restart as well as current status of the plant.

**12:15 - 1:15 P.M.** *****LUNCH*****

10) 1:15 - 2:00 P.M. Future ACRS Activities/Report of the Planning and Procedures Subcommittee (Open) (WJS/FPG/SD)
10.1) Discussion of the recommendations of the Planning and Procedures Subcommittee regarding items proposed for consideration by the full Committee during future ACRS meetings.
10.2) Report of the Planning and Procedures Subcommittee on matters related to the conduct of ACRS business, including anticipated workload and member assignments.

11) 2:00 - 2:15 P.M. Reconciliation of ACRS Comments and Recommendations (Open) (WJS, 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.

12) 2:15 - 2:30 P.M. Subcommittee Report on State-of-the-Art Reactor Consequence Analysis (SOARCA) Project (Open) (WJS/HPN)
Report by and discussions with the Chairman of the ACRS Subcommittee on Regulatory Policies and Practices regarding the SOARCA Project that was discussed by the Subcommittee on July 10, 2007.

**2:30 - 2:45 P.M.** *****BREAK*****

13) 2:45 - 3:45 P.M. Status Report on the Quality Assessment of Selected NRC Research Projects (Open) (DAP/SB/WJS/OLM/HPN)

13.1) Remarks by the Subcommittee Chairman

13.2) Report by and discussions with the members of the ACRS Panels regarding their assessment of the quality of the NRC research projects on: Cable Response to Live Fire (CAROLFIRE) Testing, Fatigue Crack Flaw Tolerance in Nuclear Power Plant Piping, and Technical Review of the Online Monitoring Techniques for Performance Assessment.

14) 3:45 - 7:00 P.M. Preparation of ACRS Reports (Open)

Discussion of proposed ACRS reports on:

14.1) Sampling Methodology and Statistical Thresholds of Selecting ITAACs for Inspection (MLC/DCF)

14.2) Dissimilar Metal Weld Issue (WJS/CGH) **(TENTATIVE)**

14.3) Revisions to NUREG-1852, "Demonstrating the Feasibility and Reliability of Operator Manual Actions in Response to Fire" (GEA/MAJ)

14.4) Technology-Neutral Framework for Future Plant Licensing (TSK/DCF)

14.5) NUREG-0654, Supplement 3, "Criteria for Protective Action Recommendations for Severe Accidents" (MVB/MB)

**FRIDAY, JULY 13, 2007, CONFERENCE ROOM T-2B3, TWO WHITE FLINT NORTH, ROCKVILLE, MARYLAND**

15) 8:30 - 1:00 P.M. Preparation of ACRS Reports (Open)
**(10:30-10:45 BREAK)** Continue discussion of proposed ACRS reports listed under Item 14.

16) 1:00 - 1:30 P.M. Miscellaneous (Open) (WJS/FPG)
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.

Thirty-Five (35) hard copies and (1) electronic copy of the presentation materials should be provided to the ACRS.

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| ACRS<br>SD/bjw<br>06/ /07 | ACRS<br>CS<br>06/ /07 | Filed: CM-180 |

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
544th FULL COMMITTEE MEETING

July 11-13, 2007

PLEASE PRINT CLEARLY

## NRC Attendees

TODAY'S DATE: July 11, 2007

| | NAME | NRC ORGANIZATION |
|---|---|---|
| 1 | Jay Collins | NRC/NRR/DCI |
| 2 | Yung Hsien Chang | RES |
| 3 | Simon Sheng | NRC |
| 4 | Eric Focht | NRC |
| 5 | Tim Lupold | NRC |
| 6 | Tim Reed | NRC |
| 7 | Bonnie Schnetzler | NRC/NSIR |
| 8 | Dennis Gordon | NRC/NSIR |
| 9 | Doug Huyck | NRC/NSIR |
| 10 | Jose Ibarra | NRC/RES |
| 11 | Alex Klein | NRC/NRR/DRA |
| 12 | Phil Qualls | NRC/NRR/DRA |
| 13 | Pete Barbadoro | NRC/NRR |
| 14 | Naeem Iqbal | NRC/NRR/DRA |
| 15 | Gabe Taylor | NRC/NRR/DORL |
| 16 | Omid Tabatabai | NRC/NRO/DCIP |
| 17 | Jason Jennings | NRC/NRO/DCIP |
| 18 | Mark Lesser | NRC/Region II |
| 19 | Rich Rasmusson | NRC/NRO/DCIP |
| 20 | Glenn Tracy | NRC/NRO/DCIP |
| 21 | Gene Imbro | NRO/DCIP |
| 22 | Karlen Ruleman | NRC/NRR/DCI |
| 23 | Hulbert Li | NRO/DE/ICEZ |
| 24 | J. Gaslevic | NRC/NRO/DCIP/CCIP |
| 25 | Yeon-Ki Chung | NRR/DLR |
| 26 | Bill Borchardt | NRO |
| 27 | Mary Ann Ashley | NRR |
| 28 | John Nakowski | NRO |

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
544th FULL COMMITTEE MEETING

July 11-13, 2007

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**NRC Attendees**
TODAY'S DATE: July 11, 2007

| | NAME | NRC ORGANIZATION |
|---|---|---|
| 29 | Lois James | NRO/DE |
| 30 | Ann Hodgdon | OGC |
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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
544th FULL COMMITTEE MEETING

July 11-13, 2007

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**NRC Attendees**
TODAY'S DATE: July 12, 2007

| | NAME | NRC ORGANIZATION |
|---|---|---|
| 1 | Tim McGinty | NRR |
| 2 | Kathryn Brock | NRR/NSIR |
| 3 | Anthony McMurtray | NSIR |
| 4 | Jason Schaperow | RES |
| 5 | Steve LaVie | NSIR |
| 6 | Jocelyn Mitchell | RES |
| 7 | Falk Kantor | NSIR |
| 8 | Sandra Lai | RES |
| 9 | Eva Brown | NRR/DORL |
| 10 | Malcolm T. Widdman | RII/DRP |
| 11 | John G. Lamb | OEDO |
| 12 | Alex Klein | NRR/DRA |
| 13 | Phil Qualls | NRC |
| 14 | Charles Moulton | NRR/DRA |
| 15 | Reed Anzalon | NRR |
| 16 | R Sullivan | NSIR |
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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
544th FULL COMMITTEE MEETING

July 11-13, 2007

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**Visitors**
TODAY'S DATE: July 11, 2007

| | NAME | ORGANIZATION |
|---|---|---|
| 1 | Scott Newberry | ISL |
| 2 | Alan Levin | AREVA |
| 3 | Tyson Smith | Winston & Strawn |
| 4 | Russ Bell | NEI |
| 5 | Jim Riley | NEI |
| 6 | Mike Melton | NEI |
| 7 | Jeff Jacodin | NRL |
| 8 | Glenn White | Dominion Engineering |
| 9 | Charles Brinkman | Westinghouse |
| 10 | Jay Thayer | NEI |
| 11 | Paul Gunter | NPRI |
| 12 | Steven Dolby | Inside NRC/Platts |
| 13 | Allain Olivier | ASN |
| 14 | Dave Rudland | EMC$^2$ |
| 15 | Rachel Vaucher | ASN |
| 16 | Sebastien Limousin | ASN |
| 17 | Pascal Mutin | ASN |
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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
544th FULL COMMITTEE MEETING

July 11-13, 2007

PLEASE PRINT CLEARLY

**Visitors**
TODAY'S DATE: July 12, 2007

| | NAME | ORGANIZATION |
|---|---|---|
| 1 | Stephen M. Hess | EPRI |
| 2 | Martin Hug | NEI |
| 3 | David Leaver | Polestar Applied Technology, Inc. |
| 4 | David T. Langely | TVA |
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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
544th FULL COMMITTEE MEETING

July 11-13, 2007

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**Visitors**
TODAY'S DATE: July 13, 2007

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August 6, 2007

**SCHEDULE AND OUTLINE FOR DISCUSSION**
**545th ACRS MEETING**
**SEPTEMBER 6-8, 2007**

**THURSDAY, SEPTEMBER 6, 2007, CONFERENCE ROOM T-2B3, TWO WHITE FLINT NORTH, ROCKVILLE, MARYLAND**

1) 8:30 - 8:35 A.M. Opening Remarks by the ACRS Chairman (Open) (WJS/CS/SD)
   1.1) Opening statement
   1.2) Items of current interest

2) 8:35 - 10:30 A.M. Final Review of the License Renewal Application for the Pilgrim Nuclear Power Station (Open) (OLM/MB)
   2.1) Remarks by the Subcommittee Chairman
   2.2) Briefing by and discussions with representatives of the NRC staff and Entergy Nuclear Operations, Inc. regarding the license renewal application for the Pilgrim Nuclear Power Station and the associated NRC staff's final Safety Evaluation Report.

   Members of the public may provide their views, as appropriate.

**10:30 - 10:45 A.M.** ***BREAK***

3) 10:45 - 12:15 P.M. Revisions to Standard Review Plan (SRP) Sections 19.0 and 19.2 (Open) (GEA/DCF)
   3.1) Remarks by the Subcommittee Chairman
   3.2) Briefing by and discussions with representatives of the NRC staff regarding revisions to SRP Sections 19.0, "Probabilistic Risk Assessment and Severe Accident Evaluation for New Reactors," and 19.2, "Review of Risk Information Used to Support Permanent Plant Specific Changes to the Licensing Basis: General Guidance."

   Representatives of the nuclear industry and members of the public may provide their views, as appropriate.

**12:15 - 1:30 P.M.** ***LUNCH***

4) 1:30 - 3:00 P.M. Proposed Recommendations for Resolving Generic Safety Issue (GSI) 156.6.1, "Pipe Break Effects on Systems and Components Inside Containment" (Open) (WJS/DB)
   4.1 ) Remarks by the Subcommittee Chairman
   4.2) Briefing by and discussions with representatives of the NRC staff regarding the recommendations proposed by the staff for resolving GSI-156.6.1, and related matters.

Representatives of the nuclear industry and members of the public may provide their views, as appropriate.

**3:00 - 3:15 P.M.** *****BREAK*****

5) 3:15 - 4:45 P.M. Status of NRR Activities in the Fire Protection Area (Open) (OLM/CGH)

5.1) Remarks by the Subcommittee chairman

5.2) Briefing by and discussions with representatives of the Office of Nuclear Reactor Regulation (NRR) regarding the status of ongoing and proposed NRR activities associated with fire protection.

Representatives of the nuclear industry and members of the public may provide their views, as appropriate.

**4:45 - 5:00 P.M.** *****BREAK*****

6) 5:00 - 7:00 P.M. Preparation of ACRS Reports (Open)

Discussion of proposed ACRS reports on:

6.1) License Renewal Application for the Pilgrim Nuclear Power Station (OLM/MB)

6.2) Revisions to Standard Review Plan Sections 19.0 and 19.2 (Tentative) (GEA/DCF)

6.3) Proposed Recommendations for Resolving Generic Safety Issue 156.6.1, "Pipe Break Effects on Systems and Components Inside Containment" (WJS/DB)

6.4) Technology-Neutral Framework for Future Plant Licensing (WJS/DCF)

**FRIDAY, SEPTEMBER 7, 2007, CONFERENCE ROOM T-2B3, TWO WHITE FLINT NORTH, ROCKVILLE, MARYLAND**

7) 8:30 - 8:35 A.M. Opening Remarks by the ACRS Chairman (Open) (WJS/CS/SD)

8) 8:35 - 9:30 A.M. Future ACRS Activities/Report of the Planning and Procedures Subcommittee (Open) (WJS/FPG/SD)

8.1) Discussion of the recommendations of the Planning and Procedures Subcommittee regarding items proposed for consideration by the full Committee during future ACRS meetings.

8.2) Report of the Planning and Procedures Subcommittee on matters related to the conduct of ACRS business, including anticipated workload and member assignments.

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|---|---|---|
| 9) | 9:30 - 9:45 A.M. | Reconciliation of ACRS Comments and Recommendations (Open) (WJS, et al./SD, et al.)<br>Discussion of the responses from the NRC Executive Director for Operations to comments and recommendations included in recent ACRS reports and letters. |
| 10) | 9:45 - 10:00 A.M. | Subcommittee Report (Open) (MVB/CGH)<br>Report by and discussions with the Chairman of the Plant License Renewal Subcommittee regarding interim review of the license renewal application for the Fitzpatrick Nuclear Plant. |
| | **10:00 - 10:15 A.M.** | *****BREAK***** |
| 11) | 10:15 - 11:45 A.M. | Draft Report on Quality Assessment of Selected NRC Research Projects (Open) (DAP/HPN)<br>11.1) Remarks by the Subcommittee Chairman<br>11.2) Discussion of a draft ACRS report on the results of the quality assessment of the NRC research projects on: Fatigue Crack Flaw Tolerance in Nuclear Power Plant Piping; Cable Response to Live Fire (CAROLFIRE) Testing; and Technical Review of On-Line Monitoring Techniques for Performance Assessment. |
| | **11:45 - 12:45 P.M.** | *****LUNCH***** |
| 12) | 12:45 – 2:45 P.M. | Draft ACRS Report on the NRC Safety Research Program (Open) (DAP, et.al/HPN, et.al)<br>12.1) Remarks by the Subcommittee Chairman<br>12.2) Discussion of the draft ACRS report on the NRC Safety Research Program. |
| | **2:45 - 3:00 P.M.** | *****BREAK***** |
| 13) | 3:00 - 7:00 P.M. | Preparation of ACRS Reports (Open)<br>Discussion of proposed ACRS reports on:<br>13.1) License Renewal Application for the Pilgrim Nuclear Power Station (OLM/MB)<br>13.2) Revisions to Standard Review Plan Sections 19.0 and 19.2 (Tentative) (GEA/DCF)<br>13.3) Proposed Recommendations for Resolving Generic Safety Issue 156.6.1, "Pipe Break Effects on Systems and Components Inside Containment" (WJS/DB)<br>13.4) Technology-Neutral Framework for Future Plant Licensing (WJS/DCF) |

**SATURDAY, SEPTEMBER 8, 2007, CONFERENCE ROOM T-2B3, TWO WHITE FLINT NORTH, ROCKVILLE, MARYLAND**

| | | |
|---|---|---|
| 14) | 8:30 - 12:30 P.M.<br>**(10:30-10:45 BREAK)** | Preparation of ACRS Reports (Open)<br>Continue discussion of proposed ACRS reports listed under Item 13. |
| 15) | 12:30 - 1:00 P.M. | Miscellaneous (Open) (WJS/FPG)<br>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.

Thirty-Five (35) hard copies and (1) electronic copy of the presentation materials should be provided to the ACRS.

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| ACRS<br>MA<br>08/ /07 | ACRS<br>SD/bjw<br>08/ /07 | ACRS<br>CS<br>08/ /07 | Filed: CM-180 |

**LIST OF DOCUMENTS PROVIDED TO THE COMMITTEE**
**544th ACRS MEETING**
**July 11 - 13, 2007**

**MEETING HANDOUTS**

| AGENDA ITEM # | DOCUMENTS/HANDOUTS LISTED IN ORDER |
|---|---|
| 1. | Opening Remarks by the ACRS Chairman<br>1. 1.Items of Interest |
| 2. | Sampling Methodology and Statistical Thresholds for Selecting ITAACs for Inspection<br>2. ITAAC Closure Verification Using Sample-Based Inspection Process (Slides from Richard Rasmussen and Richard Laura, NRC/NRO/DCIP/CCIB) |
| 3. | Dissimilar Metal Weld Issue<br>3. Proposed Schedule<br>4. Advanced Finite Element Analyses of Pressurizer Nozzle Weld Flaws (Slides from Ted Sullivan and Al Scontos, NRC/NRR/DCI)<br>5. Pressurizer Nozzle Dissimilar Metal Weld Advanced Finite Element Analyses (Slides from EPRI/ Amir Shahkarami) |
| 4. | Activities in the Safeguards and Security Area<br>6. Nuclear Power Plant Security (NRC slides) |
| 5. | Revisions to Draft Final NUREG-1852, "Demonstrating the Feasibility and Reliability of Operator Manual Actions in Response to Fire"<br>7. NUREG-1852 (Slides from Erasmia Lois, NRC/RES/DRASP) |
| 8. | Draft NUREG-0654, Supplement 3, "Criteria for Protective Action Recommendations for Severe Accidents"<br>8. Protective Action Recommendation Project (Slides from Shawn Burns, Sandia National Labs)<br>9. Protective Action Recommendation Study (Slides from Randolph Sullivan, NRC/NSIR)<br>10. Risk-Informed Evaluation of Protective Action Strategies for Nuclear Plant Offsite Emergency Planning (Slides from David Leaver/Polestar; Stephen Hess/EPRI; Alan Nelson/NEI) |
| 9. | Browns Ferry Nuclear Plant Unit 1 Restart Activities<br>11. Browns Ferry Unit 1 Restart/Recovery Summary and Plant Status (Slides from NRC staff, Malcolm Widmann, Region II) |

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

10. Future ACRS Activities/Report of the Planning and Procedures Subcommittee
    12. Proposed Assignments (Table)
    13. Planning & Procedures/Future Activities Handout from Sam Duraiswamy, NRC/ACRS Staff.

11. Reconciliation of ACRS Comments and Recommendations
    14. Faxed letter from Thomas E. Murley, member of the Public, "Comments on Framework Safety Standard."

**Copies of most of the handouts can be obtained through the transcript copy found in the Agency Document Management System (ADAMS) or a complete set can be requested by calling the ACRS office of the NRC.

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

# ITEMS OF INTEREST

# 544th ACRS MEETING

# July 11-13, 2007

# ITEMS OF INTEREST
# ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
# 544th MEETING
# July 11-13, 2007

**Page**

## SPEECHES


- Remarks by Luis Reyes, EDO (for Chairman Dale E. Klein), at the Global Initiative to Combat Nuclear Terrorism Law Enforcement Conference," Miami, Florida, June 12, 2007 . . . . . 1-5

- Remarks by Dr. Peter B. Lyons, Commissioner, at the First Global Nuclear Fuel Reprocessing & Recycling Conference, "Closing the Fuel Cycle A Regulator's Perspective, dated June 11-14, 2007 . . . . . 6-9

- Remarks by Commissioner Jeffrey S. Merrifield, at the 13th Annual Nuclear Generator & Executive Summit, "Newtown's First Law of Physics", dated June 13, 2007 . . . . . 10-13

- Remarks by Edward McGaffigan, Jr., Commissioner, at NEI's Nuclear Energy Assembly Acceptance Speech (In Absentia), for the American Nuclear Society/ Nuclear Energy Institute Henry DeWolf Smyth Nuclear Statesman Award, Turnsberry Isle, Florida , May 25, 2007 . . . . . 14-15

- Remarks by Chairman Dale E. Klein, at the Browns Ferry Unit 1 Restart, June 21, 2007 . . . . . 16-17

- Remarks by Dr. Peter B. Lyons, Commissioner, Key Address to the IAEA International Conference on Common-Cause Failures of Digital Instrumentation and Control Systems in Nuclear Power Plants, "Keeping the "Safe" in New Digital Safety System Designs" dated June 19, 2007 . . . . . 18-23

- Remarks by Chairman Dale E. Klein, at the Society of Nuclear Medicine, Washington Conference Center, Washington, DC, June 3, 2007 . . . . . 24-27

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# NRC NEWS

U.S. NUCLEAR REGULATORY COMMISSION


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No. S-07-023

**Remarks Prepared for EDO Luis Reyes (for Chairman Klein)**

**Global Initiative to Combat Nuclear Terrorism Law Enforcement Conference**

**Miami, Florida**

**June 12, 2007**

Good morning. It is a pleasure to be here representing Chairman Klein and the U.S. Nuclear Regulatory Commission at this very significant conference. Chairman Klein regrets that he is not able to be here, and extends his best wishes for a successful meeting.

While the NRC is not a defense or law enforcement agency, we are intimately concerned with—and involved with—the security of nuclear technology and materials. On behalf of Chairman Klein and the entire NRC let me say that we appreciate the efforts that have gone into organizing this conference, and we thank and encourage all the participating nations and agencies that are helping to protect the world from nuclear terrorism. In particular, we have enjoyed a mutually beneficial relationship with the FBI as well as support from many local law enforcement agencies.

The focus of my talk today is to give you a brief overview of the U.S. Nuclear Regulatory Commission's activities over the past few years related to security in the commercial nuclear industry in the United States, and an overview of our partnerships and outreach activities to enhance nuclear security worldwide. The commercial nuclear industry is the collection of privately owned companies in the U.S. which process, store, generate, transport, or otherwise use nuclear material for peaceful purposes. These include uranium mining and conversion facilities, uranium enrichment and fuel manufacturing facilities, and of course the commercial nuclear power plants.

The Mission of the U.S. Nuclear Regulatory Commission is to regulate the Nation's civilian use of byproduct, source, and special nuclear materials to ensure adequate protection of public health and safety, promote the common defense and security, and protect the environment.

The NRC's regulatory mission covers three main areas:

- Reactors: specifically, the commercial reactors for generating electric power and non-power reactors used for research, testing, and training;

- Materials: referring to uses of nuclear materials in medical, industrial, and academic settings, and facilities that produce nuclear fuel; and
- Waste: including transportation, storage, and disposal of nuclear materials and waste, and decommissioning of nuclear facilities from service.

Obviously, the security of the nuclear facilities and materials the NRC regulates has always been a priority. But the terrorist attacks of September 11, 2001, brought heightened scrutiny and spurred increasingly stringent security requirements throughout the nation. Today, I am proud to say that NRC-regulated nuclear facilities are among the most secure of the nation's critical infrastructure.

Over the past five-and-a-half years, the NRC has required many security enhancements at its licensed power reactors, decommissioning reactors, independent spent fuel storage installations, research and test reactors, uranium conversion facilities, gaseous diffusion plants and fuel fabrication facilities. The NRC directed many of these facilities to upgrade their physical security plans, guard training and qualification plans, and contingency plans. These facilities now have, among other heightened measures:

- More patrols
- Stronger and more capable security forces
- Additional physical barriers
- Greater stand-off distances for vehicle checks
- More restrictive site access controls
- Enhanced emergency preparedness and response plans

Nuclear power plants and fuel fabrication facilities must show they can defend against a set of adversary characteristics outlined in the NRC's Design Basis Threat, or DBT. For security reasons, the details of the DBT are not public. But I can say that it outlines threats and adversary characteristics that these facilities must defend against with high assurance. In 2004, the NRC implemented more realistic "force on force" exercises to evaluate the DBT. Since late 2004, nearly 40 of these full-scale exercises have been conducted under this enhanced evaluation program. Efforts are ongoing to further enhance realism and "lessons learned" from these exercises.

The NRC has also significantly increased its oversight of security capabilities. In 2000, NRC inspectors spent about 40 staff-weeks a year at nuclear power plants directly inspecting security, excluding inspections of the "force-on-force" drills I just mentioned. By 2003, this inspection effort had increased five-fold to 205 staff-weeks. These inspections specifically focused on the implementation of "compensatory measures" the NRC required after the 2001 attacks to address the new threat environment. In 2004, the NRC implemented a new "baseline inspection program" for security, and by 2005, direct staff inspections at nuclear power plants had increased further to about 400 staff-weeks a year.

To consolidate the various elements of security throughout the agency, NRC created the Office of Nuclear Security and Incident Response in April of 2002. The mission of this office is "To prevent nuclear security incidents and respond to safety and security events." This office provides policy, evaluation and assessment of issues involving security at nuclear facilities. NSIR, as we call it, is the NRC's safeguards and security interface with:

- The Department of Homeland Security,
- Intelligence and law enforcement communities,

- The Department of Energy, and other agencies.

- The Office also directs the NRC's program for response to incidents, including emergency preparedness and incident response interface with other Federal agencies.

NRC staff from the NSIR office will be briefing you later this morning, and that presentation will go into specific details about a variety of NRC security measures and procedures. So rather than pre-empt that presentation, let me take this opportunity to focus in on the theme of how the NRC communicates and cooperates with other agencies, in the U.S. as well as internationally.

The NRC doesn't stand alone in protecting its licensees. The NRC and the Department of Homeland Security coordinate resources and work together in today's threat environment. One tangible example is the 2006 National Infrastructure Protection Plan, which facilitates the sharing of information and provides for a coordinated, comprehensive response to threats and events.

Federally integrated response is also illustrated by DHS's decision to begin infrastructure reviews in the nuclear sector, making it a model for future reviews of security at other critical industries. A DHS-led program to evaluate national critical infrastructure protection capabilities—called the Comprehensive Review initiative—integrates a full range of security, law enforcement and emergency preparedness professionals to identify strengths and potential weaknesses of the nation's critical infrastructure and key resources. Nuclear power plants were identified as an initial area for review because of the high level of planning already in place, and all plants have either been reviewed or are scheduled to be reviewed in the next year.

The NRC has also developed a Threat Advisory and Protective Measures System that corresponds to the color-coded Homeland Security Advisory System. The NRC system identifies specific actions to be considered by NRC licensees for each threat level to counter projected terrorist threats. If a credible threat emerges against a specific nuclear facility, additional protective measures may be mandated even without a change in the overall threat level.

At the NRC, we know that the timely sharing of accurate information with other federal agencies and the nuclear industry is critical to preventing or mitigating the effects of terrorist attacks. Therefore, we have NRC staff onsite at the Domestic Nuclear Detection Office, the National Counterterrorism Center, the DHS Infrastructure Protection Office, as well as representatives to the FBI National Joint Terrorism Task Force to support the integrated assessment of security-related information. The NRC Operations Center, located in the agency's headquarters in Rockville, Md., provides an around-the-clock conduit for disseminating information and coordinating response, and NRC's highly-trained specialists review intelligence and threat-related information from a range of sources in order to assess suspicious activity related to its licensees. Secure communications systems also allow the NRC to communicate with nuclear regulators in other countries.

In addition, NRC works in partnership with NORAD/NORTHCOM (North American Aerospace Defense Command/United States Northern Command) to provide advance warning of commercial aircraft diversions that could potentially affect power reactor facilities. NRC has utilized the insights from its classified research on security assessments to direct that appropriate imminent threat procedures be developed at each power reactor. We believe that implementation of these procedures significantly enhances mitigation capabilities.

The NRC also participates in key international initiatives that have contributed significantly to strengthening control of sources around the world. Since 2005, the NRC and several other federal agencies—including DOE, DHS, and Customs and Border Protection—have worked cooperatively through the U.S. Department of State to achieve a strong Security and Prosperity Partnership with our North American neighbors. Although the Security Prosperity Partnership encompasses numerous cooperative initiatives across many industrial sectors, our efforts have focused on the continued safe and secure beneficial uses of radioactive materials for medical and industrial applications. One outcome of these efforts has been to open channels of communication across our respective borders, allowing the commerce of these materials to proceed securely. These efforts have also resulted in an unprecedented sharing of information among the Mexican, U.S., and Canadian governments for the mutual benefit of all three countries. As we continue to participate in the Security Prosperity Partnership, the NRC is looking forward to renewed strong cooperation with our sister regulatory agencies, the Canadian Nuclear Safety Commission and the Comisión Nacional de Seguridad y Salvaguardias.

One of the NRC's most successful international initiatives, in conjunction with the departments of Energy and State, concerns the development and implementation of the IAEA's Code of Conduct on the Safety and Security of Radioactive Sources. The Code provides a reinforcing framework of sound international export controls on radioactive materials that could be used to construct devices for malicious purposes. It was adopted by the IAEA in September 2003, endorsed by the Group of Eight industrial nations in 2004, and was fully implemented by the NRC in December 2005. So far, 88 nations have made a commitment to implementing the code.

The NRC used its technical expertise to play a key role in developing the categorization of sources, upon which the Code was based. Further, the enactment of the Energy Policy Act of 2005 codified certain of the Code's import-export restrictions for risk-significant sources. The NRC has used the Code as the underlying principle for the security enhancements of licensees possessing risk-significant sources.

The U.S. has worked to promote the Code's implementation worldwide. As the government agency responsible for import-export licensing of radioactive sources, the NRC has coordinated extensively with its international regulatory counterparts to assist them in understanding both changes in U.S. regulations and the responsibilities associated with implementing the Code in their countries. In this effort, the NRC has partnered with the regulatory authorities of the United Kingdom, Canada, and Australia, among others, on projects to secure, protect, and monitor radioactive sources.

The NRC staff maintains a close partnership with the IAEA on other source-related issues, participating regularly in international meetings to develop safety and security guidance documents. NRC staff have also participated in Radiation Safety and Security Infrastructure Appraisal missions, which assess the effectiveness of individual nation's regulatory infrastructure for the safety and security of radioactive sources.

I should mention that our success in controlling high-risk radioactive sources internationally is largely dependent on our success in controlling them domestically. Some examples of these NRC efforts include the plan to implement a National Source Tracking System; our issuance, together with the Agreement States, of legally-binding requirements for increased security of high-risk sources to nearly 3,000 licensees; the Radiation Source Protection and Security Task Force; our Rulemaking on Secure Transfer; and NRC's partnership with Customs and Border Patrol to validate the authenticity of radioactive material shipments.

Okay, since I promised not to go into too much detail, let me stop there. As I mentioned, I just wanted give you few highlights of how the NRC has contributed to enhancing the security of nuclear facilities and materials, here in the U.S. and internationally. NRC staff will be providing presentations with more specifics later in the conference.

Let me conclude, then, by returning to a point I opened with: The NRC is not a law enforcement entity; we are a regulatory body. And I should mention that the safety and oversight responsibilities we have keep us busy enough. The utilities that operate nuclear power plants have told us that they plan to submit license applications for as many as 27 new nuclear power plants within the next two years. So we have an enormous amount of work to prepare for.

But no matter how busy we may be, we will *always* make time to help our colleagues in law enforcement protect the nation's security. Please keep that in mind. Any time you encounter a situation that involves the words "nuclear" "radioactive" or "radiological," remember that you can call upon our knowledge, our training and our experience—not only in nuclear and radiological safety and security issues, but also nuclear-related risk assessment, which is an area where we have done a great deal of work.

With that, let me once again thank you for inviting the NRC to participate in this important conference, and let me encourage all of the participants to continue working together on the critical challenge of preventing nuclear terrorism.

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No. 07-024


## Closing the Fuel Cycle
## A Regulator's Perspective


**Dr. Peter B. Lyons, Commissioner**
**U.S. Nuclear Regulatory Commission**


**at the**
**First Global Nuclear Fuel Reprocessing & Recycling Conference**

**June 11-14, 2007**

It is a great honor to speak to you during the First Global Nuclear Fuel Reprocessing & Recycling Conference. Chairman Dale Klein also extends his regards for a successful conference. I am extremely pleased to share my perspectives on the renewed global interest in nuclear energy and to discuss some of the U. S. Nuclear Regulatory Commission's (NRC) future challenges.

This first conference is not only timely but is making history by establishing a forum to explore global policy perspectives on development of nuclear fuel production as well as reprocessing and recycling partnerships and initiatives. In addition, conference participants will discuss emerging policies, issues, and developments associated with nuclear fuel production, reprocessing, and recycling. I strongly encourage future conferences as these technical, political, and regulatory challenges unfold. I especially want to recognize the efforts of the Conference Program Steering Committee in the planning and execution of this conference.

Over the last year, I have had several opportunities to represent the agency and our nation at international conferences and meetings. Such visits impress upon me the extent to which nuclear energy is a global enterprise, with countless contributions from a very wide range of countries. At the same time, such visits are a sobering reminder that, while the United States originated much of the nuclear technology in use around the world, there are many situations in which the most modern applications of these technologies are now abroad.

Answers to, or expertise in, all our technical challenge areas no longer reside totally within our country. We have a great deal to learn from the international community in areas ranging from construction techniques, to reactor safety experiments, to reprocessing and recycling technologies, and to technologies applicable to new domestic plants. I don't mean to imply that we in the United States do not have much to contribute to the global community in these areas, however, the inescapable truth is

that we have much to gain from interactions with the international community in terms of improving the safety and security of our nation's power reactors and nuclear materials.

As nuclear power expands around the globe, the NRC must constantly encourage that this expansion be accomplished with strict attention to safety. Through our global interactions, we can and do exchange regulatory practices and technical information that enable safer operations in other countries; and it is equally true that we obtain information and data in these exchanges that enhance the safety of plants in this country as well.

As many of you know, spent fuel is currently being reprocessed internationally but not in the United States. The United States had a reprocessing program but ceased activities subsequent to President Carter's 1977 decision to defer indefinitely the commercial reprocessing and recycling of plutonium produced in our nuclear power programs due to the proliferation risk. Although President Reagan subsequently lifted this indefinite ban, further commercial reprocessing was not pursued, primarily due to cost considerations. As a result, there is limited domestic experience with commercial reprocessing and recycling.

For military purposes, the United States used reprocessing during World War II in the Manhattan project. Subsequently, the Atomic Energy Commission (AEC) encouraged private organizations to become involved in reprocessing. Commercial operation included the West Valley facility, which operated in the late 1960s and early 1970s, using the PUREX process. The facility reprocessed metal fuel from the Hanford N-Reactor and also performed a demonstration on thorium spent fuel. West Valley operations generally met regulatory requirements, although exposures were not as low as reasonably achievable, and radiation protection was a significant problem. The operator planned an expansion of West Valley to quadruple its capacity. Seismic issues were raised as part of the regulatory review, and these issues increased the estimated costs by over an order of magnitude. Based on the increased costs and the potential for significant competition from other companies, the operator decided to cease operations.

GE designed and built in 1967 a reprocessing facility in Morris, Illinois, utilizing a dry process for the main separations. The process relied on the volatility of uranium hexafluoride and was successfully demonstrated in the laboratory. Pre-operational testing at the constructed facility was not fully successful and it would have required major renovations for commercial operation. Given the projected costs and competitive reprocessing market, the operator decided not to pursue reprocessing at the facility. It is currently used as an independent spent fuel storage installation for wet storage of commercial spent fuel.

The Allied General Nuclear Services consortium constructed a third facility adjacent to the Savannah River Site in Barnwell, South Carolina. This facility planned to utilize an advanced PUREX technology. The facility conducted uranium testing but never operated due to President Carter's decision to indefinitely defer commercial spent fuel reprocessing. The facility is currently undergoing decommissioning. Other companies also planned reprocessing and recycle facilities. Two recycling facilities , Exxon and Westinghouse, were shelved in the late 1970s and early 1980s.

Currently, the country's 104 commercial nuclear reactors produce more than 2,000 metric tons of spent nuclear fuel per year. Under the Nuclear Waste Policy Act of 1982, the Yucca Mountain repository, for which the NRC awaits a license application, is currently limited to 70,000 metric tons of spent nuclear fuel and DOE defense-related wastes. By DOE's estimate, by approximately 2010, the

accumulated spent nuclear fuel generated by reactors operating to that date together with defense-related waste will reach this limit.

New approaches to management of the fuel cycle are being proposed and may significantly challenge the NRC. The DOE's Global Nuclear Energy Partnership (GNEP) is intended to develop the systems, technologies, and policy regimes to allow recycling of used light water reactor fuel and, to a large extent, eliminate the actinides in fast-burner reactors in a way that enhances proliferation resistance. The resulting waste streams are envisioned to have characteristics that would lessen the volume and thermal challenges for a geologic repository.

The GNEP initiative could involve several interconnected (and possibly co-located) facilities: (1) a Consolidated Fuel Treatment Center; (2) an Advanced Burner Reactor; and (3) an Advanced Fuel Cycle Facility. As currently envisioned, NRC would probably be the regulator for the Consolidated Fuel Treatment Center and the Advanced Burner Reactor, as these would be commercial enterprises. In addition, the NRC would need to be involved in development and operations of DOE's research facilities, such as the Advanced Fuel Cycle Facility, to be able to understand issues that may affect its licensing process. However, as the DOE is formulating this program, it is not yet clear at what stage in its evolution the NRC will be participating.

I will let other panel members and conference participants expand on the technical and political challenges, but I want to offer my perspective on some possible regulatory challenges.

I believe that NRC's regulatory role will depend largely on DOE's and industry's participation and on legislation. The interdependence of the facilities, that is, defining how each facility affects the safety, safeguards, quality, effectiveness, and efficiency of the others, will require involvement of multiple NRC program offices. We must ensure that a stable and reliable regulatory infrastructure is in place well before an application is submitted. Our challenge will be to (1) develop a regulatory framework for commercial GNEP facilities, (2) provide guidance to applicants, (3) develop qualified NRC staff to support a timely NRC licensing review, and (4) maintain an effective inspection program.

NRC staff has already begun to consider a path forward, including modification of existing regulations and possible new rulemaking to address the safety and security requirements needed for these new technologies. Also under consideration is development of specific GNEP regulations applicable to both fuel reprocessing and fast-burner "recycling" reactors.

As the NRC staff proceeds with development of a regulatory framework for possible reprocessing and recycling facilities and fast-burner reactors, policy issues will probably arise. Some examples are: (1) how defense-in-depth should be applied; (2) the level of safety necessary for the group of facilities; (3) the integration of safety and security; and (4) the site's emergency preparedness.

Addressing National Environmental Policy Act requirements will also be a challenge. One question will be whether to establish unique environmental impact statements for each facility or develop a generic environmental impact statement for the proposed fuel cycle management program.

Management of both high- and low-level waste from these facilities may challenge industry and the NRC. We face a monumental task to review a license application for a potential Yucca Mountain waste repository. Nevertheless, we stand ready to initiate this review when DOE submits its license application. Low-level waste issues may also present challenges in the future. Without adequate low-level waste disposal sites, as highlighted by the recent planned closure of Barnwell in 2008 to out-of-

compact states, the NRC would be faced, in all probability, with assuring that the absence of disposal capacity for such wastes does not translate into unsafe storage of such wastes by generating organizations.

When the price of uranium fell in the early 1980s, conventional uranium mining production in the United States dropped precipitously. Many conventional mills ceased operations or closed permanently and began decommissioning and reclamation. Although conventional mills will continue to contribute to the supply of uranium, in-situ leach (ISL) facilities are the predominant source of domestic uranium production in the foreseeable future for both economic reasons and because of reduced surface environmental impacts. Since the requirements in 10 CFR Part 40 were issued, there has been no corresponding regulatory change addressing this emerging technology. As a result, much of the regulation for ISL facilities has been imposed by the NRC through license conditions.

There is currently one NRC-licensed, operating conventional mill and two mills that have ceased operation but expect to resume operation in the future. There are six ISL facilities that are operating or are licensed to operate. In addition, there are 14 conventional mills that have ceased operations and are in reclamation; two that have been reclaimed and transferred to DOE for long-term care; and one operating 11e.(2) byproduct material disposal cell. Based on discussion with the industry, the NRC expects a considerable increase in licensing activity, as many as 12 new applications, for both types of uranium recovery facilities in the foreseeable future.

Regulating ISL facilities in the absence of specific applicable regulations is becoming increasingly problematic and more complicated for the NRC. Examples of the issues include: (1) the potential environmental impacts of groundwater from the uranium extraction operation; (2) the application of 10 CFR Part 40 by the NRC to ISL facilities; and (3) the use of performance-based licenses.

I also see the need for human capital as a significant issue for the future development, management and regulation of the fuel cycle. NRC has experts in many of the core technical areas needed for licensing reviews of facilities for a spent fuel recycling program, including chemical engineers and ceramic engineers with experience in waste vitrification. Some of these experts have recent experience in reviewing license applications for related fuel cycle facilities (i.e., the MOX fuel fabrication facility). We have had recent success in hiring experienced chemical engineers, however, the NRC needs additional expertise in several specialty fields that would be needed for reviewing the advanced technologies used in a limited recycling facility. Specifically, the NRC needs additional chemical engineers (with a detailed knowledge of reprocessing), actinide chemists, plutonium chemists, and radiochemists. In addition, nuclear engineers with expertise in transmutation would be required to review fuel recycling facilities. Further, the NRC must also rebuild regulatory capabilities and the underlying scientific base to accomplish a future role in licensure of the fast-burner reactors.

NRC will also need to draw on the regulatory experiences in similar facilities, such as La Hague, MELOX, Atalante, and Phenix in France and Rokkasho and Monju in Japan. Other countries have significant operational experience with facilities similar to those proposed for GNEP.

In closing, for our part, the NRC must be a strong and independent regulator, and we will continue with the hard work of creating the needed framework to provide regulatory stability. In turn, we expect that the manufacturers, builders, and operators of current and future facilities will meet their obligations to the public as well. In this way, with all of us doing our jobs, nuclear energy may continue to play a valuable role in our nation's energy future.

# NRC NEWS

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No. S-07-025


## Newton's First Law of Physics

**Commissioner Jeffrey S. Merrifield**

**13th Annual Nuclear Generator & Executive Summit**

**June 13, 2007**

During the almost nine years that I have spent on the Nuclear Regulatory Commission, I am frequently asked how it was that I came to become a Commissioner. The simple answer is that I was working as an attorney on the Senate Environment and Public Works Committee, and I happened to be in the right place at the right time when they needed a Republican nominee for the Commission. Invariably, people then ask me what kind of training I undertook to become a Commissioner, which I typically answer that I have a background in science....political science.

Now, given that backdrop, I am sure that it would strike many of you as odd that someone of my pedigree would use as the title of my speech, "Newton's First Law of Physics." Well, the answer to that query is quite straightforward. Newton's First Law of Physics states that unless acted upon by an unbalanced force, an object at rest tends to stay at rest and an object in motion tends to stay in motion with the same speed and in the same direction. Over the last 27 years, the nuclear industry has seen an application of the latter part of that theory, particularly as it relates to the growth of nuclear power in our country. With the "unbalanced force" resulting from Three Mile Island, efforts to order and build new nuclear power stations came to a standstill, and nothing seemed to be able to change that status.

Malcolm Gladwell, in his best selling book, *The Tipping Point*, discusses the phenomena where events can align, and a single, sometimes seemingly simple event takes place that causes a major change in trajectory or outcome. I think Gladwell's theory is very relevant to what has happened to nuclear power in the United States. The need for baseload power in the mid-part of the next decade, dramatically increasing prices for carbon based fuels, significant domestic economic expansion, worries about energy security, decades of safe nuclear operation in the U.S., and an increasing concern about the global environmental impact of the use of carbon, all provided the perfect environment for a national reassessment about the use of nuclear power.

All that was needed was a tipping point, and in this case it was the Energy Policy Act of 2005, which caused a serious and real movement toward building new nuclear power plants in our country. Whether it was the production tax credits, the government loan guarantees,

regulatory risk insurance, or all three, a multiplicity of utilities have jumped into the fray jockeying to be among the first to order new nuclear plants for the first time in nearly three decades.

As many of you may know, our agency, the U.S. Nuclear Regulatory Commission (NRC), is anticipating that between now and the end of 2008, we may receive 17 Combined Operating License applications for almost 30 new units. Over the last year it seemed that each month brought with it a new utility announcing that it would climb aboard the new plant bandwagon. More recently, during visits I have made to Wall Street it has become apparent that investors and analysts, although somewhat slow off the mark in embracing this change, seem to be increasingly convinced that events have aligned to a point where building a new plant is economically plausible. Such a theory would have been heresy in New York just a handful of years ago.

As a Commissioner, I have the occasion to make frequent visits to the House and Senate, and I can easily say that the Congressional enthusiasm for nuclear power is the highest it has been since the late 1960s. While there remain a small number of steadfast opponents to nuclear power in Congress, even those who oppose it won't openly admit it. This is a far cry from the anti-nuclear platform endorsed by a large number of Members of Congress during the 1970s and 1980s.

Even the views of the environmental community have changed. Now I would not be so bold as to say that the environmental community is embracing nuclear power. However, the opposition to nuclear power within the environmental community is more tempered and less shrill than it was when I first came to Washington in 1986. Rather than utilize a sky-is-falling mentality, the environmental community is focusing on the cost of nuclear power plants and the ongoing debate on Yucca Mountain as the principle avenues of debate.

Currently, former NRC Commissioner Peter Bradford, on behalf of some anti-nuclear groups, has been trying to remind the Wall Street community and the press about the horrors of Shoreham and the plants that were built back in the 1980s. I don't know Peter Bradford, and despite all my travels over the last nine years, he and I have not crossed paths during that time. Nonetheless, I suspect that his views remain focused on his involvement in this arena during the Jimmy Carter era, and are not fully informed by the reality of what has happened at our agency and in this industry over the last 10 years.

Irrespective of what is happening to the opponents, what does all of this mean for the views of the public? Well, when you look at the polling data over the last 20 years you can see a dramatic switch in the overall views toward nuclear energy with today 60 percent to 65 percent of the American people voicing their support for building new plants in our country. While I suspect that one quarter of the American people will always oppose nuclear power no matter what, this industry has clearly been winning the battle for the silent majority.

When taken together, I think that we have seen a major shift relative to Newton's First law. Rather than staying at rest, in my view, this industry is in motion and will stay in motion. Absent some unforeseen event, I believe that we have approached the tipping point of inevitability that new nuclear power plants will be built in the United States. Today the topic, I believe, is not whether we will build new plants, but how many.

Now, that having been said, what does that mean for those of you whose companies have or will soon jump aboard the new build bandwagon. Adam Smith laid it out quite well in *Wealth of Nations* when he stated that, "the real price of everything is the toil and trouble of acquiring

it." For those of you who wish to travel down this path, your companies must be ready for what awaits you, and to the extent that you prepare well, you are more likely to be rewarded for your effort.

In that vein, I would like to raise a series of questions about what I believe is necessary to be successful in an effort to build a new nuclear power plant. To begin with, do you have the right team? Have you selected a group of staff who understand the NRC and appreciate the expectations of their NRC counterparts? Have you created a separate organization within your company to assure that you aren't weakening your ongoing operations or taking away from your operational focus? Have you asked your potential architect engineers and vendors about how they intend to meet NRC deadlines, and do they have an understanding of how to work toward NRC expectations? Have you given yourselves sufficient time and resources to prepare a combined license application that is robust and complete? Have you been communicating regularly with the NRC staff to understand their views and how NRC realignments may affect your effort? Have you done everything you can to minimize surprises in the application process?

Clearly, strong community involvement will be a key measure in a smooth effort to build a new unit. Have you done enough to engage with the local community in a meaningful way so that they have some ownership of the project? Do they really remember or appreciate what impacts construction of this magnitude can have on areas surrounding the plant? Have you fully considered the environmental impacts of the site, as this typically was a major impediment to construction the first time around? To what extent have you engaged with your regional EPA office to make sure they are aware of the impacts of your plans?

Emergency planning was a major point of contention at a number of plants previously built. Have you engaged with your local FEMA administrator, and are they aware of your plans? If you are building at a greenfield site, have you begun the dialog with the parties who will be new participants in the emergency planning process? Have you begun to think about where you will put all those new sirens?

Having the workforce needed to build these plants will be a key driver in making sure they are constructed on time and within budget. Are there sufficient qualified welders, pipe fitters and electricians in your region, and if not, from where will they come? To what extent is your company engaged with local technical schools and high school vocational programs? Have your unions and your workforce been involved in planning for this new wave of workers? If you have to hire people from outside your communities, what will be the response if they come from outside the U.S.?

Transmission has been a major issue at a number of sites, with delay times sometimes in excess of the NRC permitting process. Have you engaged with your counterparts in the wires business or at the Federal Energy Regulatory Commission? Are your regional and local system operators fully engaged with your plans? Is your offsite power supply sufficient to meet the needs of additional units that may be added at your site?

For those of you further down the line, do you have a good handle on where you stand in the queue to obtain the forgings needed to manufacture your vessel, your low pressure turbine, and for some of you, your steam generators? Has your staff checked the backlogs for tubes and motors, and how will those affect your construction schedules? While modular production methods have worked successfully in Japan, have you met with your potential vendors and are you confident in their construction methods? Have you begun planning for your future fuel load, and what country will be its source?

Now, I could go on and on, but I think you get my point. There is an old joke about a man in New York City who approached an elderly woman on the street and when he asked her how to get to Carnegie Hall, her answer was "practice, practice, practice." Well the corollary is that if you want to build a new nuclear power plant, you must prepare, prepare, prepare.

This is the final public speech I will be giving as a member of the Nuclear Regulatory Commission. It has been a wonderful nine years, and I have been proud to have been a Commissioner at our agency. I won't list for you the many areas of accomplishment we have engendered over these years, but I think that anyone who has been in this industry awhile will tell you we are a far, far different agency than we used to be.

As I leave, I would reflect on what has made us, this industry, successful in our interactions over the time I have served. Frankly, the key word is communications. I have a phrase that I have used with my staff over the years that I think is instructive of this effort: "I can only fix what I know about." For the Commissioners to be successful, they must work hard to learn about this industry, its participants, its stakeholders, the NRC staff, and the myriad of details that this arena touches upon. My success as a Commissioner directly resulted not only from a constant effort to learn, but also from the openness and engagement that I and my staff have had with the internal and external stakeholders, with whom I have made contact.

While I will be leaving, I would urge that you and the companies you represent remain engaged with the Commission and its senior staff. The more the Commission knows about what is going on out in the field and the impact of the decisions that they make, the better informed their decisions can be. You all make a significant part in maintaining that continued success.

It has been a delight to get to know this industry and its stakeholders. While I may be leaving my current position, I hope that whatever I do, I can remain engaged in this vitally important source of our nation's safety, security, and economic livelihood. Thank you very much.

# NRC NEWS

U.S. NUCLEAR REGULATORY COMMISSION
Office of Public Affairs Telephone: 301/415-8200
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No. S-07-026


**Edward McGaffigan, Jr., Commissioner**
**U. S. Nuclear Regulatory Commission**

**Acceptance Speech (In Absentia)**

**American Nuclear Society / Nuclear Energy Institute**
**Henry DeWolf Smyth Nuclear Statesman Award**

**May 25, 2007**
**NEI's Nuclear Energy Assembly**
**Turnberry Isle, Florida**

Good morning. My name is Ed McGaffigan, and I am speaking to you from NRC headquarters in Rockville, Maryland, on May 15th, 2007. I regret that I am not able to be with you in Florida today to receive the Smyth Award personally. And I am deeply grateful to Chairman Klein for doing me the honor of receiving the award in my name.

I receive this award with great humility and gratitude. I am not sure that I am deserving of the honor, particularly given the roster of those who precede me, people I consider giants in the nuclear field, starting with Dr. Smyth himself. I might have grown to giant status had I been given a bit more time on this Earth. That does not make me less grateful for having received this award today.

I am deeply grateful to Chairman Klein for nominating me and to Admiral Bowman for supporting my candidacy. And I'm sure many others did as well. I am grateful for the recognition of a career of more than 31 years of service to this nation in which nuclear energy and nonproliferation policy have been my constant touchstones.

I started my service in 1976 as a young Foreign Service officer. I had the great opportunity to immediately work for George Vest, the State Department's political military director, who was chair of the Nuclear Suppliers Group created after the Indian event. I went on to serve my former professor Joseph Nye during the Carter administration as he formulated nonproliferation policy for President Carter and then had a two-year tour in Embassy Moscow, where I was also responsible for nuclear energy and other energy matters on behalf of the embassy.

All through my thirteen and a half years working for Senator Jeff Bingaman, supporting his work on the Senate Armed Services Committee, nuclear issues were a constant focus. We worked closely with Senator Pete Domenici, a former recipient of this award and a true giant, and his staff. And I believe we achieved some important legislative successes.

Senator Bingaman recommended me to President Clinton in 1996 to serve on this Commission. Nils Diaz and I were confirmed the same day in early August of 1996. And NRC has been my home since.

I believe that we as a Commission have achieved great success during the time that I have

served on the Commission. And I am proud of those achievements. But they were collective achievements. Our dedication, the dedication of every Commissioner and every NRC staffer, was always to the public health and safety. The new Commissioners, however, had some strong views about how to reform various Commission processes and move away from the often undisciplined and unconstructive approach that had been documented in the Towers Perrin report.

Our reactor oversight process today is a model for objective assessment of licensee performance, and for transparency of information for the public, among all regulatory agencies in all disciplines worldwide. We met the challenge of license renewal, despite great doubts. We met the challenge of processing license transfers promptly so the industry could consolidate, and in my view grow significantly safer. We revised our hearing process consistent with the law to make it more efficient while still entirely fair to intervenors. We met the challenge of 9/11 more vigorously and promptly than any other federal agency. And we have been praised constantly by our fellow homeland security agencies for the vigor with which we approach the issue.

I am proud to have served with such a talented group of fellow Commissioners. And while I may be the first of my generation to receive the Smyth Award, my hope is others will follow and that our successors, led by Chairman Klein, will be able to build on our meager accomplishments while meeting the enormous challenge of human capital, which NRC currently faces as my generation retires, and the enormous upcoming work load, which NRC will also face.

I am grateful for this award. I am proud to receive it. I am humbled at the honor. I pray that our nation is wise enough to embrace the promise of safe and secure nuclear energy in the decades ahead. And I am sure that my successors as Commissioners and the truly, truly dedicated NRC staff will ensure the safe and secure use of nuclear energy throughout this nation's history.

Thank you very, very much. God bless.

# NRC NEWS

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No. S-07-027


**NRC Chairman Dale E. Klein**
**Remarks as prepared for delivery**
**Browns Ferry Unit 1 Restart**
**June 21, 2007**

I know that this is a day of celebration for TVA, and I expect you are all excited about hearing from President Bush, who will speak in a few moments and will probably have some nice things to say about what you have achieved here and about the role of nuclear power in meeting the nation's energy challenges.

I would also like to add my congratulations. But since I am the head of the nation's independent nuclear regulatory body, let me choose my words precisely: Congratulations on successfully meeting the NRC's rigorous safety and inspection standards, and earning the authorization to restart Unit 1.

The NRC is a demanding regulator, and we hold our licensees to a high level of accountability for safety and security. The fact that the owners and operators of Browns Ferry met those standards is a testament to their diligence, attention to detail, and hard work.

The safe operation of commercial nuclear plants is a joint responsibility that requires the active cooperation of the utilities and the NRC. The successful restart of Browns Ferry Unit 1 is an excellent demonstration of what can be accomplished when everyone does their jobs well. Together, TVA and the NRC ensured that the restart we are commemorating today was accomplished safely.

In the five years since the owners announced their plans to restart Browns Ferry Unit 1, the NRC has sent more than 120 inspectors and staff to this site to oversee every aspect of the refurbishing. That is a serious allocation of resources, but it allows us to say with confidence that this plant meets our rigorous safety standards, and we consider it time and money well spent.

Obviously, TVA spent a lot of time to make this possible. But I hope William Sansom and Skila Harris will indulge me if I also take a moment to congratulate the skill, dedication, and hard work of the NRC staff. Altogether our agency's personnel devoted more than 60,000 hours to reviewing licensing requests and conducting inspections on Unit 1. This time was divided roughly in half between the regional office in Atlanta doing on-site inspections and our headquarters staff in Washington, D.C., reviewing licensing activities.

Now, 60,000 hours is a big number to comprehend. Since we are in Alabama, let me put it this

way: An 11-man football squad running drills for 6 hours a day, every day of the week, rain or shine, would take 130 weeks – or two and half years straight – to reach a combined total of 60,000 hours of practice time. That would be a lot even in Texas, where we also take football seriously.

So a great deal of effort went into approving this restart. But in a way, that is just the beginning – not the end – of the NRC's safety oversight responsibilities. Because from the first day of operations, until the last day of operations, this site will be under the constant watch of the NRC resident inspector's office.

Resident inspectors are the front lines of the NRC's safety oversight – our boots on the ground, so to speak. These are highly trained staff who live in the community, work on-site at the reactors, and are on call 24 hours a day, 365 days a year for operational oversight and emergency response. Their entire job is to make sure that the status of the nuclear plant is where it should be to operate safely. So on behalf on the Commission, I want to thank them for their hard work.

Now, I know there are other speakers lined up, including the man who nominated me to my current job, so let me conclude today's lesson in NRC safety oversight by thanking you for your attention – and saying, once again, congratulations.

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No. S-07-028


## Keeping the "Safe" in New Digital Safety System Designs


**Dr. Peter B. Lyons, Commissioner**
**U.S. Nuclear Regulatory Commission**


**Keynote Address**
**to the**
**IAEA International Conference on**
**Common-Cause Failures of Digital Instrumentation and Control Systems in Nuclear Power Plants**

**June 19, 2007**

### Introduction and Overview

I want to add my welcome to all of you in attendance at this conference and particularly to those who have traveled far. I am extremely pleased that you have made the effort to be here. I truly hope that you find this conference and its information exchanges beneficial in helping us all to better achieve nuclear plant safety through the benefits of digital technology. My remarks today represent my personal thoughts and not necessarily those of the Commission.

The common-cause failure theme of this conference is of great interest and importance to nuclear regulators throughout the world. Much thought and debate have been devoted to it for many years. I note and am encouraged that practical solutions have already been implemented to address it. However, the continuing advance of digital technology and the increasing world-wide interest in "all-digital" new nuclear plants have combined to make it imperative for us to continue constructive dialogue and the identification of practical and safe solutions. I believe that significant improvements to safety-system reliability can be gained through the use of digital technology, provided we don't lose focus on keeping the "safe" in new digital safety system designs.

### II. Historical Perspective

Let me start with some Nuclear Regulatory Commission (NRC) history that I have found to be very insightful in understanding this issue. Software-based nuclear plant safety systems deployed in the U.S. in the 1980s, such as the Combustion Engineering Core Protection Calculators or CPCs, were considered safe by the NRC, largely due to being designed as a single digital component of a much

more extended analog safety system. Thus, every safety function initiated by these CPCs had at least one analog backup. The use of CPCs enabled more precise computations of plant operating parameters, thereby reducing uncertainties and allowing greater operational flexibility. Because the analog channel was diverse from the digital channel and could equally and redundantly fulfill the safety function when needed, the question of common-cause failure of the digital channels was not a significant concern.

In the early 1990s, the NRC began reviewing advanced reactor designs developed by General Electric, Combustion Engineering, and Westinghouse. At about the same time, the U.K. regulator was similarly reviewing the Sizewell B design. I understand that great debates took place among these regulators, their advisory committees, and the nuclear and computer software industries. Such debates were far ranging across a wide spectrum of issues. Questions included whether it would ever be possible to estimate the probability of common-cause and other design flaws leading to software failure that could impact reactor safety. Technical questions were debated, such as whether "hard-wire" or analog backup instruments and controls were needed to implement the concept of diversity, or whether diverse digital systems would suffice. To help resolve these debates, the NRC commissioned a study panel of the National Academies of Science and Engineering.

The 1997 report from this study panel supported the NRC staff's approach that common-cause software failures were credible, and it recommended maintaining diversity in digital safety systems. The panel recommended that the staff not rely heavily on techniques, such as different programming languages, different design approaches meeting the same functional requirements, different design teams, or using similar equipment from different vendors. The recommendation was that the staff should emphasize more robust techniques, such as the use of diverse inputs and processing algorithms, diverse hardware, and diverse real-time operating systems.

The panel also agreed with the NRC position that common-cause failures could be addressed using diversity in a number of different ways dependent upon plant-specific factors, including use of diverse digital systems. In fact, designs certified by NRC in the 1990s permitted the use of an added non-safety-grade diverse digital system to address the common-cause failure potential for important safety functions. To me, this seems a relatively straightforward approach to address the issue of digital-system common-cause failure.

As most of you are aware, international approaches to addressing common-cause failure in digital safety systems vary widely, but most are grounded in the application of varying degrees of diversity and independence to safety system components and functions. In fact, I am aware that at least one design certification application being prepared now plans to incorporate a diverse analog backup safety system to address common-cause failures of the primary digital safety system.

I believe that there are very real safety benefits that can be achieved through the use of digital systems in nuclear power plants, but to address persistent regulatory questions regarding some of the new approaches being taken, the Commission recently directed senior NRC managers to engage industry and establish a project plan to address these questions.

So I'd like to further discuss some of my initial thoughts on the application of independence and design techniques such as functional diversity in the application of the defense-in-depth philosophy to digital safety systems.

## III. The Application of Defense-in-Depth Principles to Digital Systems

Digital safety and I&C systems have already demonstrated greater operational flexibility through (1) more precise calculations of plant parameters and safety margin and (2) greater reliability over analog systems by using features such as on-line diagnostics. However, ongoing advances in digital and human-machine interface technology can potentially lead to digital systems that more closely couple the various hardware components and software logic, thereby raising regulatory questions about the extent and adequacy of independence and diversity. In the U.S., the nuclear industry has argued that the familiar approaches to achieving defense-in-depth in electro-mechanical safety systems must be modified when they are applied to digital systems. I have considered that idea and offer the following thoughts.

First, we often use the term "diversity" and "defense-in-depth" as if they were two separate concepts. However, if defense-in-depth is viewed as the overarching objective, then diversity as well as redundancy and the implicit assumption of independence are three of its most important contributing elements.

We all know that traditional defense-in-depth concepts in the nuclear power industry often involve multiple and identical redundant electro-mechanical safety system trains, and in some cases, include additional diverse systems that can satisfy the same safety function, using alternative means. Inherent in these concepts of redundancy and diversity is the presumption of independence. Each train of each system that is capable of providing the safety function is designed to avoid being adversely influenced by the actions or failures of the other trains. Traditionally, for electro-mechanical systems, such independence has been achieved using separation: spatially, mechanically, electrically, and by utilizing separate sensors, communications, and controls. As redundant and/or diverse system components are designed to become more interconnected, and previously separate means of performing safety functions are combined into one system, it becomes increasingly important to understand the nature and effect of possible interactions between these components and to guard against unintended adverse outcomes. I believe the need to fully understand such effects is fundamental and, therefore, that it must also apply to digital safety systems.

The basic rule, as I see it, is that there are two determinations that need to be made. The first is to determine that the interconnections actually have a safety benefit. In some cases, designers may use interconnections for ease of installation or to avoid the need to redesign a commercially available system. Second, when two components of a system are designed to be more and more intertwined and coupled, greater and greater attention and effort must be paid to guarding against adversity while preserving the intended advantages of the coupling. From a regulator's point of view, we must continue to apply the fundamental concept of achieving defense-in-depth through, in part, independence of redundant and diverse safety system components. Independence and diversity are the key concepts, and there are presently no other safety concepts or approaches to take their place. As digital I&C system designers increase the number and types of software and hardware interconnections and resource sharing between components in pursuit of better overall system performance, the regulator must equally increase the scrutiny of how the designers have achieved the necessary independence and diversity to address common-cause and other failures.

I do not doubt that we can certify future digital I&C designs in which the treatment of common-cause failure may depart significantly from those designs already certified by the NRC, assuming full and proper attention is paid to the issues of independence and diversity, leading to adequate overall

defense-in-depth. The question for applicants today is one of whether at this point in time it is worth using significantly different digital-safety-system design concepts that raise new questions, which the designers, applicants, and regulators must ensure are addressed for adequate defense-in-depth. Although the NRC is actively working on updating our regulatory guidance in this area, current designers would do well to 'begin with the end in mind' and, at the very beginning, anticipate the regulatory safety case that must be made at the end.

I recognize that part of good regulation is being clear about the standard to be met. However, as standards become more precisely defined, they can often become more limiting. Given the continued rapid advance of digital technology, I worry about being an overly prescriptive regulator. Here I would emphasize that in setting its current standard, the NRC's definition of diversity can be applied at several levels, including at the component level of the digital safety system, or at the level of the mechanical systems that can provide the safety function, or even at the level of safety system functions themselves.

**IV. The Big Picture**

Common-cause failures are just one type of digital system failure. There are many more. So, I would like to turn to a discussion of the "Big Picture" view, encompassing the broadest definition of digital-system failure modes. We have found probabilistic risk assessments, or PRAs, to be a useful Big Picture tool, which are aimed at understanding overall system failure as a function of individual failures of system components following various initiating events. Such tools can help us better understand the risk of a system's operation in those cases in which it is impossible to test the overall system reliability. It is widely acknowledged that digital systems, beyond the simplest of designs, cannot be demonstrated as having achieved a minimum reliability standard through testing. So industry attention and NRC research is being devoted to examining whether it is possible to incorporate digital system failures into probabilistic risk assessment models.

A decade ago the great debate over this question was almost philosophical in nature. Today, the NRC is continuing to explore this question, and I cannot predict how it might be answered in the future. But I do know that in order to estimate the probability of failure of any system, digital or otherwise, for starters, you need to know how the various parts of the system can fail – individually, collectively, and synergistically. That is, each of the most basic elements of a probabilistic model must be defined before it can be given a failure probability or event likelihood. Such basic element failures are then logically connected to represent collective failures that could contribute to overall system failure. Synergistic failures must also be represented in the model and should include common-cause failures as well as consequential failures.

My point is that at the heart of these modeling assumptions is one fundamental assumption: that is, we assume that we have identified the basic failure causes, failure modes, and connections between failures. Given the complexity of digital systems, I believe that it might be helpful to create a catalogue of digital failures, organized to better enable industry and the NRC to systematically and methodically address each known failure mode, to coherently add to the knowledge base over time as operating experience accumulates, and, perhaps, to provide the basis for defense-in-depth evaluations, PRA models, or similar uses. At the highest level, such a catalogue might start with three broad categories of failure: hardware failure, software failure, and combined or synergistic hardware/software interactive failures. The message here is that a systematic approach to cataloging digital system functions and failures can be potentially very helpful to both the designer and the

regulator. This was also reinforced by the NRC's Advisory Committee on Reactor Safeguards, highlighting the need for an inventory and classification of digital software systems to support our analysis of the susceptibility of these systems to failures.

A second important Big Picture issue is the need for gathering, sharing, and using digital-system operating experience. The need to broadly share such experience was also emphasized by the advisory committee. Useful insights can even be obtained from experience with non-safety digital systems and from outside the nuclear industry. The U.S. stands to benefit from such international efforts as we move toward deployment of new plants. The U.S. should also provide increasing contributions to such a base of knowledge. The infrastructure for managing this sharing of experience is already beginning to take form, but must be managed to ensure we do not duplicate efforts and that we capture the most useful information. I am aware of the COMPSIS and OECD/NEA initiatives in this area and hope that as we move forward we continue to collaborate and stay coordinated. The Big Picture is that sharing operating experience becomes even more vitally important for systems where testing cannot be expected to "shake out" all the potential failure causes and modes. Thus, the NRC is working closely with other international regulatory bodies to learn and to share insights.

A third Big Picture issue for the NRC is that currently we are addressing the regulatory challenges of digital systems by using the test and analysis capabilities of our national laboratories, universities, and international research centers, as well as our own staff resources. The research through such varied contractor arrangements is conducted in a case-by-case fashion in which research topics are not always fully or efficiently integrated where appropriate. This approach has made regulatory improvements slower than we need them to be to keep up with advancing digital technology and the science of human-machine interface approaches. In addition, in a recent report prepared by the Idaho National Laboratory for the Department of Energy addressing the need for I&C and human-machine interface to support DOE's advanced nuclear energy programs, the lack of a national simulation facility to provide a test bed for the nuclear industry is discussed.

To close this gap, the Commission has directed its staff to begin a public dialogue on the potential benefits and challenges of a research, test, and evaluation facility in the U.S for digital safety system applications. My hope is that such an integrated facility would create synergies and efficiencies not evident in our current approach. Also, I believe this could better attract new graduates and experienced professionals in this highly competitive field. Possibilities include the participation of other government agencies and industries in examining issues, including hardware and software configuration, system requirements, maintenance approaches, normal and adverse environmental conditions, faulted condition performance, and a variety of human-machine interaction approaches, all evaluated under controlled conditions representative of those in nuclear facilities and in other safety-related applications outside of the nuclear industry.
I am pleased to announce that this dialogue will start with a public workshop to be held (tentatively) in Atlanta, Georgia, on September 6 and 7, 2007. More information is available from our NRC website at www.nrc.gov. I hope you will consider attending or at least letting your colleagues know about it.

## V. Closing

So in closing, let me again emphasize my key points:

First, today's and tomorrow's digital technology can be put to good use in improving the effectiveness of human-machine interfaces and the precision by which we monitor and control reactor parameters to maintain safety at all times.

Second, reactor designers, and digital safety and I&C system designers in particular, must begin with the safety end in mind and recognize the fundamental regulatory principles that will ultimately need to be satisfied. These require achievement of adequate defense-in-depth based, in part, on independence of the means to satisfy each safety function. The goal to keep the "safe" in digital safety system design is absolute and must be met. To achieve this, we must find the appropriate ways to apply the concepts of redundancy, diversity, and independence with digital system designs.

Third, designers, researchers, and regulators need to be systematic, methodical, and thorough in identifying and cataloguing all the ways that digital systems can fail. We need to share these insights broadly, deriving them from design work as well as from our collective operating experience.

Finally, regulators should continue to improve the clarity and usefulness of regulatory requirements and standards for digital technology and must find better ways of evaluating these new designs, which will surely continue to evolve into the future.

I am pleased that the Commission is taking an active role in ensuring that adequate attention is being paid to addressing these issues. Thank you for your attention, and I hope you have a very informative and productive conference.

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No. S-07-029

**Remarks Prepared for NRC Chairman Dale E. Klein**
**Society of Nuclear Medicine**
**Washington Conference Center**
**June 3, 2007**

In my capacity as Chairman of the NRC I often speak to nuclear reactor designers, power plant operators, electrical and metallurgical specialists, so I am fairly accustomed to addressing my fellow engineers. This morning, I have the opportunity—for which I am very grateful—to speak to health professionals such as all of you: physicians, medical chemists and physicists, and nuclear pharmacists.

Medical professionals and engineers often operate on a different plane, and speak a different language. Yet these two very different fields represent, in a sense, the twin oversight responsibilities of the Nuclear Regulatory Commission: civilian nuclear reactors and nuclear materials used for research, medical applications, and other purposes.

When you mention the NRC, most members of the general public know that our agency helps ensure the safe and secure operation of America's commercial nuclear power plants. These plants currently supply about 20 percent of all the electricity generated in the U.S., and according to what industry tells us, we may be receiving license applications for as many as 27 new plants over the next few years.

The importance of ensuring the safety and security of these plants is so obvious that I don't think it requires further elaboration—even to an audience of non-engineers! But while these plants generate a lot of power, they also tend to soak up a lot of publicity. So the other part of what we—and what all of you do—doesn't always get much attention. That's unfortunate for several reasons, one of which is that if more people understood the nature of radiation, and the important role it plays in our everyday lives, they might be less afflicted by what you might call "radiation phobia."

I am gratified, then, by this opportunity to talk a bit about how nuclear materials used in medical applications—in fields ranging from cardiology, to neurology, oncology, radiology and many more "ologies" I probably don't even know about—are helping people all over the world live better, longer, healthier, and more comfortable lives.

At the NRC, we are very proud of the work we are doing to help ensure the safe and secure use of nuclear materials for medicine. It also has a personal meaning for many of us. Some of you may know that my fellow Commissioner Ed McGaffigan has been battling melanoma for over seven years. I cannot make a medical evaluation of Ed's condition. But from what he tells me, and from what I

have seen myself, his treatment protocol – including Gamma Knife therapy – has had a remarkable effect on prolonging and improving the quality of his life to this point.

So, as I say, this topic has a personal meaning for many of us at NRC, and I want to thank all of you who have been involved in making these technologies possible

Now, as those of you in the medical community seek to push the frontiers of nuclear medicine even further, it is our job at the NRC to ensure that this happens in a way that protects everyone involved: you, the patient, the public, and the environment. Our mission is to provide a stable, predictable, and realistic regulatory framework for the use of medical isotopes and other nuclear materials. I cannot emphasize enough how important it is that the NRC and its licensees uphold robust standards of health and safety to manage radiation risks. As I constantly remind our licensees in the nuclear power sector, an accident or significant nuclear event anywhere would have lasting consequences for all of us. That is the kind of publicity we don't want to generate.

To help us do this, the NRC needs something from you: your continued participation, communication, and feedback. The full involvement of all stakeholders is essential to informing and improving the regulatory process... making our activities and decisions more effective and efficient... and reducing unnecessary regulatory burden. We need you to help us understand the unique and ever changing characteristics and needs of the medical community. It is especially important that we receive early input on new and unique medical applications of radioactive materials so that we can be better prepared for any resulting or required reviews and license applications.

Although regulating the diverse medical community is challenging, I can assure you that we seek to have a balanced approach—where all stakeholders have equal opportunity to participate and influence the process. Enabling the medical use of radioactive materials in a manner that protects public health and safety and the environment requires a collective effort of the NRC, the Agreement States, and the medical community.

This duty to protect public health and safety by ensuring the security of radioactive materials has, of course, taken on a new urgency and a new focus since 9/11, not only for regulators but for licensees as well. I want to take this opportunity, therefore, to tell of you how much the NRC appreciates the medical community's serious commitment to this goal.

From the responses to the recently issued Increased Controls requirements, it is clear that the nation's hospitals, universities and medical clinics have made this a priority. In fact, thanks to many of you in this room, the progress of America's medical community toward increasing the security of the radioactive materials it uses has in some cases gone beyond what the NRC has prescribed. So thank you, and congratulations.

I don't mean to suggest that our work is done. Certainly, the NRC still faces significant challenges in the areas of knowledge management, and the need to have appropriately trained staff as we look to our future regulatory obligations. As part of our efforts to enlarge our workforce in the face of significant additional responsibilities, we are looking to develop new staff in nuclear materials and to effectively transfer knowledge from senior staff. It won't be easy, but I believe we are making good progress, and we will continue to develop the mechanisms to meet these challenges.

Now, I know that later in the conference NRC technical staff will be giving presentations on several topics, including:

- "How an NRC Inspector Conducts a Risk-Informed, Performance Based Inspection"
- "Medical Events and Other Radiation Safety-Related Incidents in a Nuclear Medicine Department"
- "The Energy Policy Act of 2005 and the NARM Rulemaking

It seems to me, therefore, that you will have plenty of time and opportunity to get into more specific detail on various NRC processes and procedures over the next few days.

So instead, let me address something that I think would allow each of us to do our work better: that is, helping to give the public a better understanding of nuclear materials and radiation in a broad sense. By this I mean an understanding that includes all aspects of nuclear and radiological issues: the risks and the benefits.

According to the preliminary findings of a study by the National Council on Radiation Protection and Measurements, the average individual's radiation exposure from medicine in the United States has increased six fold from around 54 millirem in the 1980s to over 320 millirem in 2006. This is primarily due to the greatly increased use of CT and nuclear cardiology procedures.

There are very real issues and grave dangers involved with radiation, and it is incumbent on all of us to lay them out in detail. I think you would agree that the public deserves to know what not to be afraid of, as well. I would urge all of you to go back and review your public education programs, and strengthen them, especially in light of NCRP's plan to publish its update later this year.

Last year, I visited the Port of Seattle and toured the radiation detectors operated by U.S. Customs and Border Patrol at the Port. Their primary mission is to examine cargo entering the U.S. that may contain nuclear materials that could be used in weapons or dirty bombs. They have excellent equipment and well-trained and motivated agents. Part of that training is to understand what is a real threat versus a naturally occurring source. They need to make decisions—at this one facility, they average 1600 hits per month. In fact, while I was there one cargo container triggered the alarms. It was a shipment of Chinese fireworks and isotopic analysis showed the culprit was potassium 40.

The Customs agents told me about one particular port that receives nothing but bananas – and virtually every shipment sets off the detectors. That struck a chord with me, because some of my fellow Commissioners have joked about creating the "standard banana" as a harmless unit of radioactivity. Commissioner Ed McGaffigan has frequently pointed out that we're all in violation of standards.

Ed said once in an interview, "We're self-radiating ourselves at 40 millirems per year because of the potassium 40 we carry in our bodies. Double beds -- your spouse will radiate you to about two to three millirems per year. Those are doses at which we actually regulate. And I've always wondered, when people [demand] tighter regulation, why they're not demanding that double beds be regulated, or bananas, or brazil nuts."

It would be helpful for the public to know these facts when, for instance, there is debate about increasing security for smaller radiation sources. All of us need to work to see that the public deliberation over these matters proceeds in a reasonable and risk-informed manner.

Without such understanding, we will continue to receive pressure to increase health and safety as well as security requirements to reach a "zero" risk level. Paradoxically, this would likely have the opposite of the intended outcome. It could actually decrease the overall health and safety of the US

population by imposing such restrictive requirements that the medical community would essentially be denied access to radioactive materials for nuclear medicine, thus preventing patients from receiving the beneficial treatments you currently provide.

So let me conclude by leaving you with this challenge: I would like to see a genuinely coordinated and concerted by those of you in the medical and scientific communities to inform the public, the media, your elected officials, and other opinion leaders about the causes, effects, risks, and benefits of nuclear and radiological issues. Give them the facts regarding both natural, background radiation, as well as the many purposes that scientific and medical applications of nuclear materials serve in our society.

This would make your work easier, and it would make the work we do at the NRC easier. And frankly, improving the level of understanding in public opinion is a worthy goal in its own right. Abraham Lincoln, who didn't know much about nuclear science but knew a lot about democracy said, "In America, public opinion is everything. With it, nothing can fail. Without it, nothing can succeed."

With that, let me conclude by thanking you for the invitation to join you this morning and share some thoughts with you. And I do hope you will heed my challenge. Since I have four years left on the NRC, I will have ample opportunity to check on your progress!

Thank again for your attention. Now I would be happy to take some questions.

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# NRC NEWS

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No. S-07-030


**Edward McGaffigan, Jr., Commissioner**
**U. S. Nuclear Regulatory Commission**

**Presentation of the**
**American Nuclear Society's**
**Distinguished Public Service Award**

**May 15, 2007**
**NRC Headquarters**
**Rockville, MD**

Left to Right: Commissioner Lyons, James Reinsch, ANS, Commissioner McGaffigan, Chairman Klein, Commissioner Merrifield, Admiral Bowman, NEI

MODERATOR REYES: I think we're ready. It is my privilege today to welcome Chairman Klein, Commissioner McGaffigan, Commissioner Merrifield and Commissioner Lyons. Welcome all to the NRC.

You know Commissioner McGaffigan has now been on the Commission for almost eleven years. We recently recognized him as the longest serving commissioner here. I've only been EDO for three years. It actually feels like eleven. So I can somewhat sympathize with that.

But I just want to reflect for a moment here. It really takes a unique individual to work in such a demanding position for such a long time. He is an advocate of the NRC. He's an advocate of the Commissioners and the staff. I think the Commissioner has been one of the contributors who built the NRC to what it is today being recognized as the best place to work in the government, and I'm glad to see Commissioner McGaffigan being recognized by such an elite organization.

Let me just introduce Chairman Klein for some remarks before we make the formal presentation. Chairman.

CHAIRMAN KLEIN: Thanks, Luis. This is one of the those happy days where you get to recognize a colleague who has contributed so much and thanks, Jim, on behalf of the American Nuclear Society for this award and, Skip, thanks for coming and fellow Commissioners.

This is a day where we get to acknowledge 31 years of public service. I think when you look at Commissioner McGaffigan he really reflects what it means to be a public servant in having done this for so many years. Obviously he came to the best agency for those last eleven years of public service. So we certainly appreciate that. But he's really contributed a lot not only to the Nuclear Regulatory Commission but for the public-at-large where he has really ensured that we have high standards, we do the right thing and it really ensures the public's health and safety. So on behalf of all of us, it's been a pleasure to be both a friend and a colleague. Thank you.

MODERATOR REYES: Thanks Chairman. I would like to make the official presentation here. On behalf of the American Nuclear Society, we have Jim Reinsch going to be making the presentation to the Commissioner.

MR. REINSCH: Thank you, Luis. Thank you. In 1963, the American Nuclear Society created the Distinguished Public Service Award and I'm pleased to be able to present that today to Commissioner Edward McGaffigan, Jr.

The Distinguished Service Award was established to recognize and honor a public servant who has demonstrated leadership in energy policy formulation and public enlightenment and has made significant contributions for the betterment of mankind in the national and international sphere of public service and I cannot imagine an individual more worthy of such an award than the Commissioner. For a second, what I'd like to do is just to read the plaque if I may. It says –

> "Presented to Edward McGaffigan, Jr. in recognition of the outstanding leadership he has provided in effective regulatory and security policy formulation and implementation. During his distinguished government service, he has also made significant contributions to nonproliferation and export control policies and to international scientific cooperation."

On behalf of the American Nuclear Society, congratulations.

COMMISSIONER McGAFFIGAN: Thank you very much. A couple of months ago, I told the NRC's Regulatory Information Conference that in nine out of eleven years speaking at that conference I had spoken from notes, not a prepared text. Today you get McGaffigan talking from notes. So bear with me. Today is going to be one of those talks where maybe you'll get some insight as to what makes me tick.

I'm also going to be receiving the ANS/NEI Smyth Nuclear Statesman Award, for which I taped a video this morning to be shown at NEI's meeting in Florida later this month. I said in that video that I did not feel completely worthy of that award, given the roster of giants who preceded me. But I do feel grateful and worthy of this award, and thank the ANS for recognizing me.

I know that only two people have previously received the ANS Distinguished Public Service Award, Mike McCormack and John Conway. John Conway is one of my heroes. I think he did a remarkable job as Chairman of the Defense Nuclear Facilities Safety Board (DNFSB), serving longer there than I have served at NRC. With $20 million a year, DNFSB does a tremendous job of ensuring safety and high standards at DOE nuclear facilities, and as I said, he's one of my heroes. Obviously, Congressman McCormack was a little early for me although he is a legend. So I'm delighted to join them. Like them, my career has been devoted to public service, and like them I believe I have built a record of accomplishments throughout it.

I'm going to tell you a little bit about my roots. When I first was in this room in August 1996 to be sworn in as a Commissioner, I talked a little bit about why I was here, how I got here, and a lot of it comes down to being the son of an Irish immigrant who passed away a long time ago, when I was a junior in college.

My father was one of my heroes. He came here from Ireland with fourth grade education. He served in WWII when he was 36 years old at the start of the war and had very bad knees because he had fallen badly while building the first Boston Garden. Despite very severe injuries to his legs, he served his nation, served in the Army in Europe. My grandfather, my mother's father, lived with us. He was also an Irish immigrant, first cousin of Michael Collins, the founder of the Irish free state, and a terrorist in the eyes of the British government. So I'm first generation on one side and second on the other.

And we're a nation that's been enriched by immigrants of all races and creeds. We're a nation that uses the patriotism instilled in me by my father and my grandfather, and their devotion to this country. The old country was great, but they had no desire to go back to it. This was the nation of opportunity.

We were poor, not really poor, but we were not wealthy. We were not even middle class. My mother worked as a bookkeeper. Obviously she had a tremendous impact on me, but it was a different influence, a more maternal influence, an influence of unquestioning love.

Because my father's union at the Boston Gas Company, where he worked after the war, was the United Mineworkers Union, I found out early on about people giving up their lives to dig coal out of the ground. And we still sacrifice too many coal miners' lives. I grew up reading the diatribes of John L. Lewis on the evils of big coal. My father was a person who fixed main gas lines when trouble arose. A big man. A strong man. I know that we have to have coal to produce electricity. I'm not against coal because 50 percent of our electricity generation comes from coal. But nuclear by every measure has been safer than coal, by every measure, enormously safer. In a global warming world, it's unfortunate that that is not the perception of nuclear among parts of the public.

So I grew up in Boston. I'm the son and grandson of Irish immigrants. I went to Boston Latin School, and while there found out I was pretty smart. I ended up valedictorian, with a Joseph Kennedy Scholarship, and the Ben Franklin Medal. And I was heavily influenced by the son of Joseph Kennedy, who entered the White House my first year at Boston Latin. How could you not be influenced by John Kennedy? How could you not be? Seventh grade is when President Kennedy gave his inaugural address and asked us to serve the country. "Ask not what your country can do for you – ask what you can do for your country."

I took that seriously. I also had the dream of being a Nobel Laureate in Physics, which I pursued first. That dream wasn't totally worked out of me until I got to Caltech for graduate school, and met Murray Gell-Mann and Richard Feynman and discovered that I'm not in their class and that I should probably look for other things to do. So I did that. I'm probably the only person in the history of Caltech to take the Foreign Service exam and pass it.

Why the Foreign Service? I had never been out of New England until I graduated from Harvard. Never been out of probably a 50 or 60 mile radius of Boston until I graduated from Harvard. Then I got this fellowship to go to Europe, the Sheldon Travelling Fellowship. Harvard gives two a year and I was lucky enough to get one of them. I flew to Europe on the first plane I had ever been on, and traveled in Western Europe. My fellowship lasted as long as the $3,000 could be stingily spent, which was about ten months. It was a tremendously broadening experience.

Then I went to Caltech. As I said, I discovered I was in a different class from their two Nobel Laureates, but I had this other thing I wanted to do, inspired by John Kennedy and inspired by my father and my grandfather, and by my year abroad.

I take seriously this notion that we are the greatest country on earth, and that the American Nuclear Society is really an international society. American is in its title, but we are a nation that

absolutely has benefited from immigrants of all nations and creeds. That's what makes us great.

I spent a couple of years at the Kennedy School after leaving Caltech. I needed to wait until the Foreign Service could process all the paperwork, although in my oral exam, I think my examiner didn't know what to do with me honestly because here's this guy that could actually pass the written Foreign Service exam with its emphasis on the social and political sciences but also could talk about science and public policy. My examiners pretty much guaranteed me that I'd get into the Foreign Service when I wanted to get in, but the clearance process would take time. So I spent two years at the Kennedy School, and did learn a tremendous amount, particularly in one course taught by John Steinbruner and the late Richard Neustadt.

Steinbruner had written a book called *The Cybernetic Theory of Decision*. I mentioned it at this year's Regulatory Information Conference back in March. Steinbruner teaches at the University of Maryland now, and what he wrote about in his book was how different people make decisions, and his book contains a warning. It's a warning that we must beware of people who are theoretical or ideological thinkers. It's a warning against ideological thinking. He tells a story and I'm not going to go through it here, but the heart of it is that we wasted vast amounts of money on a theory that the West Germans wanted to have access to nuclear weapons in the late 1950s and early 1960s. It's a story of how people in various Federal bureaucracies managed to resist the facts for many years and how in the end President Johnson and Prime Minister Wilson in 1964 cancelled this ill-conceived program that had been kept alive by theoretical thinking for so long. That book taught me to embrace rational fact-based analysis and to beware of theoretical thinkers who avoid facts that don't serve their theories.

I pulled out something last night. It's my first efficiency report in the Foreign Service written by George Vest who was one of the great Foreign Service officers of the post-World War II generation. He was Director of the Political Military Bureau and he selected me in June 1976 to be his staff assistant. It was the perfect first Foreign Service assignment for me and I was so lucky to get it.

What Mr. Vest wrote about me in December 1976 was very laudatory. In his cover letter where he's trying to get me an early promotion he wrote, "Every once a while I run into someone extraordinary among our Foreign Service officers." But the interesting part in the efficiency report is where he is forced to write something negative as well. So Mr. Vest in his inimitable way wrote the following. It starts even in this section with a compliment. "This is an exceptionally capable officer who demands (and habitually produces) perfection of himself. As he rises to positions of supervisory responsibility, he will have to guard against those barely perceptible flashes of impatience of those who are less gifted or less committed." I don't think I ever solved that problem. And I think Luis Reyes will probably be the first to confirm that.

Then the second point Mr. Vest made, which I do think I solved, was this. "As well, Ed has an unusually engaging, quiet and low key personality. Eventually, there will be circumstances where people mistake this for weakness and will try to take advantage of him. He may find it necessary to raise the decibel count of his personality from time to time." I think everyone would agree that although I am an introvert, I did take that warning to heart and solved it in the remainder of my career.

The other fact about me that I'm going to mention is something I learned very late in my service to Senator Bingaman, something about me which I didn't know. I took the Myers-Briggs exam together with the Senator and his entire staff. It was probably in 1995. Senator Bingaman likes to read about management theories sort of like everybody else goes through bacon at breakfast. But this was one time I really appreciated his bringing the technique to the office. I turned out to be a very strong Introverted Sensing Thinking Judging (ISTJ) in all four categories. The opposite categories were Extraverted, Intuitive, Feeling, and Perceiving.

I'll read you what the Myers-Briggs worksheet says about ISTJs: "Serious, quiet, earn success by concentration and thoroughness. Practical, orderly, matter-of-fact, logical, realistic and dependable. See to it that everything is well organized. Take responsibility. Make up their own minds as to what should be accomplished and work toward it steadily regardless of protests or distractions."

And I discovered upon getting those results a bit about my role for Senator Bingaman. Having

learned that rule at the Kennedy School from John Steinbruner to deal with facts as they are and not as you wish them to be, to not be a theoretical thinker, I now knew that that was probably embedded in my personality. I also learned that Senator Bingaman was an intuitive. And the great thing about intuitives, former Chairman Diaz was definitely an intuitive, is they need people like me to talk them out of things that are not fact-based.

And that explains part of my role here at NRC, as it was my role with Senator Bingaman. I think I have intuition, I will say defensively, because I really understand the processes of government and read voraciously in a broad number of fields that have touched my life. But that is a "sensing" personality. Intuitives can make leaps with far less data or no data at all, and sometimes they are right, but often they have gone too far. Intuitives need sensors. They need people like me. So that was my role with Senator Bingaman. I think it has been part of my role here at NRC.

I can accept this award with great gratitude and the feeling that perhaps I deserve it. I love this place. I love the career that I've had in government with the very, very fine people with whom and for whom I have worked. I think the American people don't understand how great our government is. We have a remarkable government, remarkable people. I'm glad that some of the NRC staff who are ANS members are here today. I particularly wanted to have some of you here, although the turnout may be less because we gave you so little notice.

We are a great institution. Government is a great place to serve. And the American people are well served by government on a daily basis despite the constant harping in news headlines about the misdeeds of the few. We have people in government who cheat, who try to take advantage of purchasing arrangements and those sort of things. But there are laws to punish the few who mis-serve and we enforce those laws vigorously. But the vast, overwhelming, 99.9 plus something percent of government employees are truly dedicated, work their hearts out and yet usually do not receive enough notice. So I accept this award on behalf of all the folks who are unknown and who serve their nation with distinction to their greatest ability.

I happen to have been born with a few things that set me apart intellectually, perhaps emotionally that have allowed me to get to this level. But there are lots of people in government who the American people should get to know other than by reading the *Washington Post* or *New York Times* or whatever scandal they're covering each day.

Thank you very much. I appreciate your presence at this ceremony. My understanding is that we will now move across the hall to the Commission dining room for some cookies and soft drinks. Thank you again.

MODERATOR REYES: For the record, Commissioner, I agree. You are well deserving of this award. Let me thank the American Nuclear Society for taking the time and recognizing Commissioner McGaffigan and his glowing career. Now we go to the official part. We would like to have a picture of the Commissioners. So I would like you to join us here and then after that, we invite everybody for some carbohydrates and something to drink.

# NRC NEWS

U.S. NUCLEAR REGULATORY COMMISSION


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No. S-07-031

**"A Look Ahead for NRC and the Industry"**

**NRC Chairman Dale E. Klein**

**Canberra User's Group**
**Indian Wells, CA**

**June 27, 2007**

Thank you.

You may have seen on the news that the President was in Alabama last Thursday to commemorate the restart of the Browns Ferry Unit One nuclear reactor. He toured the plant and congratulated the hard work of the TVA and NRC employees who supervised the safe restart of the plant after 22 years. The President also gave a speech that focused on the importance of expanding the use of nuclear energy to help solve the nation's growing energy needs and significant environmental challenges.

I also had the opportunity to speak to the TVA audience briefly. But since I am a regulator, and not an advocate for or against commercial nuclear power, I simply congratulated them on successfully meeting the NRC's rigorous safety and inspection standards, and earning the authorization to restart Unit One.

Many people regard this restart as a sign that the Nuclear Renaissance is under way. That may or may not the case. In any event, I can tell you that the NRC is quite busy. Let me give you some idea of what we are facing.

a. We've been told by industry to expect license applications for 27 new reactors in the next two years... and every day our Executive Director of Operations warns me to prepare for an even higher number.
b. To do that, we had to create an entirely new inspection office in Atlanta.
c. We are scrambling to increase our workforce by a net of 600 employees.
d. We urgently need 120,000 more square feet of office space at our headquarters.
e. With uranium at $130 a pound, we are hearing from a dozen companies expressing an interest in new mining operations in the U.S.
f. We are making plans to receive an application for the Yucca Mountain high-level waste repository, which DOE has said it plans to submit next year.

g. Our office in charge of international programs has its hands full dealing with the fact that nuclear energy has become, in almost every respect, a multinational business.

h. And all of that is on top of our regular workload of overseeing the safety of the 104 plants already operating in the U.S. and a large number of licensees using radioactive materials.

How are we dealing with all of his? Well, the Commission's most immediate challenge is finding and hiring the additional 600 full-time employees I mentioned—which we hope to accomplish by 2009. This significant expansion of our staff, in addition to ordinary employee turnover, means that we will have 1,200 new people at the NRC headquarters by 2009—nearly one-third of our entire workforce.

Obviously, this kind of growth and transition will not be easy. And given our serious and often complex regulatory responsibilities, hiring people is just the first step. In addition to finding qualified employees, we need to ensure that the staff is appropriately trained to handle our future regulatory obligations... including new reactor technologies, such as Digital Instrumentation and Control.

This demand for qualified staff is complicated by the fact that at the same time we are looking for qualified engineers and skilled workers, industry is also seeking to hire such people to meet its needs. But we have a comprehensive plan in place, and I believe that we will be able to meet the significant challenges we face in the areas of workforce development and knowledge transfer.

In the final analysis, I am confident that we will be prepared. I have assured Congress and industry that the NRC will not be a bottleneck. Notwithstanding the challenges I just outlined, our staff is highly professional, motivated, and dedicated. And in case you missed the announcement, we are the "Best Place to Work" in the federal government. So we will do our job, and we will do it well.

There is one thing that would make our jobs easier... and it is something that all of you can help us with. I am talking about the need to expand and refine the public's understanding about all things nuclear. You just heard Frederic Van Heems give a very good explanation of how the Nuclear Renaissance is unfolding. And I think that President Bush's visit to Brown's Ferry—and the significant media coverage of that visit—prove that there is a lot of interest in nuclear issues. But the fact that the media and the public at large are paying attention does not necessarily mean that they understand the issues as well as they might. And if industry doesn't explain these issues, then someone else will.

A few weeks ago I spoke to the Society for Nuclear Medicine, and I pointed out that because there is so much focus on the NRC's work on reactors, many people don't appreciate the other half of what we do—which is regulating the safe use of nuclear materials for research, medical applications, and other purposes. That's unfortunate for several reasons. If more people understood the nature of radiation, and the important role it plays in our everyday lives, they might be less afflicted by what you might call "radiation phobia."

There are, of course, very real issues and grave dangers involved with radiation, and it is incumbent on all of us to lay them out in detail. But I think you would agree that the public also deserves to know what not to be afraid of.

So I challenged the audience to become much more active in helping to give the public a better understanding of nuclear materials and radiation in a broad sense. This was a conference comprising several thousand health professionals. And I pointed out that as doctors, nurses and medical

technicians, they had a position of trust and confidence that could help them undertake this effort in a credible way.

But all of you are also in a unique position to educate the general population. Because so many of you here this morning are involved in radiation detection, analysis, and instrumentation, you are well equipped to help explain these issues clearly and concisely.

Now, as all of you know very well, the first step in explaining things properly is having the right metrics. So let me take this opportunity to propose a new calibration that you could put before your Standards Committee, and perhaps the National Institute of Standards and Technology. The new metric or quantification method that I am suggesting would be called... "The Standard Banana."

Many of you will know immediately what I am referring to, but let me tell you a quick story to put this in context.

Last year, I visited the Port of Seattle and toured the radiation detectors operated by U.S. Customs and Border Patrol at the Port. Their primary mission is to examine cargo entering the U.S. that may contain nuclear materials that could be used in weapons or dirty bombs. They have excellent equipment and well-trained and motivated agents. Part of that training is to understand what is a real threat versus a naturally occurring source. They need to make decisions—at this one facility, they average 1,600 hits per month. In fact, while I was there one cargo container triggered the alarms. It was a shipment of Chinese fireworks and isotopic analysis showed the culprit was potassium 40.

The Customs agents told me about one particular port that receives nothing but bananas – and virtually every shipment sets off the detectors. That struck a chord with me, because some of my fellow Commissioners have joked for some time about creating the "standard banana" as a harmless unit of radioactivity.

The public needs to understand there is such a thing as harmless exposure—which I think most people would grasp if you explain it in terms they can understand... like a standard banana.

My fellow Commissioner Ed McGaffigan has frequently pointed out that we're all in violation of standards. Ed said once in an interview, "We're self-radiating ourselves at 40 millirems per year because of the potassium 40 we carry in our bodies. Double beds -- your spouse will radiate you to about two to three millirems per year. Those are doses at which we actually regulate. And I've always wondered, when people [demand] tighter regulation, why they're not demanding that double beds be regulated, or bananas, or brazil nuts"—end quote.

It would be helpful for the public to know these facts when, for instance, there is debate about increasing security for smaller radiation sources. All of us need to work to see that the public deliberation over these matters proceeds in a reasonable and risk-informed manner.

Without such understanding, we will continue to receive pressure to increase health and safety as well as security requirements to reach a "zero" risk level. As I told the Society for Nuclear Medicine, this would likely have the opposite of the intended outcome. It could actually decrease the overall health and safety of the US population by imposing such restrictive requirements that the medical community would essentially be denied access to radioactive materials for nuclear medicine, thus preventing patients from receiving beneficial treatments.

Now, while the public education campaign I am talking about is important for the medical community, it is even more crucial for the commercial nuclear energy industry. After all, people trust their doctors... most of the time. But there is not the same reserve of trust for nuclear power plant owners. So one of the themes I have been reiterating in my speeches to industry representatives is the need to make sure that the senior executives of the power companies have a proper understanding of the technical issues involved in operating commercial nuclear reactors. These are generally people who are very well trained in business and management—and that is important, obviously. But if industry expects the Nuclear Renaissance to proceed smoothly, the executives who run the utilities also need to be able to communicate effectively about nuclear and radiological issues.

So let me conclude by asking those of you who really understand radiation to help in this effort. I would like to see a genuinely coordinated and concerted effort by those of you in the detection and instrumentation communities to inform the public, the media, your elected officials, and other opinion leaders about the causes, effects, risks, and benefits of nuclear and radiological issues. Give them the facts regarding both natural, background radiation, as well as the many purposes that nuclear materials serve in our society.

This would make your work easier, and it would make the work we do at the NRC easier. And frankly, improving the level of understanding in public opinion is a worthy goal in its own right. Abraham Lincoln, who didn't know much about nuclear science but knew a lot about democracy said, "In America, public opinion is everything. With it, nothing can fail. Without it, nothing can succeed."

With that, let me conclude by thanking you for the invitation to join you this morning and share some thoughts with you. And I do hope you will heed my challenge. Since I have four years left on the NRC, I will have ample opportunity to check on your progress!

Now I would be happy to take some questions.

June 22, 2007

MEMORANDUM TO: Luis A. Reyes
Executive Director for Operations

Karen D. Cyr
General Counsel

Frank P. Gillespie, Executive Director
Advisory Committee on Reactor Safeguards

FROM: Annette L. Vietti-Cook, Secretary /RA/

SUBJECT: STAFF REQUIREMENTS - COMDEK-07-0001/COMJSM-07-0001 - REPORT OF THE COMBINED LICENSE REVIEW TASK FORCE

The Commission has approved (in part and disapproved in part) the recommendations of the Combined License Review Task Force. The staff should expeditiously provide the Commission with plans for implementing the recommendations, as noted in the comments below.

The staff shall conduct a public meeting with external stakeholders to roll out its combined license (COL) review approach and to provide an overview of the New Reactor Licensing Program Plan. These discussions should occur prior to implementation of the recommendations. The Task Force Report should be released to the public.

Recommendation (1) The Commission has approved the proposal that the Commission itself will conduct the mandatory hearing (in the absence of legislation eliminating the requirement for a hearing even if a request for hearing is not made). The Commission continues to have the authority and discretion to request that the ASLBP conduct a hearing in a particular case. OGC should prepare a plan for the conduct of these hearings by the Commission modeled after the Browns Ferry restart meeting and the Calvert Cliffs and Oconee license renewal meetings.

Recommendation (2) The Commission has approved expansion of the scope and duration of the COL application acceptance review to include completeness and technical sufficiency reviews. The staff should ensure that the criteria used for this expanded scope of review are clear and transparent. In extending the duration of the application for acceptance review from 30 to 60 days, the staff should consider the start of the safety and environmental reviews from the date when the application is docketed (i.e., after the acceptance review when the application is determined to be complete and technically sufficient); not when the application is initially submitted by the applicant.

Recommendation (3) The Commission has disapproved the establishment of a 45-day public comment period for the Environmental Scoping Process and the draft Environmental Impact Statement.

Recommendation (4) The Commission has approved of the staff seeking additional opportunities to use Environmental Impact Statements completed by other government agencies for NRC COL reviews, to the extent they are appropriate and applicable.

Recommendation (5) The Commission has disapproved the Task Force's recommendation to create an Environmental Review Working Group at this time. A better use of staff resources would be augmentation of staff management and oversight of the national lab contractors. The NRC staff should conduct a public meeting with industry representatives and other stakeholders to give the public and stakeholders an opportunity to present their views on how to enhance the efficiency and effectiveness of the environmental review process.

Recommendation (6) The Commission has approved maximizing the use of electronic document management to eliminate the processing time for bound reports from the critical path on the schedule.

Additional Recommendation (1) The Commission has approved obtaining legislative authority from Congress to eliminate, from Section 189a of the Atomic Energy Act, the statutory requirement to conduct a hearing even if no one has asked for a hearing.

Additional Recommendation (2) The Commission has approved rulemaking to resolve issues that are generic to COL applications. The staff should propose to the Commission those rulemakings that will provide the greatest efficiencies, on such subjects as non-proliferation risks of nuclear power, the need for power, long term storage of spent fuel, reprocessing, and waste confidence and assess the impact of pursuing such rulemaking initiatives on the staff's ability to complete the COL reviews in a timely manner. Where appropriate, OGC should be given the lead on completing these rulemaking activities with whatever support from the appropriate staff offices may be needed.

Areas Needing Further Consideration In addition, the staff should investigate the following items as noted in Enclosure 4 to the Task Force Report.

1. The staff should consider applying Lean Six Sigma, or other appropriate techniques to identify additional process improvements in the safety portion of the COL licensing review.

2. The staff should consider how the schedule duration for the environmental scoping phase may be improved for COL applicants that reference an early site permit or a new plant site that is co-located with an existing nuclear power plant.

3. The staff should consider re-establishing environmental expertise on the staff when the workload becomes more predictable.

4. The Advisory Committee on Reactor Safeguards (ACRS) should consider pursuing efficiencies and effectiveness in the review of subsequent COLs by adopting a "delta" review approach but only after the completion of the first COL of each design type. The ACRS, with staff input from an expanded acceptance review, could focus their reviews on the significant differences between the reference COLs and subsequent COLs. These differences would likely include the site-specific design features of the facility, including security design features and emergency plans.

5. The staff should consider the use of public forums for constructive discussions on the

- New Reactor Licensing Plan and its proposed use. The purpose of these discussions would be to solicit additional recommendations on process improvements.

cc: Chairman Klein
Commissioner McGaffigan
Commissioner Merrifield
Commissioner Jaczko
Commissioner Lyons

June 27, 2007

MEMORANDUM TO: Luis A. Reyes
Executive Director for Operations

Frank P. Gillespie, Executive Director
Advisory Committee on Reactor Safeguards

FROM: Annette L. Vietti-Cook, Secretary **/RA/**

SUBJECT: STAFF REQUIREMENTS - SECY-07-0081 - REGULATORY OPTIONS FOR LICENSING FACILITIES ASSOCIATED WITH THE GLOBAL NUCLEAR ENERGY PARTNERSHIP (GNEP)

The Commission has approved proceeding with only Phase I of Option 1, subject to the comments noted below, to develop the regulatory framework by preparing the technical basis documentation to support rulemaking for Part 70 with revisions to Part 50 as appropriate, and a gap analysis for all NRC regulations (10 CFR Chapter I) to identify changes in regulatory requirements that would be necessary to license a reprocessing facility and advanced recycling reactor. At this time, the Commission does not support the plan to shift to Option 3 next year. As part of Phase I, the staff should provide the Commission with supplemental information that discusses how this regulatory framework and gap analysis will be performed and coordinated among the NRC organizations. The staff should provide the gap analysis and the technical bases document with recommended options on a path forward and an associated rulemaking plan, if appropriate, in a separate Commission paper after the DOE Secretary provides his June 2008 decision for the Global Nuclear Energy Partnership (GNEP) program and Congress determines the FY 2009 appropriations for GNEP.

During Phase I, the Office of Nuclear Material Safety and Safeguards (NMSS) should have the lead on the materials issues, but the reactor regulatory licensing review and oversight should be conducted by the Office of New Reactors (NRO) in concert with the Office of Nuclear Regulatory Research (RES), and other offices as appropriate. In addition, there will be security concerns that will need to be addressed in this effort by the Office of Nuclear Security and Incident Response (NSIR). As part of Phase I, the staff should clearly recommend with appropriate justification how the regulatory licensing review and oversight should be coordinated within the NRC organization.

For FY 2007, the staff resources should be limited to only the resources necessary to support initiation of Phase I. The Commission decided not to seek supplemental appropriations for FY 2008, but the Commission has no objection to very modest NRC funds being reprogrammed in FY 2008 consistent with the normal budget process. NRC FY 2008 funds for GNEP should be 1 to 2 FTE and the work should cover a first order gap analysis. Specifically for the advanced burner reactor, the first order gap analysis should use Clinch River as the starting point, and tabulate what rules clearly apply, what rules clearly do not apply and whether a gap exists and its relative size or complexity. No phenomena identification and ranking table analysis should

be conducted and staff should not identify any proposed regulatory resolutions because the U.S. Department of Energy has not yet defined the advanced technology nor the scope of its GNEP program. The staff should continue to pursue reimbursable agreements with DOE, which allows interactions with DOE and industry to learn about evolving GNEP technology.

Prior to commencing work on Phase II, the staff should submit another SECY paper which should include clear identification of how the staff would propose to accomplish implementation of the proposed regulatory structure within the NRC organization and address issues such as the applicability of the technology neutral framework for new reactors being developed by RES.

Given the uniqueness of these facilities and the licensing and communication challenges they will present, the staff should ensure appropriate outreach activities are conducted to obtain the view of relevant stakeholders such as local communities.

Separate from the rulemaking efforts, the Commission supports the RES's efforts in long-term research to develop and maintain technical expertise relevant to facilities of the type envisioned in GNEP, commensurate with DOE activities and subject to available funding.

In the coming years, the staff should ensure that the Offices of New Reactors, Nuclear Reactor Regulation and Nuclear Regulatory Research receive appropriate resources in future budget proposals to take the lead on examining those issues, commensurate with any progress DOE makes on development of the ABR.

The Advisory Committee for Reactor Safeguards should be the lead advisory committee for the burner reactor and reprocessing facility, and should work jointly with the Advisory Committee on Nuclear Waste and Materials on matters of common interest. The staff should note the discussions the Commission had with ACRS about the potential difficulties in coming up with a framework for licensing co-located closed fuel cycle facilities.

cc: Chairman Klein
Commissioner McGaffigan
Commissioner Merrifield
Commissioner Jaczko
Commissioner Lyons
OGC
CFO
OCA
OPA
Office Directors, Regions, ACRS, ACNW, ASLBP (via E-Mail)
PDR

June 26, 2007

The Honorable John Hall
United States House of Representatives
Washington, D.C. 20515

Dear Congressman Hall:

On behalf of the U.S. Nuclear Regulatory Commission (NRC), I am responding to your letter of May 1, 2007, regarding Entergy's formal filing of a license renewal application (LRA) for Indian Point Nuclear Generating Unit Nos. 2 and 3. Specifically, you express concern that Entergy has chosen to move forward with its application for license renewal. In your letter, you urge the NRC, if it accepts Entergy's LRA for review, to schedule and hold a robust series of public hearings in the communities surrounding Indian Point to hear concerns from the public first hand.

We value openness in our activities and seek opportunities for meaningful public participation in our licensing processes. Public participation is an important part of the license renewal review process. The NRC staff's license renewal review process includes multiple opportunities for public involvement, such as:

- A formal adjudicatory hearing process that allows any person who may be adversely affected, and who wishes to participate as a party in the license renewal proceeding, to file a written request for a hearing or petition for leave to intervene with respect to the renewal of the license.

- Meetings with members of the public to provide information about the license renewal review process.

- Meetings with members of the public as part of the environmental review to solicit comments during the scoping process and upon issuance of the draft environmental impact statement.

- Meetings with the applicant to present the NRC's inspection findings or to discuss issues related to the safety and environmental reviews, which members of the public are invited to attend. We will welcome the State of New York's involvement in these inspection activities.

- Meetings with the Advisory Committee on Reactor Safeguards, which members of the public are invited to attend.

- Correspondence with the applicant and other stakeholders during the license renewal review that is publicly available through our Agencywide Document Access and Management System.

In addition, the staff plans to enhance public communications during the license renewal process for Indian Point. For example, as part of our public outreach effort, the NRC hosted a government-to-government outreach meeting on March 20, 2007, for New York State elected officials and Federal, State and local agencies with an interest or involvement in Indian Point. During this meeting, the NRC staff presented information about the license renewal process and responded to questions. The staff will also hold an information meeting near the plant to discuss the license renewal process, in addition to the public meetings that are normally conducted as part of the environmental review process.

The Indian Point LRA is currently being reviewed by the NRC staff for acceptance for docketing in accordance with the requirements of Section 2.101 of Title 10 of the *Code of Federal Regulations* (10 CFR 2.101). Should the NRC staff determine that the application is acceptable for docketing, a schedule for the license renewal review will be established and will be made available to the public. To the extent that the substantive issues raised in your letter may affect the license renewal application, they will be evaluated during the course of the license renewal review.

We believe that public participation within the license renewal process, as outlined above, allows ample opportunity for interaction between the NRC staff and the public to address environmental and safety concerns that are within the scope of license renewal. If you have additional questions, the NRC staff would be pleased to meet with you or your staff to discuss the NRC's license renewal and oversight process.

Sincerely,

***/RA by Luis A. Reyes For/***

Dale E. Klein

Identical letter sent to:

The Honorable John Hall
United States House of Representatives
Washington, D.C. 20515

The Honorable Maurice Hinchey
United States House of Representatives
Washington, D.C. 20515

The Honorable Nita M. Lowey
United States House of Representatives
Washington, D.C. 20515

The Honorable Eliot L. Engel
United States House of Representatives
Washington, D.C. 20515

The Honorable Christopher Shays
United States House of Representatives
Washington, D.C. 20515

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
WASHINGTON, DC 20555-0001

June 11, 2007

NRC INFORMATION NOTICE 2007-21: PIPE WEAR DUE TO INTERACTION OF FLOW-INDUCED VIBRATION AND REFLECTIVE METAL INSULATION

## ADDRESSEES

All holders of operating licenses or construction permits for nuclear power reactors, except those who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel.

## PURPOSE

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice (IN) to alert addressees that a licensee identified significant wear marks on the outside wall of chemical volume control system (CVCS) stainless steel piping, which was subject to flow-induced vibration conditions. The licensee determined that the wear marks were caused by the interaction between the piping base metal and the properly installed reflective metal insulation (RMI). The NRC expects that addressees will review the information for applicability to their facilities and consider actions, as appropriate, to identify and address similar problems. However, suggestions contained in this IN are not NRC requirements; therefore, no specific action or written response is required.

## DESCRIPTION OF CIRCUMSTANCES

During a Catawba Unit 1 refueling outage conducted in the fall of 2006, the licensee identified multiple wear marks on CVCS field-run stainless steel piping (see Enclosure, Figure 1) that was downstream of the CVCS letdown orifices. The licensee determined that these marks were a result of abrasive wear between the stainless steel RMI end caps and the stainless steel piping. This abrasive wear was most probably caused by the known flow-induced vibration downstream of the letdown orifices combined with end cap to piping interaction. RMI is assembled by clipping short segments of insulation together. End caps are found at the intersection of each insulation segment, and these end caps are perpendicular to the pipe wall (see Enclosure, Figure 2). The licensee confirmed that the RMI end caps had been installed properly in accordance with plant procedures and vendor instructions. None of the wear marks around the piping were continuous for 360 degrees and most extended less than 180 degrees of the circumference. The deepest wear mark was one thirty-seconds of an inch. All of the CVCS piping with identified wear marks was located inside containment.

ML071150051

The licensee initially discovered three locations of base metal damage and completed weld repairs with subsequent radiographic testing for those locations. During the extent of condition review, the licensee identified an additional 81 discrete wear marks over a 150-foot length of pipe downstream of the letdown orifices. These additional wear marks were located at insulation end cap locations and were repaired by light grinding. The licensee performed ultrasonic testing of the repaired areas to confirm acceptable pipe thickness, and liquid penetrant testing to confirm the absence of any surface cracks. System piping stress analysis calculations were revised and evaluated with the new wall thickness measurements taken after repairs and inspections had been completed.

The licensee installed temporary stainless steel cuffs directly on the piping at the RMI end cap locations to provide a physical barrier so as to prevent piping wear during the next operating cycle. In some locations, where the cuffs could not be installed, the licensee placed fiberglass insulation pads. The placement of additional fibrous insulation inside containment was evaluated by the licensee in accordance with site-specific emergency core cooling system sump debris calculations. During the next scheduled refueling outage in 2008, the licensee plans to install modified RMI that will eliminate the sharp end cap to piping interaction. The licensee plans to inspect for similar piping wear at Catawba Unit 2 no later than the next scheduled refueling outage scheduled for the fall of 2007.

## DISCUSSION

There is no regulation or industry code requirement for licensees to periodically remove insulation from the affected CVCS piping and visually inspect for piping degradation. The affected portion of piping is classified as an American Society of Mechanical Engineering (ASME) Class 2 piping segment. Section XI, Subarticle IWC-2000 of the ASME Boiler and Pressure Vessel Code, requires a system leakage test and visual examination (VT-2) once every inspection period (3 years); however, the ASME Code does not require the removal of pipe insulation when performing system leakage tests or VT-2 examinations. The licensee at Catawba Unit 1 had planned to remove only the RMI needed to accomplish a CVCS valve replacement when workers discovered the abrasive wear. Otherwise, the abrasive wear of the CVCS piping could have continued undetected and led to a more significant reduction in piping wall thickness, and potentially a through-wall leak.

## CONTACTS

This information notice requires no specific action or written response. Please direct any questions about this matter to the technical contacts listed below or the appropriate Office of Nuclear Reactor Regulation (NRR) project manager.

*/RA by TQuay for/*

Michael J. Case, Director
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

Technical Contacts: Justin D. Fuller, Region II
404-562-0598
E-mail: jdf@nrc.gov

John Tsao, NRR
301-415-2702
E-mail: jct@nrc.gov

Enclosure: Catawba Unit 1, Chemical and Volume Control System Piping

Note: NRC generic communications may be found on the NRC public Web site, http://www.nrc.gov, under Electronic Reading Room/Document Collections.

## CONTACTS

This information notice requires no specific action or written response. Please direct any questions about this matter to the technical contacts listed below or the appropriate Office of Nuclear Reactor Regulation (NRR) project manager.

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Michael J. Case, Director
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DISTRIBUTION: IN Reading File

ADAMS Accession Number: ML071150051 * Indicates concurrence via e-mail

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Catawba Unit 1, Chemical and Volume Control System Piping

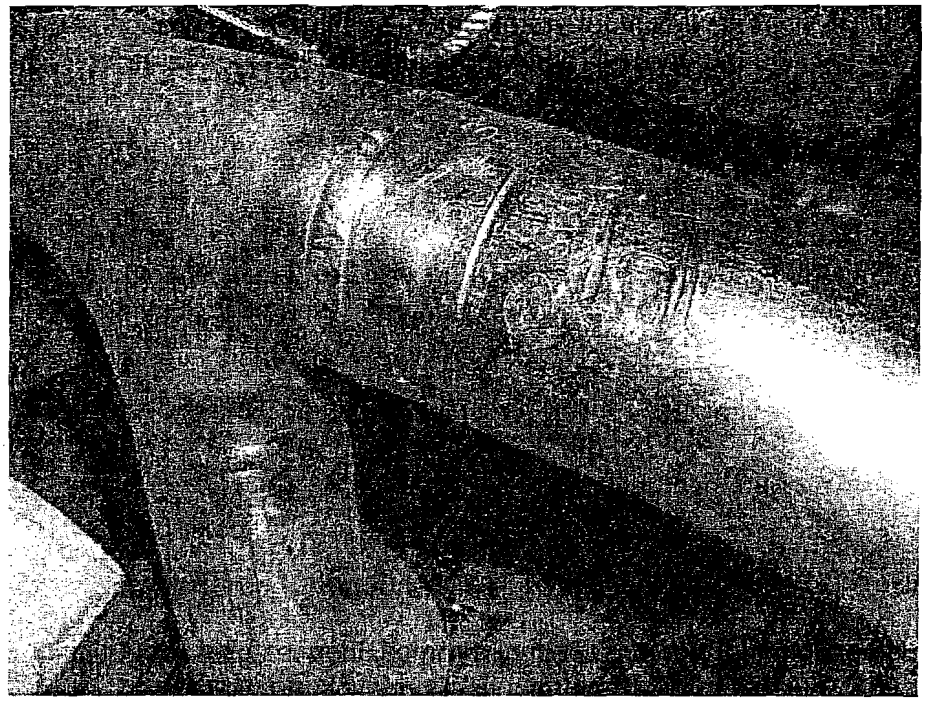

Figure 1: Wear indications identified on CVCS Letdown Piping

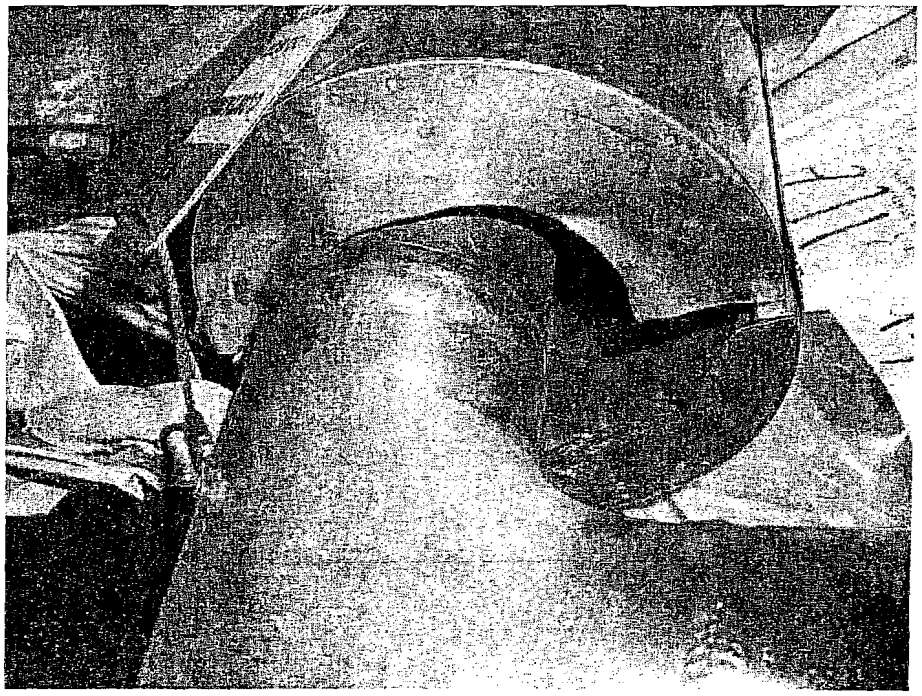

Figure 2: Insulation End-Cap to Pipe Interaction

Inside NRC

Volume 29 / Number 13/ June 25, 2007

# Industry seeks information on accident study

Power reactor operators are not likely to volunteer to participate in NRC's reactor consequences analysis unless they receive more detailed information on the project and its information needs, industry representatives told agency management at a meeting last week.

Launched last fall, the state-of-the-art reactor consequences analysis, known as Soarca, will be conducted by NRC staff and contractors from Sandia National Laboratories over the next three years, and the results used to predict the consequences of potential accidents at commercial US reactors. The goal is to provide more detailed and accurate quantification of accident consequences, using up-to-date methodology and plant-specific data to replace decades-old analyses such as Nureg-CR/2239, a 1982 report prepared by Sandia to assist in the siting of potential future reactors. That report has been strongly criticized by Commissioner Edward McGaffigan and some agency staff as being overly conservative (INRC, 30 Oct. '06, 1).

The two staff papers detailing plans for the analysis, and the commission's guidance on implementation, have not been made public. In December, Chairman Dale Klein denied a request by the Union of Concerned Scientists that the documents be released, saying they contained sensitive information. The Nuclear Energy Institute, on behalf of the industry, submitted 45 detailed questions on Soarca in a November 29, 2006 letter to NRC (INRC, 25 Dec. '06, 9) but has not yet received a reply.

At a June 19 meeting of NRC's probabilistic risk assessment (PRA) steering committee, Anthony Pietrangelo, vice president for regulatory affairs at NEI, said that the industry supports the goals of Soarca. But he said it was "hard to

enlist volunteer plants when you don't have something to show them" that describes how the analysis will be carried out and what types of specific information will be required from licensees.

Peach Bottom and Surry will be the first two plants assessed in the Soarca, partly because a good deal of accident consequences information is already available from previous analyses for those plants (INRC, 14 May, 12). But it "could be a fair amount of work to support the project," and "it becomes a more intensive effort" for subsequent plants that did not participate in the earlier assessments, Biff Bradley, risk assessment director at NEI, said at the meeting. John Monninger, deputy director for probabilistic risk and applications at NRC's Office of Nuclear Regulatory Research, said at the meeting that agency staff will respond to NEI's list of questions in a public meeting to be scheduled later this summer, but 90 to 95% of the staff's plans for Soarca have already been discussed publicly at previous meetings.

**Incentive needed**

Pietrangelo also said there needs to be "some incentive" for licensees to volunteer their plants to participate in the analysis, and also a way for them to "protect their interests." He suggested that participating licensees be allowed to review staff's assessments of their plants before the analysis is completed. The intent is not to give plant operators a "yea or nay on the project," but to allow them to verify the accuracy of results for their plant, Pietrangelo said.

Monninger said that the staff "definitely appreciates" the need for such reviews, noting that "it is very important for us to allow this ... to make sure plants are properly modeled." How this would work in practice must still be determined, however, because "we don't want to release preliminary, unverified results," he said.

Industry representatives also urged that Soarca be expanded to a risk analysis which also quantifies the probability of reactor accidents. Pietrangelo said the project "ought to be a safety study, not a consequence analysis," and said there is "concern" in the industry "about how this is going to be used in the public arena." McGaffigan and others have criticized earlier consequence analyses, such as the 1982 siting study, for detailing consequences of accidents without also assessing their probability, making the studies prone to abuse by opponents of nuclear power. Brian Sheron, director of NRC's Office of Nuclear Regulatory Research, said he is "not sure we can do anything" to quantify probabilities for the accident scenarios to

be reviewed in the Soarca, partly due to resource limitations. Sheron said that he will see if staff can develop a document describing Soarca which could be provided to licensees that might be interested in volunteering their plants for the analysis —***Steven Dolley, Washington***

# Some PWR sump issues remain as December deadline nears

Despite the approaching December deadline for PWR licensees to upgrade their containment sumps, a substantial number of technical issues must still be addressed, NRC staff told industry representatives last week.

Michael Scott, chief of the safety issues resolution branch at NRC's Office of Nuclear Reactor Regulation, noted in slides accompanying his presentation at a June 19 public meeting that there are still "significant common strainer hydraulic design and testing issues for licensees to address," as well as a set of "remaining technical questions or concerns ... obtained through informal elicitation of [the] NRC team evaluating the issue."

These issues fall into two categories, Scott said. The 11 issues in the first category should be "addressed by licensees as applicable to their plant configurations," and include hydraulic input and design criteria, scaling, testing protocols related to the effects of containment chemistry on debris generation after a loss of coolant accident, near-field settlement of debris, and "other design considerations." The second category consists of questions NRC staff raised that are not expected to trigger any industry actions at this time, Scott said in his presentation.

The chemical effects issue remains the most nettlesome (INRC, 30 Oct. '06, 4). Ervin Geiger and Robert Tregoning of NRC's Office of Nuclear Regulatory Research (RES) and Paul Klein of the Office of Nuclear Reactor Regulation (NRR) said in slides accompanying their presentation that NRC had conducted "an external review of NRC-sponsored research in chemical effects during 2005-2006," and a phenomena identification and ranking table (PIRT) exercise had "identified and evaluated 108 chemical phenomena." Forty-one of these issues were ranked as "unique with at least one high importance ranking," they said.

A joint NRR/RES team evaluated each of the 41 unique items, and determined that 34 of those phenomena are "potentially deleterious," the staffers said. Fifteen of those issues "can be dispositioned based on available technical information or planned industry evaluations," but 19 issues "merit additional analysis by NRC and industry," they said. "Most issues have been previously communicated to industry," and NRC staff "plans to develop technical justification supporting disposition of all issues," they said. The

issues not previously identified are "potential for biological fouling" within the emergency core cooling system, "possible additional debris contributions from spalled reactor fuel deposits created by post-LOCA chemical effects," and "coating dissolution," the staffers said in their presentation. "Industry evaluations are not currently expected to address these previously unidentified phenomena," they said. Initial evaluations of the remaining issues will be provided by August or September and completed by December, the staffers said.

John Butler, director of safety-focused regulation at the Nuclear Energy Institute, said in a June 20 interview that "all remaining issues need to be identified up front or as quickly as they are known, and discussed with the industry," because "we are reaching the final throes" of resolving the PWR sump safety issue. "Activities that are under way currently" at PWRs "have the potential to be impacted by any issues arising late in the process; therefore, the earlier they arise and are discussed, the better," Butler said.

Some of the issues that affect sump strainer testing now being conducted by vendors have "the potential to delay the conduct of testing ... if it's necessary to modify the testing protocol or testing facilities to address the issues," Butler said.

Scott said in an interview last week that "at this point, we still expect the licensees to be done by the end of the year," unless they have already received extensions beyond the December 31 deadline, as a few licensees have. No additional licensees have so far requested extensions based on the new set of issues, Scott said last week, but "one participant at the meeting asked how many are considering sending in a request for extension" and "quite a few hands went up. I imagine a number of utilities are considering whether they can make [the deadline] or not. The fact that we continue to have issues identified will be challenging for some," he said.

"If a licensee is concerned about its ability to complete these actions" by the end of the year, Scott said, "then they need to correspond with us."—*Steven Dolley, Washington*

# Use of licensee PRAs in ROP unlikely, but NRC open to SPAR improvements

Although no decision has been made, NRC management appears to be unwilling to accept industry's proposal to use licensee probabilistic risk assessments to determine the safety significance of inspection findings under the agency's reactor oversight process, or ROP. However, agency staffers said at a meeting last week that they welcome suggestions on improving NRC's risk models.

An industry-NRC staff working group has held three meetings over the last several months to consider industry's proposal to use licensee PRAs in the significance determination process, SDP, of the ROP (INRC, 5 March, 3). Industry has complained that licensee PRA calculations of the risk of various SDP findings sometimes differ from those of NRC staff using the agency's standardized plant analysis risk, or SPAR, models. On some occasions, the licensee PRA results suggest that a "green" finding would be appropriate, but staff's SPAR model results support a more serious "white" finding (INRC, 25 Dec. '06, 1).

Under the four-color system in the ROP, green findings indicate low safety significance and mean that performance is meeting all "cornerstone" objectives. There are seven safety cornerstones, although NRC no longer publicizes current information about the physical protection findings. Findings that are white, yellow and red equate to increasing levels of risk significance, and result in increases in NRC oversight. At a June 19 meeting of NRC's PRA steering committee, Anthony Pietrangelo, vice president for regulatory affairs at the Nuclear Energy Institute, said that having a licensee's PRA be "the model of record" for the SDP would "incentivize" licensees "moving more expeditiously" to improve the quality of their PRAs to meet standards recently promulgated in Revision 1 of Regulatory Guide 1.200, issued in January.

Gregory Krueger, senior manager for risk management at Exelon Nuclear, said that different risk models "can get widely varying answers," given the very low probability of the events being assessed, yet NRC is using such results to "draw a line" between green and white determinations in the SDP.

Rather than being risk-informed, in accordance with commission guidance, the SDP as currently implemented is

"risk-based" — that is, heavily reliant on quantitative SPAR model results, Pietrangelo said. The problem "gets worse when the scope of the PRA is expanded" to include fire, seismic, and other events, Pietrangelo said.

"We have a risk-based process that looks at a wire-thin threshold" between green and white findings, which represents a significant "diversion of resources" and is "not consistent with the intent of the ROP as it was laid out," Pietrangelo said.

Biff Bradley, risk assessment director at NEI, said that there "should be value for all that work" that licensees have undertaken and will undertake to improve their PRAs, but it "seems like it's getting discounted" by NRC staff's resistance to industry's proposal. Given that 40 to 50 licensees are or will be developing fire PRAs as they transition to a voluntary, risk-informed approach to fire protection regulation, known as NFPA 805 (INRC, 23 Jan. '06, 1), "NRC will have no choice but to use licensee models" because there are currently no SPAR fire models, Bradley said.

While accepting the need to update and improve SPAR models, NRC management at the meeting appeared unreceptive to industry's proposal. John Grobe, associate director for engineering and safety systems at NRC's Office of Nuclear Reactor Regulation, said that "the SDP issue isn't the modeling, it's the assumptions that go into the model" and how those assumptions are considered in determinations. But "how decisions are made, and the difficulties that go into the decisions at the regulatory conferences, have nothing to do with the models," Grobe said.

Another concern was raised by Gary Holahan, deputy director of NRC's Office of New Reactors, who said that the key issue is "who's responsible for the decision" and whether NRC should have "the capability to do independent analysis" using its own models. When there are specific issues with NRC SPAR models, the agency and industry "can deal with those problems" by updating and improving the SPAR models and the data and assumptions that go into them, Holahan said.

Industry's proposal blurs "two different arguments," Holahan said. One relates to the "technical quality of SPAR models," and the other is that "you don't like how we regulate" under the ROP, he said. Stuart Richards, a senior manager at NRR, made a similar point, saying that industry is making this proposal because it has previously been unsuccessful in changing the ROP process and wants there to never be another white finding. Licensees perform their own

PRA assessments of proposed SDP findings "because they don't like the result and want to drive it to green," Richards said. Pietrangelo disagreed strongly with Richards' characterization. Even if licensee PRAs were to be used instead of SPAR models in the SDP, NRC staff still would "have review and approval of the final outcome. We've never said anything different," Pietrangelo said.

But NRC managers appeared to remain skeptical at the end of the discussion. "Your proposal won't sell," Holahan said at one point. Aparently referring to the commissioners and the executive director for operations, Holahan said "I don't know one EDO or five other guys who will buy it," and that's "a fundamental problem."

Brian Sheron, director of NRC's Office of Nuclear Regulatory Research and chairman of the steering committee, suggested that another meeting be held to review the matter.—***Steven Dolley, Washington***

Inside NRC

Volume 29 / Number 14 / July 9, 2007

# Commission tells staff to go slow in developing GNEP licensing rules

The NRC Commissioners last month directed the staff to launch a limited effort to prepare for licensing of fuelcycle facilities under DOE's Global Nuclear Energy Partnership.
In their individual vote sheets and interviews, the commissioners chose a course more cautious than the one the staff had proposed, largely because of questions about DOE's ability to implement GNEP on the timetable the department had laid out. GNEP is a multi-decade program to develop new types of reprocessing plants and fast reactors.

The staff proposal (Secy 07-81) also recognized the "programmatic uncertainties" and suggested a "measured regulatory approach" to GNEP licensing (INRC, 11 June, 1).

Under that plan, development of the regulations for GNEP facilities would proceed in two stages. The first phase would focus on developing the technical basis documentation to support rulemaking for licensing a reprocessing plant while looking at a potential rulemaking for a fast reactor. In the second phase, the staff would develop a regulation applicable to both facilities. But moving to the second phase would have depended on a number of factors, including the level of congressional funding for GNEP. Also, as the staff said, the picture for GNEP is likely to be clearer after the secretary of energy

makes a decision, scheduled for June 2008, on how to proceed with the initiative. But in a June 28 staff requirements memorandum, SRM, the commission said the staff should dispense with phase 2, at least for the time being, and pursue phase 1 in a more limited way than the Secy paper suggested. In the SRM, the commission said it "has no objection to very modest NRC funds being reprogrammed" in fiscal 2008 to support "1 or 2" full-time equivalents, or FTEs — a standard measure of staffing requirements in the federal government.

The staff proposal had estimated that the FY-08 work would require 19.95 FTEs, with 12.8 FTEs from NRC and 7.15 FTEs from DOE. The NRC funds would have to come from "supplemental appropriations or some other means," since the administration's FY-08 request does not include funds for that effort, the staff said.
But the commission said it has decided not to seek supplemental appropriations for FY-08. According to the staff paper, NRC had requested FY-08 funds for the GNEP effort, but the White House Office of Management and Budget removed that item from the final version of the budget request.

The SRM said the staff should pursue technical basis documentation that would support rulemaking for 10 CFR Part 70, which governs the licensing of special nuclear material, and with revisions to Part 50, which covers the licensing of production and utilization facilities.

The SRM gives specific instructions on how the staff should proceed with its analysis of gaps in the current regulations for the fast reactor. The staff should conduct a "firstorder gap analysis," using the Clinch River Breeder Reactor as the "starting point," the SRM said. Congress terminated funds for that project, by DOE and its predecessor agencies, in 1983. According to the SRM, the staff should "tabulate what
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rules clearly apply, what rules clearly do not apply and whether a gap exists." If there is such a gap, the staff should analyze its "relative size or complexity," the commission said. It added, "No phenomena identification and ranking table analysis should be conducted and staff should not identify any proposed regulatory resolutions because the US Department of Energy has not yet defined the advanced technology nor the scope of its GNEP program."

**Multiple uncertainties**
In a July 3 interview, Commissioner Gregory Jaczko emphasized the uncertainty of GNEP plans. DOE has not

determined what reprocessing and fast-reactor technology it will use. Jaczko said it would not be sensible to design a regulatory regime for a technology that "may or may not appear." For the NRC, he said, it is an issue of "properly using resources."

Other commissioners also raised the issue of resource allocation. Jeffrey Merrifield, whose term as commissioner expired June 30, said in his vote comments that the NRC "cannot afford to let GNEP become our highest priority." The agency's staff "should not overreact to every public statement or expressed interest by DOE" and should be "very careful and diligent in determining what existing actions are delayed as staff is reassigned to support GNEP." Merrifield cited a DOE estimate for a three-year NRC review and hearing process as "overly optimistic." More broadly, he invoked DOE's "long and spotty track record for accurately predicting how long major projects will take to complete." The staff proposal said a license could come to NRC "as soon as FY 2010." That projection, the staff said, was based on DOE's plans for having a reprocessing plant and fast reactor in operation in 2020 and assumed six to seven years for construction and three years for the NRC review and hearing process. Further complicating the picture, said Commissioner Edward McGaffigan, are uncertainties over congressional support for GNEP. "Today GNEP appears to lack the level of congressional support needed to keep it on the schedule DOE had hoped to sustain," McGaffigan said in his vote comments. The House and Senate Appropriations committees both have voted to provide far less than the $405 million that the administration requested for GNEP for FY-08. The House appropriators would spend $120 million on the program, while their Senate counterparts would provide $242 million.

More broadly, McGaffigan said, GNEP must be able to survive "multiple Presidents and numerous future Congresses." To do that, he said in a July 3 interview, the program will have to be developed "rationally" and acquire bipartisan support.

At some point, McGaffigan said, there may be a national consensus to proceed with the kind of program DOE has laid out — and when that happens, NRC has to be ready. But "we'll know a few years ahead of time" and can gear up then, he said.

For now, he said, the message is "Everybody, just catch your breath" and "do the best you can" with limited resources.

In his vote comments, McGaffigan said he did not foresee a license application for a GNEP facility being submitted "before the second quarter of this century, much less 2010." He said, "My personal view is that, while the US may someday want to close the fuel cycle, the technologies are not ready today and there is no need for and great technical risk in the sort of crash program DOE wants to pursue." Commissioner Peter Lyons, in a July 5 interview, said a closed fuel cycle is "an appropriate goal for the country to be working towards," and, therefore, an appropriate focus for NRC. If there is a nuclear renaissance, he said, "to me it is quite clear" that the country should be moving towards a closed fuel cycle.

But he said he wanted to be "very cautious" about "proceeding too far down the path" while GNEP remains "undefined" in its technology and time frame. Another key issue for NRC, he said, is the nature of industry's involvement. In DOE's original description of GNEP in February 2006, the program was to be developed primarily at the department's national laboratories. But in August, DOE proposed a shift that would give industry a greater role earlier in the process (NuclearFuel, 14 Aug. '06, 1) DOE is now considering industry proposals on how to do that.

Another factor, Lyons said, is putting in place an NRC workforce with the knowledge necessary to license the type of fuel-cycle facilities that GNEP would require — a point he made in his remarks last month to the Global Nuclear Fuel Reprocessing and Recycling conference (NuclearFuel, 18 June, 1). In the interview, he said the staff would have to be "substantially augmented," but he emphasized NRC was "not starting from zero."

NRC Chairman Dale Klein joined Jaczko, Lyons and Merrifield in voting to proceed with phase 1. McGaffigan voted against it.

**Positive reactions**

The commission vote should give assurance to GNEP critics that NRC will not be "irrational" in the way it deals with the program, McGaffigan told Platts. Citing in particular Edwin Lyman, a senior scientist with the Union of Concerned Scientists and a frequent critic of NRC, McGaffigan said the issue of GNEP is "one case where Lyman is right in many respects."
Lyman, in a July 5 interview, praised the NRC's approach as "eminently sensible." The commissioners are more "rooted in reality" than is DOE about the "challenges ahead for GNEP," he said. The SRM, he said, reflects an "awful lot of pessimism" about GNEP's ability to come to fruition on

DOE's current timetable.

Steven Kraft, the Nuclear Energy Institute's senior director of used fuel management, said the NRC is "hitting the tone we would hit." NEI has not taken a position on what the GNEP schedule should be but has said DOE's approach should be "broad" and "flexible," allowing consideration of a range of technologies, he said. In the near term, NEI believes there should be a "well-defined research program," he said. Kraft said NEI supports "advanced technology development," which is not necessarily the same as GNEP. In addition to its fuel-cycle research and development, GNEP includes a number of other elements, such as an international effort to supply fuel to countries with good nonproliferation records as an incentive for them to refrain from pursuing proliferation-sensitive technologies.

DOE spokeswoman Angela Hill said of the commission decision, "As the department continues to move forward with efforts supporting GNEP, NRC has taken an important initial step in approving the development of a regulatory framework within which commercial GNEP facilities could be licensed."

**Looking ahead**

The SRM also set down some guidelines for possible future work on GNEP. The GNEP licensing should involve not only the Office of Nuclear Material Safety and Safeguards, but also the offices of New Reactors, Nuclear Regulatory Research and Nuclear Security and Incident Response, the commissioners said. As part of phase 1, the staff should work out how to coordinate the involvement of the different offices, the SRM said.

Also, the SRM said, the staff should submit another Secy paper before beginning work on phase 2.

The commissioners referred to discussions they previously had with the Advisory Committee on Reactor Safeguards on the pros and cons of co-locating the GNEP facilities on one site. That discussion, at a June 7 briefing of the commission by the ACRS, noted the security benefits of avoiding transportation of material from one site to another, but also the potential drawbacks, from the viewpoint of quantitative health objectives, of placing multiple facilities together. Lyons, in his comments said the staff's phase 2 vision for an integrated GNEP regulation "has merit." McGaffigan thanked the staff for identifying "many important issues which would be urgent if GNEP technologies were mature and the GNEP effort were likely to proceed on a fast track."—***Daniel Horner, Washington***

# Staff questions use of EPRI tornado code

licensees' applications of an agency approved computer code for analyzing potential strikes by tornado generated "missiles," or debris, at power reactors have led industry to say it would prefer that staff's concerns be addressed as a generic issue rather than on a case-by-case basis.

The computer code in question, known as Tormis for tornado missile, was developed by the Electric Power Research Institute in the early 1980s. Tormis uses probabilistic Monte Carlo techniques to facilitate plant-specific tornado missile probability assessments, according to a bibliographic citation on EPRI's web site. In its October 1983 safety evaluation report, or SER, NRC staff concluded that the Tormis methodology is "well conceived and well developed and can

be utilized when assessing the need for positive tornado missile protection for specific safety-related plant features," the staff said in its September 2001 safety evaluation of an application of the code by Southern Nuclear Operating Co. at its Farley plant.

Thomas Boyce of the resource management branch in NRC's Office of Nuclear Reactor Regulation, or NRR, said in a July 2 interview that NRC staff questions about licensees' applications of Tormis have "been around for quite some time." In a few recently submitted license amendment requests, Boyce said, licensees applying Tormis "weren't necessarily using it in a manner consistent with our previous regulatory positions."

John Segala of the balance-of-plant branch at NRR said in the same July 2 interview that less than half of power reactor licensees have used Tormis to support their license amendment requests, or LARs, but he does not know the exact number. Some recent LAR submittals "haven't provided adequate information to address" requirements specified in NRC's 1983 SER approving Tormis, Segala said.

In the last year, the staff has issued requests for additional information on four applications using Tormis, from Byron, Davis-Besse, Kewaunee, and Waterford, Segala said. A

number of issues are arising about licensees' application of the code, "and they do cross-cut amongst multiple applications," he said.

Scott Burnell of NRC's Office of Public Affairs, who also participated in the July 2 interview, said that it seems some licensees "are not familiar with how Tormis is intended to be used, and the type of information that needs to be supplied," and NRC staff is "coming to the conclusion that there seems to be a lack of corporate knowledge out there about exactly how to use this code."

Segala said that staff's concerns relate to specific applications of the Tormis code, not to the validity or reliability of the code itself. Currently, Tormis issues are dealt with on an application-specific basis, but "if we continue to see these problems, we may consider issuing some sort of [generic] communication," he said.

**Industry questions staff approach**

Michael Schoppman of the Nuclear Energy Institute said at a May 23 public meeting between NRC staff and NEI's licensing action task force, or LATF, that the staff has raised issues regarding applications of Tormis with about 10 to 20 plants, but its concerns are "actually a generic issue." A single licensee may have to spend about $300,000 to resolve such issues for its plant, Schoppman said. Tormis-related questions are an example of an issue that "gets resolved quasi-independently 14 times," rather than generically, which is "very unsatisfying," he said.

Referring to such Tormis issues, NEI said in an attachment to a May 18 letter to Michael Johnson of NRC's Committee to Review Generic Requirements that "if the NRC now finds it necessary to question licensees about their interpretation of the tornado missile licensing basis, it should use a generic process rather than a series of non-standard, plant-specific licensing actions to do so."

"Affected licensees have been given an untenable choice between initiating open-ended plant-specific analyses without benefit of a documented regulatory basis and withdrawing the LAR. In most cases licensees will withdraw the LARs because they do not have the resources to act as a pilot plant for resolving a generic issue," NEI said.

"There is a reasonable likelihood that the issue is not risk significant, yet there has been no attempt to establish ground rules for using risk-informed evaluation methods," NEI said.

A technical review of Tormis issues "with stakeholder input would be the most efficient and effective way to derive standard acceptance criteria that could be implemented by all affected licensees by using the consolidated line item improvement process," NEI said. Under the CLIIP process, approved in 2000, NRC develops and approves generic safety evaluations of proposed technical changes that licensees can cite in their license amendment requests. "The objective should be 'one issue, one review, one resolution,'" NEI said.

Schoppman said in an interview last week that NEI is currently attempting to define the scope of the Tormis issue and the number of plants affected. He said that the task force is drafting a white paper on this and other generic issues of concern, which he hopes will be ready for internal industry review by the end of July (INRC, 28 May, 7). The paper will probably not be finalized in time to be discussed at the LATF's July 25 meeting with NRC staff, so industry is likely to request a separate meeting in August or September, Schoppman said.—***Steven Dolley, Washington***

# Near-criticality accident in 2006 draws congressional scrutiny

House Energy and Commerce Committee Chairman John Dingell is demanding the NRC explain an agency policy that delayed it from publicly reporting a serious accident that almost led to a criticality event at a fuel fabrication facility last year.

NRC's first mention of the March 6, 2006 accident at the Nuclear Fuel Services plant in Erwin, Tennessee came earlier this year in a paper the NRC staff was preparing to send to Congress. But the facility wasn't identified by name in the draft annual report on abnormal events, in which NRC is required to disclose incidents or accidents that could have a significant impact on public health or safety.

The staff's paper (Secy 07-37), dated February 22, did not identify where the accident took place because of purported security reasons. But when it came time to vote on approving the report's release to Congress, Commissioner Gregory Jaczko said the agency should not refrain from naming the facility's location. He indicated in his March 6 vote sheet that the public would be able to figure out that NFS was the facility since it is licensed to downblend high-enriched uranium, or HEU. He also said that information about the plant is publicly available in press releases and other documents available on NRC's web site.

Jaczko's insistence on naming the plant, agreed to by the other commissioners, is the only reason the NFS plant was identified as the site of the accident in the final report sent to Congress on April 27.

In the report, NRC said the accident was precipitated by workers who had drained some filters and then failed to tightly reseal them. That caused the next transfer of HEU solution through the transfer line to leak into a filter glovebox, it said. The report said about 35 liters (about 9 gallons) of HEU solution were released. The solution spilled over the glovebox, onto the floor and down "uncontrolled" drains, according to the report.

Dingell's July 3 letter to NRC said the leak was discovered only after a supervisor spotted yellowish liquid streaming into a hallway from under a doorway. NRC's report said supervisors at the plant had dismissed earlier reports from workers that there was yellowish liquid in the glovebox,

believing it was natural uranium solution that had been used for testing.

NRC said in its report that the size and shape of the glovebox, and the lack of controls, made a criticality accident possible. The report also said a criticality event could have occurred on the floor where a pool of solution accumulated in an elevator pit. "If a criticality accident had occurred in the filter glovebox or the elevator pit, it is likely that at least one worker would have received an exposure high enough to cause acute health effects or death," the NRC report said. In fact, Dingell said in his letter that it was a "matter of luck" that there hadn't been a criticality accident, since it would have taken only a "mere few inches" of HEU solution in either the glovebox or the elevator pit to start the chain reaction.

After receiving the report, Dingell, a Michigan Democrat, said his committee staff began investigating why it took NRC 13 months to publicly disclose information on the event. NRC staffers told the committee that the agency had a 3-year-old policy to withhold information on the NFS and BWXT high-enriched uranium processing plants related to DOE's Naval Reactors program. But the August 2004 staff memorandum detailing the NRC policy to keep those records "official use only," or OUO, was itself marked "OUO" and not publicly available.

"Thus, the public and Congress have been kept in the dark regarding NRC's decision to withhold all documents regarding the NFS plant from public view," Dingell said in his letter to NRC Chairman Dale Klein, which was co-signed by Bart Stupak, also a Michigan Democrat and chairman of the Energy and Commerce Subcommittee on Oversight and Investigations.

Dingell and Stupak agreed security-related information should be withheld. But, they said, "NRC went far beyond this narrow objective with its August 2004 OUO policy when it acceded to the Naval Reactor program's request to withhold all information that is neither classified nor safeguards related. As a result, NRC has removed hundreds of otherwise innocuous documents relating to the NFS plant from public view."

OUO is a category of information NRC considers to be sensitive unclassified non-safeguards information — or what it calls Sunsi. A December 2005 commission document says, "Licensees are not required to protect OUO information. It is the equivalent of company proprietary information and licensees may share the information at their discretion."

Dingell and Stupak said there might be other consequences stemming from NRC's policy to conceal information on the NFS plant. NRC might have "exposed itself to unnecessary litigation by denying the public its due process rights ... when it withheld public notice of NRC's February 21, 2007, Confirmatory Order that modified NFS's Special Nuclear Materials License," they said. Because the order was not made known, the public did not have the opportunity to request a hearing, they said.

In its report to Congress, NRC said it had issued an order to NFS that required "specific actions designated to address this and other performance issues at the facility." It did not give any specific information about the mandated actions but said it conducted three "readiness reviews" before allowing the facility to restart. It also said NFS removed all the piping affected by the accident and filled concrete in the elevator pit.

Dingell and Stupak said in their letter that they had been told by NRC staff that the agency has decided to reissue the notice of the February confirmatory order. The Michigan lawmakers urged NRC to do so quickly, and also to publicly release all documents that have been inappropriately withheld because of the 2004 OUO policy. They sent a page of questions to NRC about the policy and asked for responses by July 11.—***Jenny Weil, Washington***

# Operability guidance revised for some classes of power reactor piping

NRC last week issued interim inspection guidance on assessing the operability of certain classes of piping at power reactors, but industry wants the new guidance to apply to "high-energy fluid system" piping as well.

Industry had previously expressed dissatisfaction with what it sees as overly strict agency guidance on determining the operability of systems, structures or components exhibiting leakage, warning that the NRC staff guidance expressed in a regulatory issue summary, RIS 2005-20, could expose up to 37 units at 23 sites to the risk of "immediate" shutdown if leakage is detected in certain systems (INRC, 28 May, 1). In a June 22 memorandum released last week, Elmo Collins, director of NRC's division of inspection and regional support, said that staff "has revisited this issue" and provided new interim inspection guidance. Staff is "in the process of permanently revising the inspection guidance," reviewing revision 2 of a Nuclear Energy Institute white paper on the issue that was submitted in May. It will prepare a draft of the revised guidance by mid-summer, Collins said. The draft guidance will be discussed at a public meeting later this summer and will be provided to NRC regional offices for comment in early fall. It will be updated based on comments received, with the goal of issuing final guidance by the year's end, Collins said.

In the interim guidance, dated June 22 and issued last week, staff said that the previous guidance provided in RIS 2005-20 — which says that discovery of through wall leakage in American Society of Mechanical Engineers (ASME) Class 2 and 3 moderate-energy piping requires that those systems "must" be declared inoperable — "may be overly restrictive and not substantiated by operating experience." Instead, the new guidance says, such "immediate determinations of operability should be based on a reasonable expectation of operability."

"Prompt" determinations of operability "should be based on actual non-destructive examination measurements to characterize the flaw dimensions and engineering analysis methods acceptable to NRC staff," the guidance says. The "time frame for flaw characterization and engineering analysis should be no longer than a reasonable time frame for completing the actions," and staff views 72 hours as "a reasonable maximum time frame for this assessment," the guidance says.

However, the staff believes that "high-energy fluid system piping with through wall leakage should be declared inoperable immediately," the guidance says. Michael Schoppman of the Nuclear Energy Institute's licensing action task force said July 5 that industry disagrees with this exemption.

"The position we were seeking was across the board and would apply to everything. We're pleased with the guidance as far as it goes, but were disappointed that it doesn't include high energy piping as well," Schoppman said, adding that he was not sure what percentage of piping at power reactors would be covered by the interim guidance. Schoppman said the industry would "like to start pretty quickly" on working with staff to hammer out wording for the final inspection guidance, though he said he was unsure about NRC's schedule and resources. NRC staffers working on the issue were not available to comment by press time last week.—***Steven Dolley, Washington***

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# ITAAC Closure Verification Using Sample-Based Inspection Process

Presented At: 544th ACRS Meeting

Richard Rasmussen, Branch Chief, CCIB
Richard Laura, Acting Team Leader, CCIB

July 11, 2007

## Briefing Objective

- Describe the staff approach to inspect and verify closure of ITAAC using a prioritizing and sampling approach.
- Describe why prioritization was chosen as an alternative to statistical acceptance sampling.
- Describe how the formal decision method formulates and ranks decision options (Weil and Apostolakis 2001).

# Briefing Overview

- Background – Inspection of ITAAC is a subset of the overall NRC oversight
- Regulatory basis for ITAAC
- Grouping ITAAC
- Inspection prioritization process
- Results
- Conclusion

# NRC CONSTRUCTION OVERSIGHT HAS MULTIPLE COMPONENTS

*Oversight will assure plants are constructed as designed.*

Early component procurement | Construction start per LWA | Combined License Issuance | Fuel load

Pre-Combined License | Construction under Combined License | Start-Up

COL Application Review

[redacted]

[redacted]

ITAAC Inspections - IMC 2503

Non - ITAAC Inspections - IMC 2504

Assessment – IMC 2505

Oversight of Vendor Activities – IMC 2507

**Abbreviations**

ESP – Early Site Permit
IMC – Inspection Manual Chapter
ITAAC – Inspections, Tests, Analyses, and Acceptance Criteria
LWA – Limited Work Authorization

[redacted]

[redacted]

**IMC 2503**

Verification of successful performance of ITAAC-related activities

**IMC 2504**

-QA for construction & operations
-Problem identification, reporting, & corrective action
-Work planning/control over work & contractors
-Translation of certified design into design details
-Design change process
-Pre-operational & startup testing
-Operational programs & operational readiness

**IMC 2505**

-Guides inspection planning

**IMC 2507**

- Verification of QA program implementation, compliance, reporting and corrective action

# ITAAC Basis

- Inspection, tests, analysis and acceptance criteria
- Provide reasonable assurance that the facility has been constructed and will be operated in conformity with the license, the provisions of the Atomic Energy Act, and the Commission's rules and regulations (10 CFR 52.97(b)(1))
- Required to be submitted in the design certification and license applications
- Reviewed and approved by NRC in conjunction with approval of a certified design or issuance of a COL



# ITAAC Examples

| Design Commitment | Inspection Test Analysis | Acceptance Criteria |
|---|---|---|
| The RCPs have a rotating inertia to provide RCS flow coastdown on loss of power to the pumps. | Inspection of the as-built RCP vendor data will be performed. | The calculated rotating inertia of 16,500 lb-ft$^2$. |
| Pressure boundary welds in components identified in Table 2.1.3-1 as ASME Code Section III meet ASME Code Section III requirements. | Inspection of the as-built pressure boundary welds will be performed in accordance with ASME Code Section III. | A report exists and concludes that ASME Code Section III requirements are met for NDE of pressure boundary welds. |

# ITAAC Timeline

- 05/09/05: NRC contracted ISL to recommend sampling process for inspecting ITAAC
- 09/30/05: ISL issued Technical Report on the Prioritization of Inspection Resources for Inspections, Tests, Analyses and Acceptance Criteria (ITAAC)
- 04/25/06: Issued IMC 2503, Inspections of ITAAC
- 06/01/06: Briefed ACRS
- 01/23/07: Public Meeting
- 03/08/07: SECY-07-0047 (ITAAC closure)
- 05/16/07: SRM on SECY 07-0047
- 06/14/07: ITAAC Closure Verification Working Group



# ITAAC Implementation

- Licensees perform 100% of ITAAC verification during construction
- Licensee submits closure letter to the NRC
- NRC verifies closure of all ITAAC through documentation review
- NRC inspects a sample of ITAAC-related activities to verify proper ITAAC closure
- NRC documents ITAAC closure verification in the Federal Register
- Commission ensures ITAAC are performed and prior to operation shall find that the acceptance criteria are met

## Grouping ITAAC - Matrix

- Each certified reactor design has its own set of ITAAC including: piping, valves, welds, pumps, pipe supports, power supplies, cables, seismic qualification, etc. The total number of ITAAC range from 500 to 1000.
- For the AP-1000 and ABWR designs, the NRC staff evaluated all ITAAC and developed a *Matrix* organized by ITAAC common areas and programs applicable to those common areas. (Slide 11)



## Grouping ITAAC

- 19 matrix rows – processes
- 6 matrix columns - programs
- The intersection of each row and column are called ITAAC *families* which have common characteristics and use the same IP.
- Observing performance of ITAAC activity within a family will provide insights that are applicable to the remainder of the family.

THE AP1000 ITAAC MATRIX

| | A)As-Built Inspection | B)Welding | C)Construction Testing | D) Operational Testing | E)Qualification Criteria | F)Design/Fabrication Requirements |
|---|---|---|---|---|---|---|
| 01)Foundations & Buildings | 14 | | | | 1 | 4 |
| 02)Structural Concrete | | | 1 | | | |
| 03)Piping | 10 | 10 | 10 | 4 | | 17 |
| 04)Pipe Supports & Restraints | | | | | | 8 |
| 05)RPV & Internals | 7 | 2 | 1 | 2 | 1 | 4 |
| 06)Mechanical Components | 28 | 5 | 6 | 22 | 4 | 22 |
| 07)Valves | 8 | 4 | 8 | 27 | 12 | 20 |
| 08)Electrical Components & Systems | 15 | | 5 | 24 | 8 | 8 |
| 09)Electrical Cable | 10 | | 1 | | | 11 |
| 10)I&C Components & Systems | 61 | | 35 | 63 | 16 | 9 |
| 11)Containment Integrity & Penetrations | 6 | | | 1 | 1 | 1 |
| 12)HVAC | 11 | 3 | 3 | 14 | 2 | 10 |
| 13)Equipment Handling & Fuel Racks | 6 | | | 5 | 3 | 3 |
| 14)Complex Systems w/ Multiple Components | 25 | | | 4 | 4 | 6 |
| 15)Fire Protection | 7 | | 1 | 2 | | |
| 16)Engineering | 5 | | | | 2 | 10 |
| 17)Security | 3 | | | | 1 | |
| 18)Emergency Planning | | | | | | |
| 19) Radiation Protection | 5 | | | | 1 | 1 |

# Rank-Ordering of ITAAC

- Rank-ordering of ITAAC inspection was based on *attributes and associated ITAAC impact* that make one ITAAC more or less important to inspect based on optimizing resources to minimize the possibility of a significant flaw going undetected.

- Step 1: Five *attributes* were developed: safety significance, propensity for making errors (includes higher complexity or inherently difficult tasks), construction and testing experience, opportunity to verify by other means, and licensee oversight.
- Step 2: Expert panels assigned relative weights for attributes using AHP. Then, utility values were assigned for each attribute.
- Step 3: Expert panels determined utility factors for each attribute for each ITAAC.
- Step 4: The results were fed into an algorithm which produced a listing of ITAAC "value of inspection" results.

## ITAAC Attributes

- Propensity of Making Errors – The degree of propensity to making errors during fabrication, installation or testing. This may depend on complexity or inherent difficulty of the activity.
- Construction and Testing Experience – Relates to possible first-of-a-kind activity, or performed by company with little nuclear experience.
- Opportunity to Verify by Other Means – The degree that the activity can be verified by observing other functional, pre-operational or performance tests.
- Licensee Oversight Attention – The effectiveness and extensiveness of licensee's oversight attention and QA efforts, including their contractors and suppliers.
- Safety Significance – The safety significance assigned to the system, component, or structure included in the ITAAC.



## Utility Theory

- Utility theory approach – prioritized ITAAC by inspection value (slide 15).
- Utility is a figure of merit for a decision option that quantitatively shows how much the decision-maker's values and preferences will be addressed by implementing that option.

# ITAAC Rating Data Examples

| AP1000 ITAAC | Error Prop. | | C & T Exper. | | Verify by other means | | Lic. Over-sight | Safety Signif. | ITAAC Rank |
|---|---|---|---|---|---|---|---|---|---|
| | B | V | B | V | B | V | B | B | |
| 2.2.3.9a.i | 2 | 2 | 3 | 1 | 4 | 1 | 3 | 4 | 0.432 |
| 3.3.2a.i | 3 | 2 | 4 | 1 | 5 | 2 | 3 | 5 | 0.658 |

ITAAC 2.2.3.9a.i - The calculated flow resistance for each in-containment refueling water storage tank drain line is satisfactory.

ITAAC 3.3.2a.i - The as-built nuclear island structures, including critical sections, conform to design and will withstand design basis loads without loss of structural integrity.



## AP1000 ITAAC Assigned to IP65001.06

### Family 06A
**As-Built Mechanical Components**

| ITAAC | Rank |
|---|---|
| 2.2.02.07a.iii | 0.180 |
| 2.2.02.07c | 0.307 |
| 2.2.02.07f.ii | 0.180 |
| 2.2.02.08a | 0.180 |
| 2.2.03.08b.02 | 0.419 |
| 2.2.03.08c.ix | 0.419 |
| 2.2.03.08c.v | 0.419 |
| 2.2.03.08c.vi | 0.419 |
| 2.2.03.08c.vii | 0.419 |
| 2.2.03.08c.viii | 0.419 |
| 2.2.03.08c.xi | 0.419 |
| 2.2.03.08c.xiii | 0.289 |
| 2.2.03.08d | 0.289 |
| 2.3.02.06a.ii | 0.124 |
| 2.3.03.03a | 0.124 |
| 2.3.03.03b | 0.124 |
| 2.3.03.03d | 0.124 |
| 2.3.08.05a.i | 0.124 |
| 2.3.07.07b.i | 0.124 |
| 2.3.07.07b.ii | 0.124 |
| 2.3.09.01 | 0.124 |
| 2.3.09.03.i | 0.124 |
| 2.3.09.03.iv | 0.124 |
| 2.3.10.05a.i | 0.089 |
| 2.3.11.02.i | 0.089 |
| 2.3.12.01 | 0.089 |
| 2.3.14.03 | 0.089 |
| 2.5.05.02.i | 0.124 |

### Family 06B
**Welding Mechanical Components**

| ITAAC | Rank |
|---|---|
| 2.1.02.03a | 0.520 |
| 2.2.01.03a | 0.520 |
| 2.2.03.03a | 0.520 |
| 2.3.02.03a | 0.225 |
| 2.3.06.03a | 0.261 |

### Family 06C
**Construction Testing Mechanical Components**

| ITAAC | Rank |
|---|---|
| 2.1.02.04a | 0.289 |
| 2.1.02.08c | 0.367 |
| 2.2.01.04a.i | 0.419 |
| 2.2.03.04a | 0.289 |
| 2.3.02.04a | 0.089 |
| 2.3.08.04a | 0.124 |

### Family 06D
**Operational Testing Mechanical Components**

| ITAAC | Rank |
|---|---|
| 2.1.02.08b | 0.497 |
| 2.2.02.07a.i | 0.381 |
| 2.2.02.07b.i | 0.400 |
| 2.2.02.07d | 0.381 |
| 2.2.02.07e.ii | 0.178 |
| 2.2.02.07f.i | 0.178 |
| 2.2.03.08b.01 | 0.596 |
| 2.2.03.08c.i | 0.589 |

### Family 06D
**Operational Testing Mechanical Components**

| ITAAC | Rank |
|---|---|
| 2.2.03.08c.ii | 0.562 |
| 2.3.02.08a.i | 0.142 |
| 2.3.02.08a.iii | 0.142 |
| 2.3.02.08b | 0.089 |
| 2.3.02.12b | 0.124 |
| 2.3.03.03c | 0.142 |
| 2.3.06.09b.ii | 0.178 |
| 2.3.06.09c | 0.178 |
| 2.3.06.09d | 0.178 |
| 2.3.07.06.ii | 0.142 |
| 2.3.08.02.i | 0.178 |
| 2.3.08.02.i | 0.178 |
| 2.3.09.03.ii | 0.219 |
| 3.3.10.i | 0.497 |
| 3.3.10.ii | 0.529 |

### Family 06E
**Qualification Criteria Mechanical Components**

| ITAAC | Rank |
|---|---|
| 2.3.06.05a.ii | 0.295 |
| 2.3.10.05a.ii | 0.260 |
| 2.3.11.02.ii | 0.260 |
| 2.5.05.02.ii | 0.295 |

### Family 06F
**Design/Fab Requirements Mechanical Components**

| ITAAC | Rank |
|---|---|
| 2.1.02.02a | 0.532 |

### Family 06F
**Design/Fab Requirements Mechanical Components**

| ITAAC | Rank |
|---|---|
| 2.2.01.02a | 0.532 |
| 2.2.01.04a.ii | 0.822 |
| 2.2.02.05c | 0.300 |
| 2.2.02.07a.ii | 0.381 |
| 2.2.02.07b.ii | 0.402 |
| 2.2.02.07b.iii | 0.402 |
| 2.2.03.02a | 0.532 |
| 2.2.04.08b.ii | 0.160 |
| 2.3.01.03.i | 0.289 |
| 2.3.02.02a | 0.237 |
| 2.3.03.02 | 0.277 |
| 2.3.03.02 | 0.277 |
| 2.3.06.02a | 0.273 |
| 2.3.06.05a.iii | 0.301 |
| 2.3.08.09b.i | 0.287 |
| 2.3.07.06.i | 0.252 |
| 2.3.08.02.ii | 0.287 |
| 2.3.10.05a.iii | 0.265 |
| 2.3.10.05a.iii | 0.265 |
| 2.3.11.02.iii | 0.235 |
| 2.3.11.02.iii | 0.235 |
| 2.3.11.03a | 0.124 |
| 2.3.12.02 | 0.089 |
| 2.5.05.02.iii | 0.301 |

## Portfolio Perspective or Coverage Check for all ITAAC

- For the baseline inspection program, a threshold of .4 was selected based on engineering judgment, to provide an adequate sampling of overall ITAAC activities.
- To ensure that all ITAAC families are inspected, matrix families with no ITAAC greater than the .4 threshold are inspected by selecting one ITAAC.
- Flexibility for NRC Region 2 to modify inspections, on a limited basis, to ensure the sample is representative of the total population.



## Results

- For the AP-1000, 233/672 ITAAC were selected which is 35%.
- For the ABWR, 383/881 were selected which is 44%.
- Reviews are in process to determine resource levels needed to complete the baseline inspection program.
- Licensee performance is monitored as part of the assessment process and NRC can expand the selection of ITAAC samples based on poor performance.

# Conclusion/Questions

- The baseline inspection program consists of ITAAC selected for direct NRC inspection using a defined prioritization process.
- The prioritization process optimizes NRC resources.
- Completion of this program will provide reasonable assurance that a significant construction or design translation error does not go undetected.

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
DISSIMILAR METAL WELD ISSUE
July 11, 2007
ROCKVILLE, MD

**-PROPOSED SCHEDULE-**

Cognizant Staff Engineer: Charles G. Hammer, cgh@nrc.gov (301) 415-7363

| Topics | Presenters | Time |
|---|---|---|
| **Opening Remarks** | W. Shack, ACRS | 10:30 - 10:35 am |
| **Background and Status of dissimilar metal weld issue** | E. Sullivan, NRR<br>A. Csontos, RES | 10:35 - 10:50 am |
| **Industry analysis of dissimilar metal weld flaws** | A. Marion, et al, NEI<br>A. Shakarami, Exelon<br>G. White, et al, DEI<br>T. Gilman, et al, SIA | 10:50 - 11:40 am |
| **NRC staff evaluation of industry analysis of dissimilar metal weld flaws** | E. Sullivan, NRR<br>A. Csontos, RES<br>D. Rudland, EMCC | 11:40 - 12:00 pm |
| **Committee Discussion** | W. Shack, ACRS | 12:00 - 12:15 pm |

**Note**

- Presentation time should not exceed 50 percent of the total time allocated for specific items. The remaining 50 percent of the time is reserved for discussion.
- 35 copies of the presentation materials to be provided to the Committee.

# Advanced Finite Element Analyses of Pressurizer Nozzle Weld Flaws

U.S.NRC
UNITED STATES NUCLEAR REGULATORY COMMISSION
*Protecting People and the Environment*

Ted Sullivan & Al Csontos, Ph.D

July 11, 2007

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U.S.NRC
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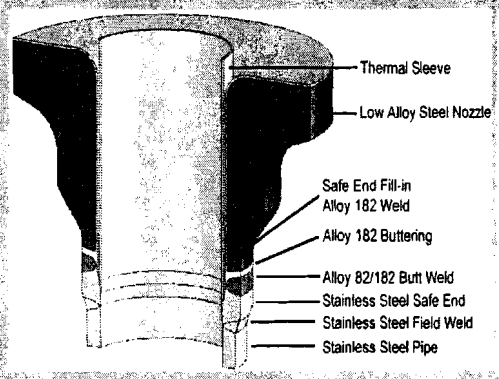
*Protecting People and the Environment*

## PWSCC in Alloy 82/182 Dissimilar Metal Butt Welds

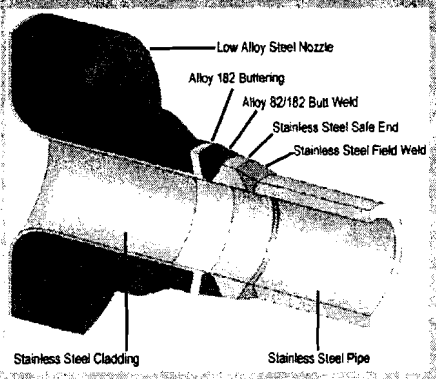
- Operational experience at Wolf Creek:
  - 5 circumferential indications found:
    - 1 in relief nozzle-to-safe end weld (7.7" ~26% through wall [TW])
    - 3 in pressurizer surge line nozzle-to-safe end weld (4" ~31% TW, 2.2" ~25% TW, & 0.8" @ ID surface)
    - 1 in safety nozzle-to-safe end weld (2.5" ~23% TW)
- NRC concerns:
  - **First case of multiple, long, circumferential flaws**
  - While axial flaws lead to leaks, circumferential flaws may lead to pipe rupture

## Westinghouse Pressurizer Dissimilar Metal Butt Welds

Surge Nozzle-to-Safe End Dissimilar Metal Weld




Safety/Relief Nozzle-to-Safe End Dissimilar Metal Weld






## NRC Wolf Creek Scoping Analysis, November 2006

- NRC staff in RES conducted a Scoping Study
- Purpose:
  - Evaluate the component integrity of the pressurizer nozzle welds using ASME Section XI flaw evaluation methodology
  - Calculate leakage rates from potential TW cracks
- Objectives of this study were to determine:
  - Time for the flaw to grow from current size to leakage
  - Time from leakage to rupture
  - Leakage rates from emerging TW flaws
- Outcomes:
  - Should inspections/mitigations be accelerated?
  - Are current leak detection thresholds adequate?

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## NRC Wolf Creek Scoping Analysis: Results

- Surge nozzle results:
  - Leakage predicted to occur 1-2.2 years after discovery
  - All cases show at least 6 months b/w leakage and rupture
- Relief nozzle results:
  - Leakage predicted to occur 1.9-2.6 years after discovery
  - 20/24 cases show leakage and rupture occur simultaneously
    - Surface cracks unstable before growing throughwall
- Safety nozzle results:
  - Leakage predicted to occur 2.6-8.0 years after discovery
  - 8/24 cases show leakage and rupture occur simultaneously



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## Regulatory Summary

- NRC staff concluded that inspections/mitigations need to be accelerated for some plants
- NRC staff concluded that enhanced reactor coolant system leakage monitoring frequency, action levels & actions needed to be put in place
- NRC issued Confirmatory Action Letters to:
  - Ensure enhanced leakage monitoring in place
  - Complete inspection or mitigation by the end of 2007
  - However, if industry's proposed advanced finite element analyses (FEA) provide reasonable assurance of safety, plants with outages planned in 2008 may avoid their 2007 outages

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## Advanced FEA Project: Background

- Purpose:
  - Evaluate the component integrity of the pressurizer nozzle welds with new advanced FEA software for circumferential flaws that removes artificial conservatisms found in NRC - Wolf Creek Scoping Analysis and ASME Section XI Code.
    - artificial constraint of the semi-elliptical crack shape
    - allow the crack to grow in a more realistic manner as a function of the stress intensity factor
- Objective:
  - Evaluate viability of through-wall leakage prior to rupture for the pressurizer nozzle-to-safe end dissimilar metal welds for the 9 PWRs that had planned to perform inspection/mitigation during the spring 2008 outage season

*U.S. Nuclear Regulatory Commission* 7

# Advanced Finite Element Analyses of Pressurizer Nozzle Weld Flaws: NRC Confirmatory Program

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Ted Sullivan & Al Csontos, Ph.D
July 11, 2007

## Advanced FEA Project: NRC Confirmatory Program

- NRC confirmatory program developed to benchmark, verify, and evaluate industry's analyses and results
- NRC staff interacting with the industry to provide timely input on the project analytical approach, modeling methodologies, and sensitivity study
- NRC provided comments by letter dated March 5th
- NRC staff reached agreement with the industry representatives on the analytical approach, modeling methodologies, and the matrix of sensitivity cases used in their analyses



## Advanced FEA Project: NRC Confirmatory Program

- Industry & NRC independently developed:
  - Separate fracture mechanics based advanced FEA models that evaluate crack growth at each point on the crack front as a function of the stress intensity factor at that point
  - Separate axisymmetric WRS models for the various nozzle types, geometries, and fabrication processes
- Industry & NRC benchmarked:
  - Calculated K-solutions for arbitrary cracks to prove the advanced FEA models produced comparable K-solutions
  - Axisymmetric WRS models for the various nozzles
- K-solutions and WRSs benchmarking showed good agreement between industry's and NRC's models

## Advanced FEA Project: NRC Confirmatory Program

- NRC reviewed the fabrication drawings for the 9 PWRs scheduled to perform inspections/mitigations in the spring 2008 outage season
- Typical fabrication steps were shown to affect WRS:
  - Backchipping and last past 360° ID welds at certain Westinghouse plants produced tensile ID axial stresses
  - SS safe end welds generally reduced the ID tensile stresses when modeled with the last pass 360° weld
- Industry and NRC WRS models are being validated using an EU round robin study on dissimilar metal butt weld WRS modeling and measurements

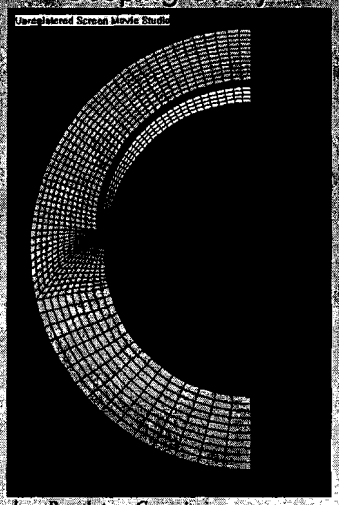


## Advanced FEA Project: NRC Confirmatory Program

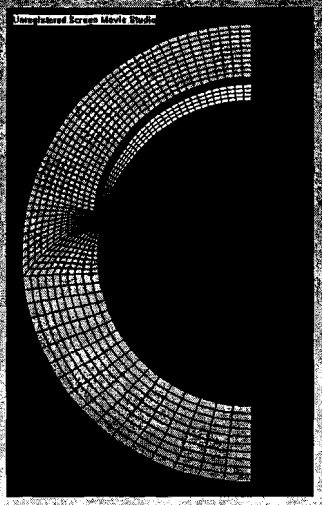
- Advanced FEA project evaluated in two parts:
- Phase I Wolf Creek relief nozzle reevaluation:
  - Reevaluate scoping analysis results with new model
  - Good agreement between industry & NRC model results
  - Unlike the NRC Wolf Creek scoping study results, margins were predicted for the time between leak and rupture
- Phase II parametric sensitivity study:
  - Evaluate margin between detectable leakage and rupture through a matrix of sensitivity cases with plant specific nozzle geometries, loads, & WRS
  - Industry evaluating 117 sensitivity cases
  - NRC confirming ~25 sensitivity cases

## Advanced FEA Project: NRC Phase I Results

Scoping Study




Advanced FEA






## Advanced FEA Project: NRC Phase II Results

- Evaluated 4 safety/relief, 3 spray, & 3 surge nozzle cases from the industry's base cases with modifications
- To date, NRC has evaluated 20 cases not including the Phase 1 reevaluation of the 2006 NRC scoping analysis
- NRC may evaluate further cases depending upon the industry's results in their draft report
- For the limited cases evaluated, Phase II results show generally good agreement between the industry & NRC advanced FEA model results

## Project Completion

- Industry provided and is scheduled to provide:
  - Results for the majority of the 117 cases on July 7
  - Draft project report to the NRC on July 10
  - Final project report to the NRC on July 31
- Public meetings scheduled for NRC staff to ask questions on report and to provide comments on draft report
- Public meeting scheduled for early August
- NRC staff to prepare safety assessment by August 31
- Safety assessment to be issued to affected plants with NRC conclusions regarding inspection timing
  - Will address whether or not commitments in CALs for inspection in 2007 can be relaxed for plants with scheduled outages in 2008



## Summary

- NRC confirmatory program developed to benchmark, verify, and evaluate industry's analyses and results
- Phase I results show good agreement between the industry & NRC advanced FEA model results
- In contrast to the NRC scoping study, margins were predicted between leak and rupture for the relief line
- For the limited cases evaluated, Phase II results show generally good agreement between the industry & NRC advanced FEA model results
- NRC staff review of Phase II results underway
- NRC staff has not yet reached any conclusions

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# Pressurizer Nozzle Dissimilar Metal Weld Advanced Finite Element Analyses

**ACRS Main Committee**
July 11, 2007

**Amir Shahkarami**
Senior Vice President
Engineering & Technical Services
Exelon Nuclear

# Advanced FEA Project Objective

- Evaluate the viability of through-wall leakage prior to rupture for the pressurizer nozzle dissimilar metal (DM) welds in the group of 9 PWRs scheduled to performed PDI inspection / mitigation during the spring 2008 outage season given the potential concern for growing circumferential stress corrosion cracks

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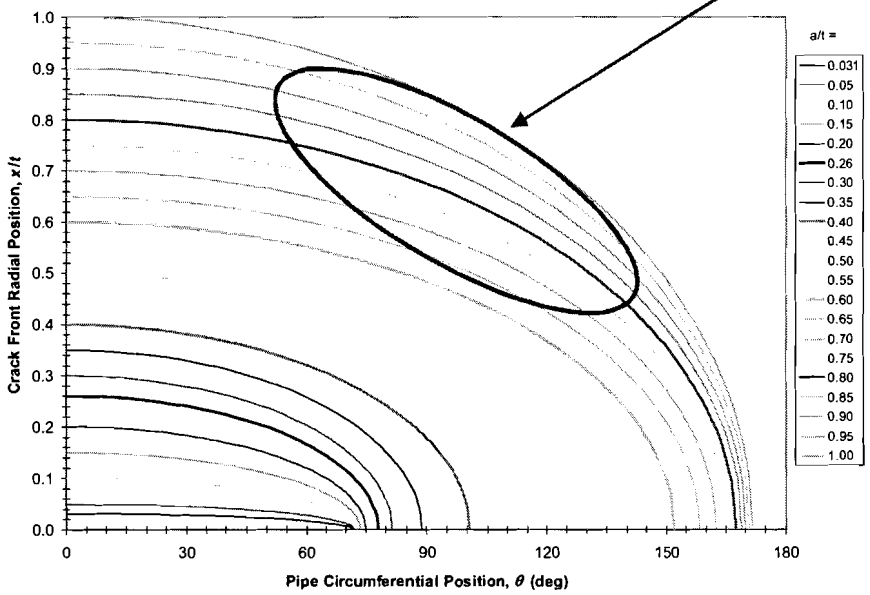
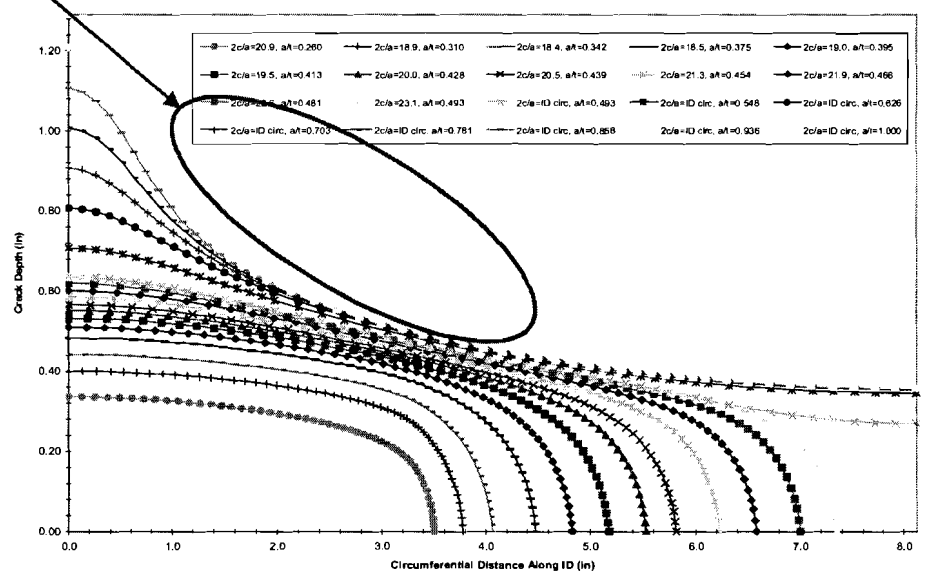
# Project Goal

Semi-ellipse assumption over predicted extent of cracked material in this zone vs. the arbitrary shape methodology for the Wolf Creek nozzle benchmark run




Semi-Ellipse Crack Shape Progression




Arbitrary Crack Shape Progression

Growth at each point on the crack front as a function of the stress intensity factor calculated at that point

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# Project Oversight

- Project Team
  - Dominion Engineering (DEI)
  - Quest Reliability – (FEACrack Software Developer)
- Expert Panel
  - Established to provide review, input, and oversight of the technical issues and approaches
  - Members well known in this industry were chosen
    - Ted Anderson, Quest Reliability, LLC
    - Warren Bamford, Westinghouse
    - Doug Killian, AREVA
    - Ken Yoon, AREVA
    - Pete Riccardella, Structural Integrity Associates
    - David Harris, Structural Integrity Associates
      - included specifically for his lack of recent involvement in Alloy 600 fracture mechanics applications to bring a fresh perspective
- Interacted with NRC Counterparts in ~7 NRC public meetings

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# Key Project Activities

- Software capability development within FEACrack
- Critical crack size calculations to define the end point for the crack growth calculation
- Crack growth calculations for custom crack shape
- Leak rate calculations - PICEP and SQUIRT models
- Develop and apply a sensitivity matrix of welding residual stress (WRS) profiles, including weld repairs
- Develop and execute an analysis parametric sensitivity case matrix
- Software verification and benchmarking
- Validation
- Expert panel input and review throughout the project

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# Evaluation Case Matrix

Assess 51 welds in 9 spring 2008 plants

- Parameters
  - Plant Specific Geometries
  - Plant Specific Piping Loads
  - Weld Residual Stresses
  - Crack Growth Rate Stress Intensity Factor Dependence
  - Initial flaw geometry
  - Effect of Multiple Crack Initiation Sites

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# Evaluation Case Matrix

*Plant Specific Geometries*

- **S&R nozzles**
  - 35 safety and relief (S&R) nozzles (1 plant has only three S&R nozzles)
    - Represented by 5 geometric configurations
- **Spray nozzles**
  - 8 spray nozzles (1 examined by PDI process in 2005)
    - Represented by 4 geometric configurations
- **Surge nozzles**
  - 8 surge nozzles (1 already overlayed)
    - Represented by 2 geometric configurations

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# Evaluation Case Matrix

*Plant Specific Piping Loads*

- Cover full range of piping loads for 51 subject welds:
  - All plants 2235 psig pressure
  - Range of axial membrane stress loading, $P_m$
  - Range of bending stress loading, $P_b$
  - Crack growth loads include dead weight and normal thermal pipe expansion loads in addition to internal and crack face pressure
  - Critical crack size calculations included normal operating thermal loads in addition to internal and crack face pressure and dead weight loads

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# Evaluation Case Matrix

*Weld Residual Stresses*

- Input obtained from design drawings & shop travelers
- Fabrication Steps affecting weld residual stress (WRS)
  - Fill-In Weld under thermal sleeve (Surge)
  - Fillet Welds (Safety/Relief)
  - Stainless steel field weld to pipe
- Repairs
  - Deep ID Repairs
- Either thermal strain applied to simulate WRS profile or WRS FEA results directly input to crack growth model

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# Evaluation Case Matrix

*Crack Growth Rate Equation*

- Sensitivity cases examine the effect of main uncertainties in the MRP-115 Crack Growth Rate (CGR) equation:
  - Uncertainty in the $K_I$ power-law exponent (nominal 1.6) addressed by crack growth sensitivity cases assuming 5$^{th}$ and 95$^{th}$ percentile exponent values from MRP-115 statistical fit to laboratory CGR data
    - Power-law constant adjusted for these sensitivity cases to maintain 75$^{th}$ percentile value used for MRP-115 deterministic equation
  - Uncertainty in power-law constant itself addressed simply by scaling factor on time
    - 95$^{th}$ percentile constant is 1.77 times 75$^{th}$ percentile constant value
- No credit taken for a PWSCC crack growth $K_I$ threshold

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# Evaluation Case Matrix

*Initial Flaw Geometry*

- Sensitivity cases investigate the effect of initial flaw geometry
  - Initial depth
  - Initial aspect ratio (2c/a) or 360° uniform depth surface flaw
  - Initial shape factor (e.g., low shape factor to semi-ellipse to uniform depth)
- Sensitivity cases indicate that crack profile upon through-wall penetration (or upon crack arrest) is insensitive to initial flaw shape for a given aspect ratio and depth.

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# Evaluation Case Matrix

*Effect of Multiple Crack Initiation Sites*

- Sensitivity cases investigate the effect of multiple crack initiation (e.g., Wolf Creek surge nozzle NDE results)
  - Enveloping of multiple initial flaws with one modeled flaw
  - Modeling of a part-depth 360° flaw
  - Growing multiple individual flaws and then combining on a single weld cross section for stability calculation

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# Evaluation Case Matrix Description

- Up to three WRS profiles applied to each case
  - Geometry and load base cases (1-20)
    - Axisymmetric WRS
    - Moment load varied up to maximum reported for specific configuration
  - ID repair base cases (21-26)
    - Non-axisymmetric WRS based on ID repair WRS FEA
  - Further bending moment sensitivity cases (27-30)
  - Sensitivity cases to investigate potential uncertainty in as-built dimensions (31-32)
    - Hypothetical ±10% variation in weld thickness
  - Axial membrane load sensitivity cases (33-34)
    - Relatively narrow range in membrane load for each geometry
  - Effect of length over which thermal strain simulating WRS is applied (35)

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# Evaluation Case Matrix Description (cont'd)

- Simulation of elastic-plastic redistribution of stress at ID (36)
- Effect of initial crack shape and depth (37-41)
- Effect of stress intensity factor dependence of crack growth rate equation (42-47)
  - 5th percentile exponent of 1.0 or 95th percentile exponent of 2.2 assumed
- Effect of pressure drop along leaking crack (48)
  - Other cases assume full primary pressure applies to leaking crack face
- Effect of relaxation of normal operating thermal load (49-51)
  - For through-wall portion of crack growth progression, the normal thermal load has been eliminated for these sensitivity cases (for crack growth, leak rate, and critical crack size calculations)
- Effect of nozzle-to-safe-end crack growth model vs. standard cylindrical crack growth model (52-53)
  - Investigate effect of detailed geometry
- Supplementary cases specific to effect of multiple flaws on limiting surge nozzles (S1-S8)

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# Calculating Critical Crack Size

*Approach*

- The flow strength for net section collapse (NSC) based on the safe end material tensile properties
- NSC equations developed by Rahman and Wilkowski were used to calculate critical crack size for an arbitrary crack shape
  - Spreadsheet calculation was verified against Arbitrary Net Section Collapse (ANSC) software developed by Structural Integrity Associates
- Full thermal stress used to calculate the critical crack size
  - Full scale SS and Alloy 600 pipe tests and piping system FEA compliance studies support reduced thermal loads prior to collapse
- Applied Z-factor to reduce supportable moment to consider effect of EPFM failure mechanism
  - Full scale SS and Alloy 600 pipe tests support limit load failure mechanism
  - Comparison of J-R curve fracture toughness demonstrates Alloy 182 weld metal is similar to the pipe test materials
- Critical load for various calculated crack growth progressions checked against reported operating load to determine load margin factor vs. time

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# Calculated Crack Leak Rate

- Leak rate calculations using two standard industry codes
  - PICEP and SQUIRT
- Flow rate through the crack based on PWSCC morphology
- Leak rate calculations based on crack opening displacement (COD) from FEA rather than standard COD expressions for simplified loading assumption

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# Evaluation Criteria

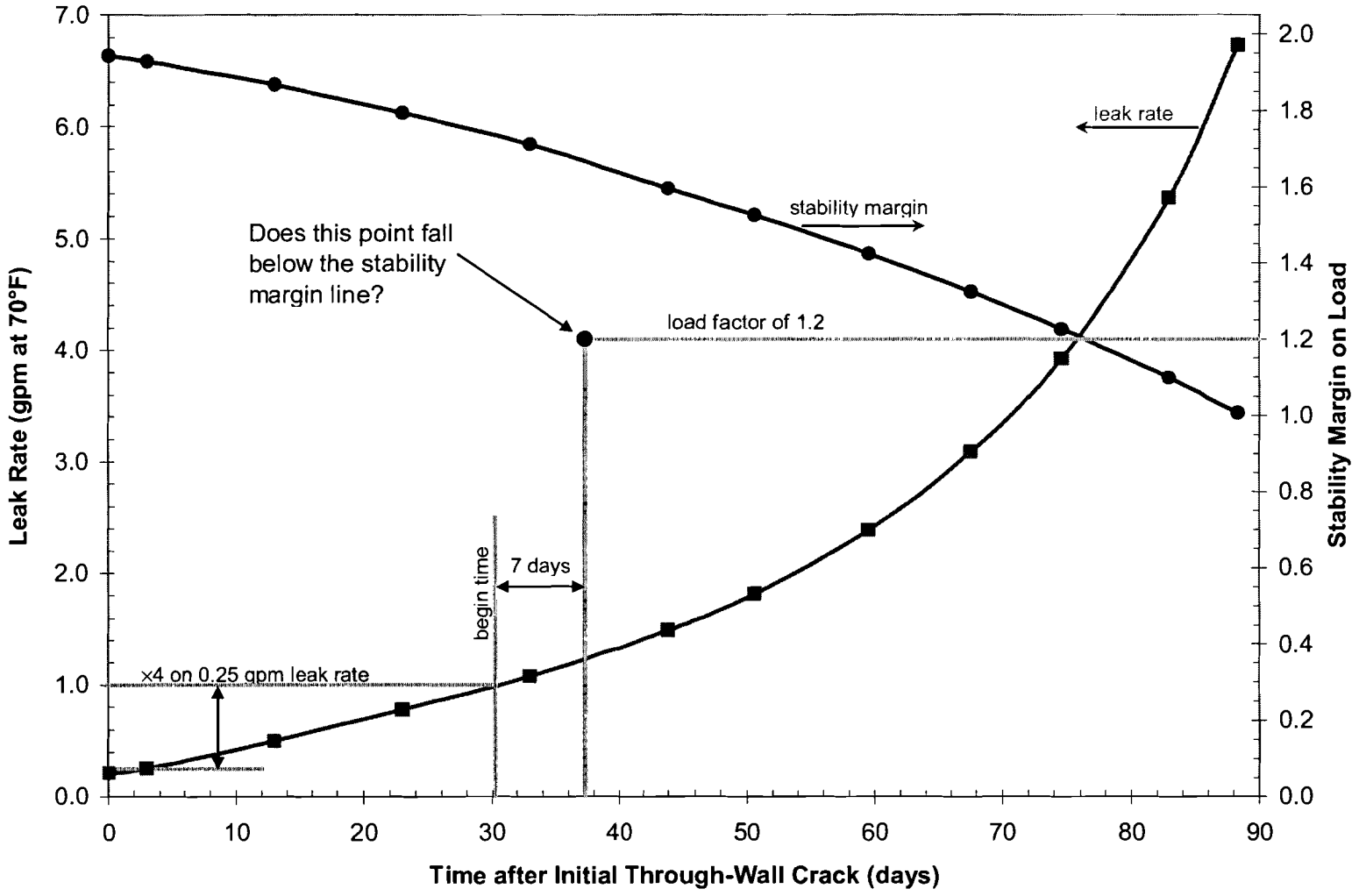


Illustration of Approach for Hypothetical Leakage and Stability Data

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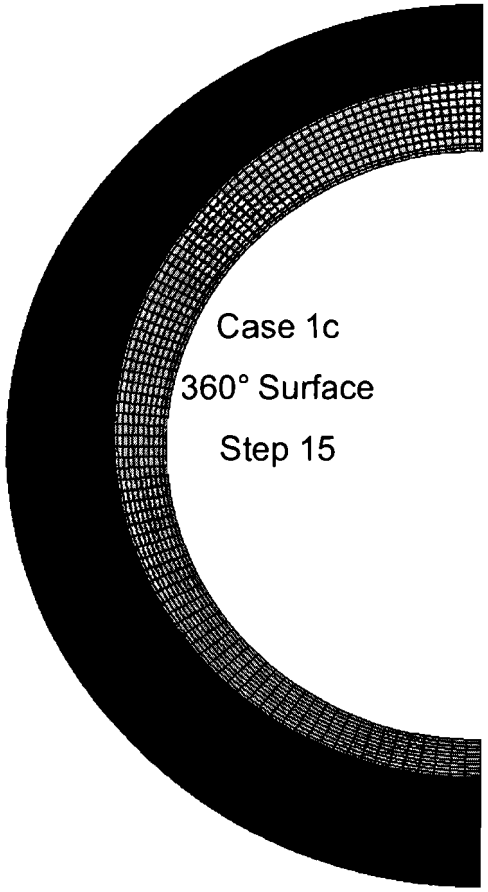
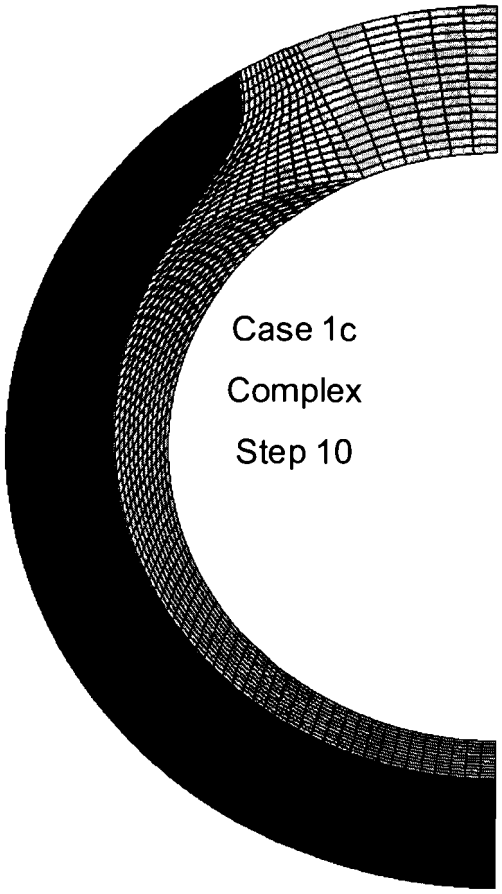
# Example FEACrack Meshes




Safety and Relief Case

from 360° 10%TW surface crack

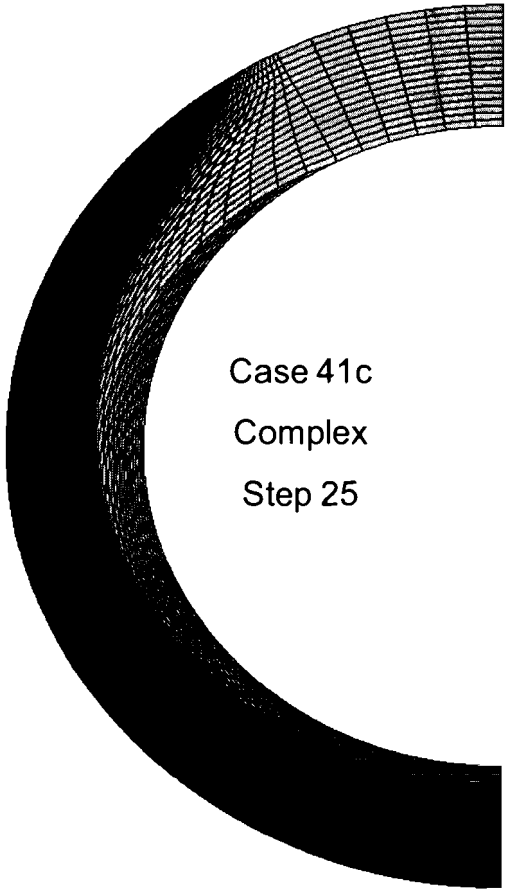
Axisymmetric WRS




Safety and Relief Case

from 360° 10%TW surface crack

Axisymmetric WRS




Safety and Relief Case

from 21:1, 40%TW surface crack

Axisymmetric WRS

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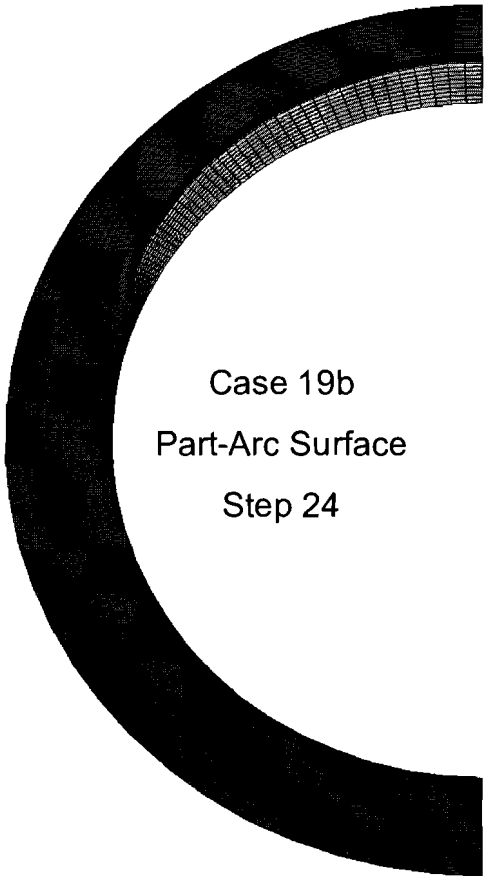
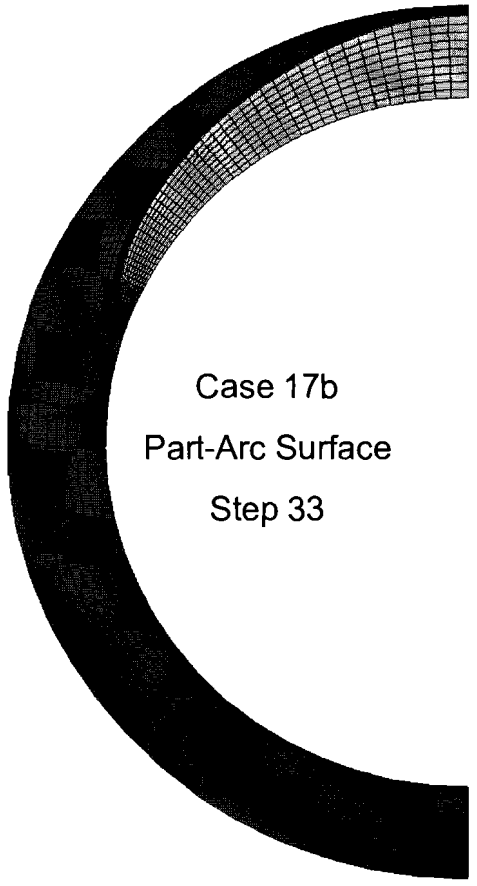
# Example FEACrack Meshes (cont'd)



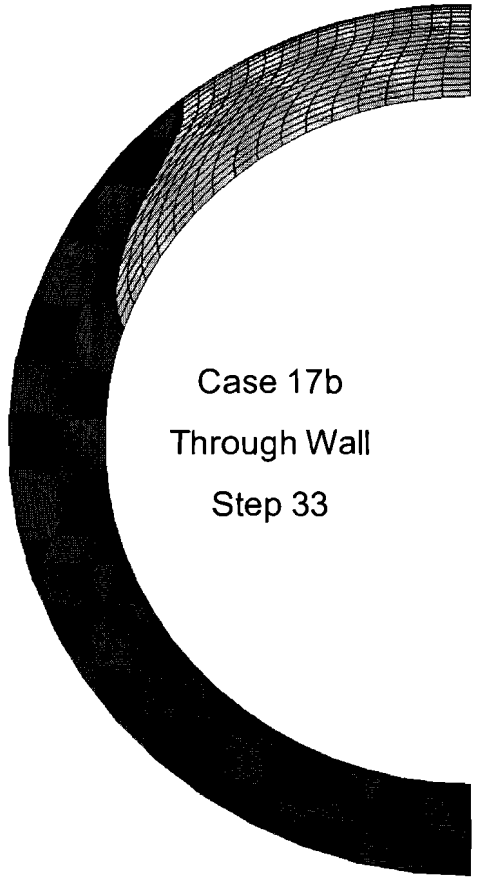

Surge Case

w/ SS Weld, Axisymmetric WRS




Surge Case

w/o SS Weld, Axisymmetric WRS




Surge Case

w/o SS Weld, Axisymmetric WRS

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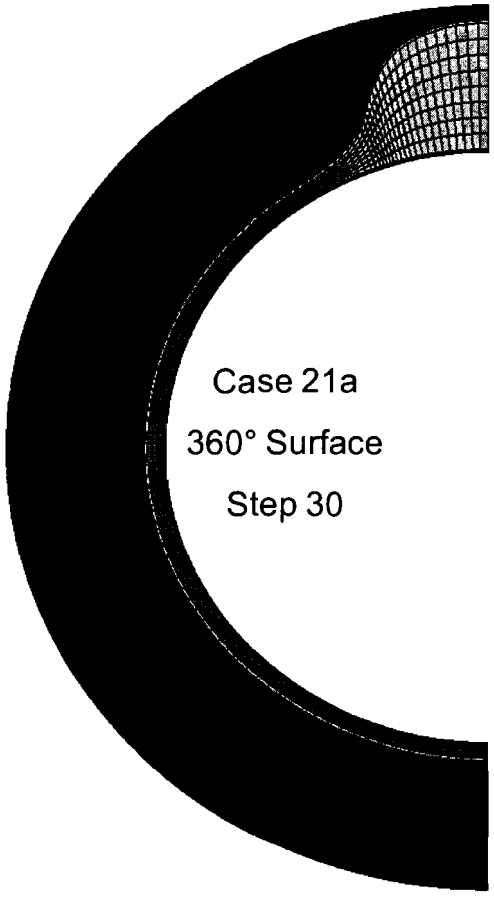
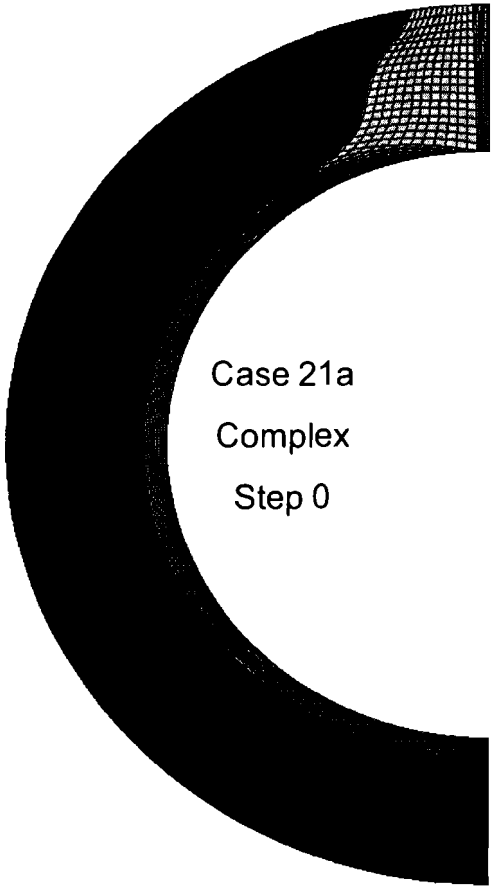
# Example FEACrack Meshes (cont'd)




20° ID Repair Case

w/o SS Weld

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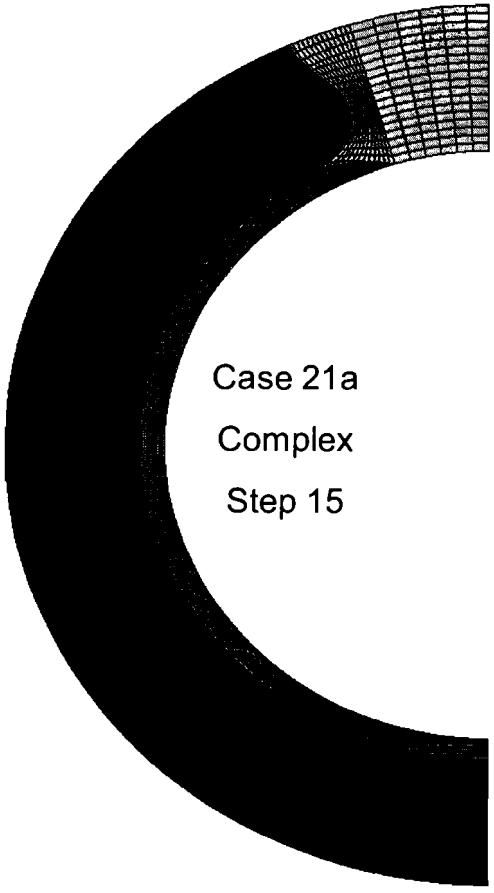


20° ID Repair Case

w/o SS Weld

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# Preliminary Results

- All 103 completed cases in the main sensitivity matrix showed either
  - stable crack arrest (59 cases), or
  - crack leakage and crack stability results satisfying the evaluation criteria (44 cases)
  - generally considerable margins beyond evaluation criteria
- 9 supplemental cases further investigated effect of multiple flaws on limiting surge nozzle cases
  - Conservative application of the three indications found in the Wolf Creek surge nozzle weld to limiting surge nozzles (fill-in weld and relatively high moment load) gives results meeting the evaluation criteria with additional margin
  - On this basis, it is concluded that the concern for multiple flaws in the limiting surge nozzles is adequately addressed by cases that satisfy the evaluation criteria with additional margin

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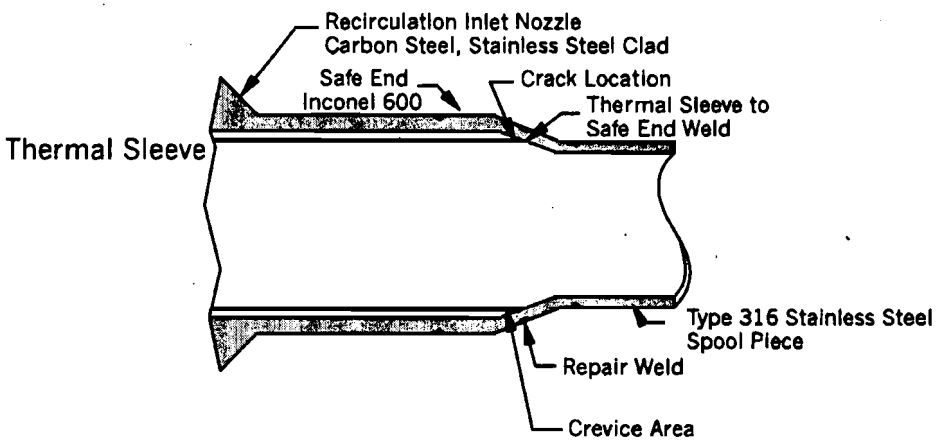
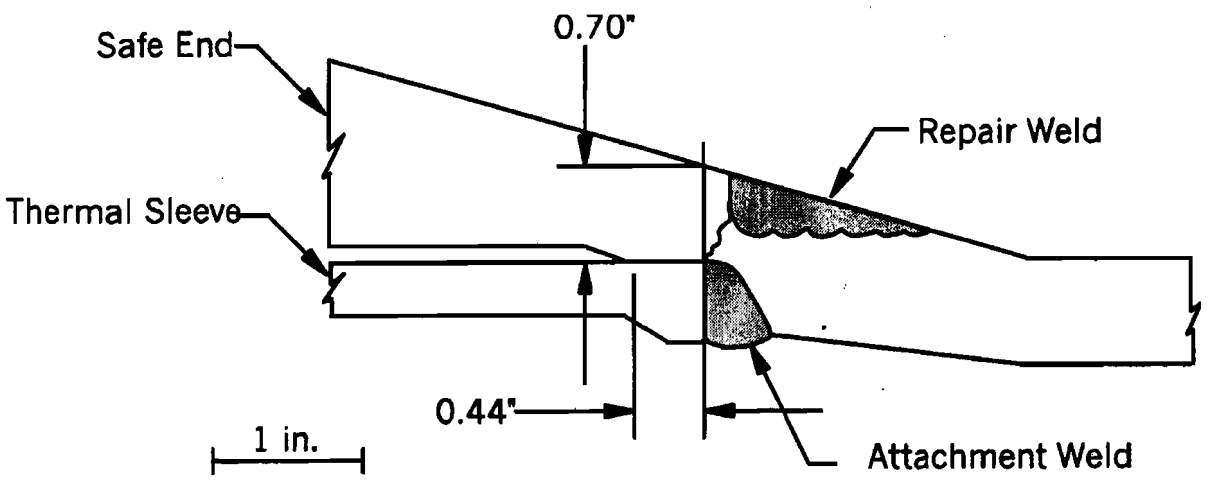
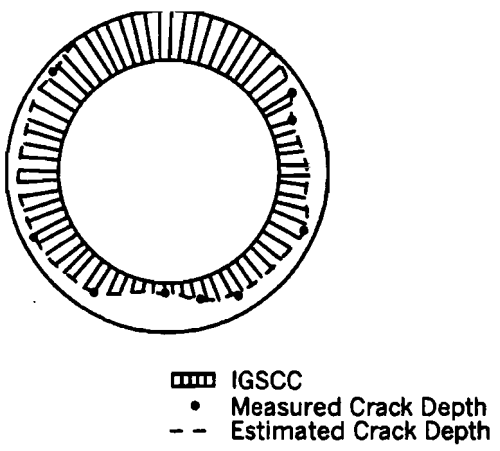
# Validation

*Duane Arnold Circumferential Crack*

- The Duane Arnold crack was applied as a validation case
  - *From MRP-113:* Crack initiation and growth were attributed to the presence of a fully circumferential crevice that led to development of an acidic environment because of the oxygen in the normal BWR water chemistry, combined with high residual and applied stresses as a result of the geometry and nearby welds. The water chemistry conditions that contributed to cracking at Duane Arnold do not exist for the case of Alloy 82/182 butt welds in PWR plants.

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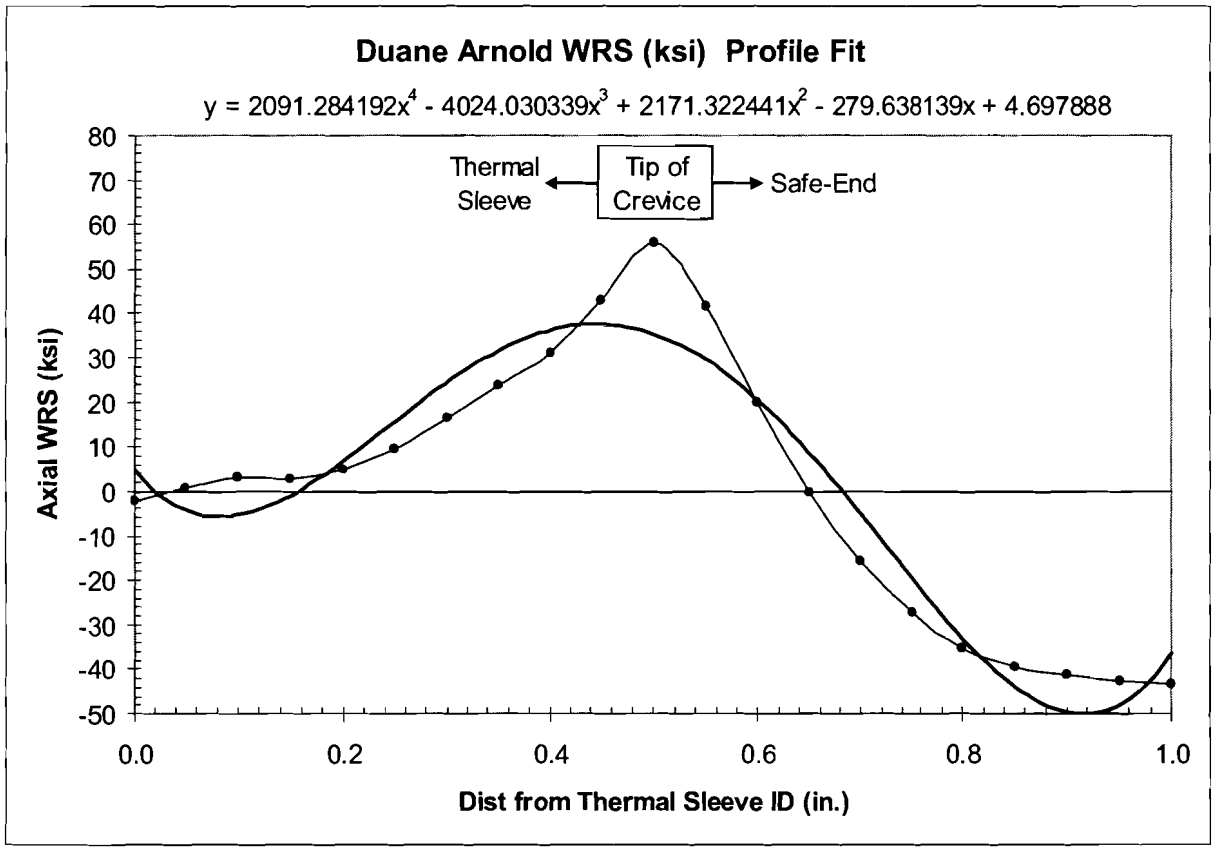
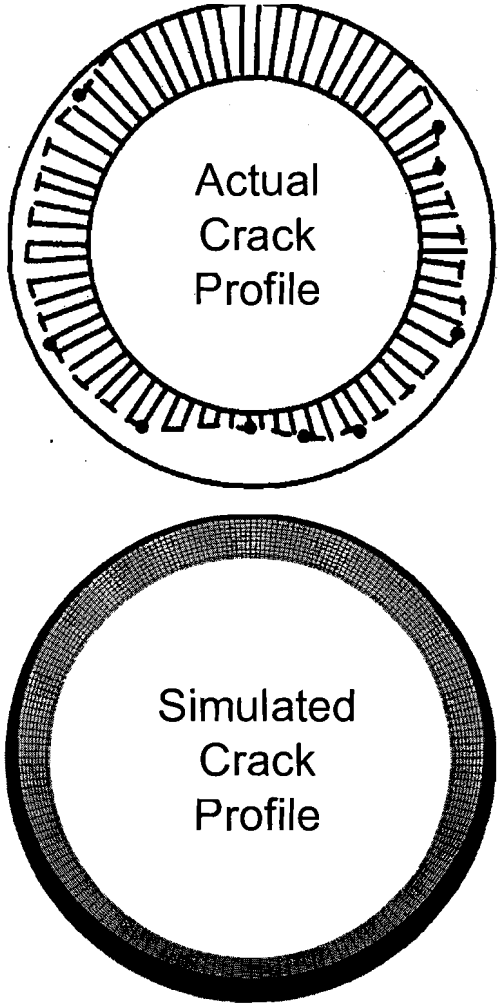
# Validation (cont'd)

*Duane Arnold Circumferential Crack*




**From 30% TW 360° Surface Flaw**

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# Preliminary Conclusions

- Assumption of semi-elliptical flaw shape shown to result in large unnecessary overconservatism
- All 51 subject welds are adequately covered by crack growth sensitivity cases that satisfy the evaluation criteria
- Results show tendency of circumferential surface cracks to show stable arrest
  - Axisymmetric welding residual stress profile must self-balance
  - Consistent with Wolf Creek experience given unlikeliness that four indications found in narrow depth band were growing rapidly at that time
- Sensitivity cases indicate a large beneficial effect of relaxation of secondary loads upon through-wall penetration
  - Detailed evaluations tend to support such a relaxation effect
  - Not credited in main cases

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# Nuclear Power Plant Security

ACRS Presentation

July 11, 2007

# Discussion Topics

- Post-9/11 Security Actions
- Energy Policy Act (EPAct)
- Security Rulemaking Objectives
- Regulatory Guidance
- ACRS Reviews
- Future for Security

# NRC Regulatory Approach to Security

- Requirements for Nuclear Power Plant Security are established in 10 CFR Part 73
- Regulations adopt Design Basis Threat (DBT) Approach
  - DBT establishes performance requirements
  - The DBT is informed by threat information; reviewed periodically, and updated as necessary
  - *"Largest reasonable threat against which a regulated private security force should be expected to defend under existing law"*

# Post-9/11 Security Actions

- Issued 5 Security-related Orders (2002-2003)
  - Interim Compensatory Measures
  - Overtime for Security Personnel
  - Training and Qualifications for Security Personnel
  - Access Authorization
  - Revision of the Design Basis Threat

# Post-9/11 Security Actions (cont.)

- Issued Security Advisories
- Issued Guidance Documents
- Enhanced coordination with Federal Agencies
  - Department of Homeland Security (DHS), NORAD, & FAA
- Conducted Force-On-Force evaluations
- Developed lessons learned from implementation and inspection of Orders, Force-On-Force, SFAQ's

# Energy Policy Act - 2005

- Enacted August 7, 2005
- Title VI focuses on nuclear security
- Several security provisions for NRC consideration
- Specific provisions for DHS/NRC interface on siting of new nuclear plants

# Energy Policy Act (cont.)

- Initiate security rulemaking with the following considerations:
  - Events of September 11, 2001
  - Assessment of a range of threats and multiple methods of implementation
  - Adequacy of planning for the protection of public health and safety in the event of a terrorist attack (force-on-force exercises)
  - Potential for fires, especially fires of long duration
  - Expanding the weapons capability of licensees in protection of facilities

# Security Rulemaking Objectives

- Make generically applicable the requirements imposed by Orders
- Add new requirements that resulted from insights gained during and following implementation of the Orders
- Incorporate, as applicable, the EPAct of 2005

# Security Rulemaking Objectives (cont.)

- Add security requirements for MOX fuel
- Enhance notification to the NRC for certain security events
- Address PRM 50-80 requesting regulations that would ensure security/safety interface remains intact
- Revise and enhance Access Authorization requirements

# Security Rulemaking

- 73.1 Design Basis Threat
  - Proposed rule published 11/06
  - Rule covers radiological sabotage and theft/diversion of special nuclear material
  - Key changes include:
    - multiple, coordinated groups of attackers
    - suicide attacks
    - and cyber threats
  - Final rule published 3/07

# Security Rulemaking (cont.)

- Part 73 Power Reactor Rulemaking (proposed rule published 10/06 )
  - 73.18 & 19 Enhanced Weapons (currently proposed to be applicable to nuclear plants and category I facilities)
  - 73.55 Physical Security for Power Reactors
  - 73.56 Personnel Access Authorization Requirements for Nuclear Power Plants
  - 73.58 Safety/Security Interface Requirements for Nuclear Power Plants
  - 73.71 Reporting of Safeguards Events
  - Appendix B to Part 73- General Criteria for Security Personnel
  - Appendix C to Part 73 – Licensee Safeguards Contingency Plans

# Security & New Reactors

- Incorporating Security into Designs of New Reactors
  - 73.62 Security Assessment Requirements for Nuclear Power Reactor Designs
    - Proposed rule to Commission 9/06
    - Commission disapproved rulemaking 4/07 (SRM-SECY-06-0204)
    - Staff directed to place some aspects of proposed rule in Part 52 rulemaking
  - Guidance for new reactors to proceed

# Regulatory Guidance

- Draft Regulatory Guides currently under development or revision. (To be published by the end of 2007)
  - New guide for Physical Security (73.55)
  - New guide for Training and Qualification (Appendix B)
  - New guide for Contingency Planning (Appendix C)
  - New guide for Access Authorization (73.56)
  - New guide for Safety/Security Interface (73.58)
  - New guide for Cyber Security (73.55(m))
  - New guide for Enhanced Weapons (73.18 and 73.19)
  - Revised RG 5.62 Reporting of Safeguards Events (73.71 and Appendix G)

# Regulatory Guidance

- Other existing and new regulatory guidance under development
- Drafts expected in late FY-08 and FY-09:
  - RG5.7, Entry/Exit Control for PA, VA, and MAA
  - RG5.12, General Use of Locks in Protection and Control of Facilities and Special Nuclear Material
  - RG5.44, Perimeter Intrusion Alarm Systems
  - RG5.65, VA Access Controls, Protection of Physical Security Equipment, and Key and Lock Controls
  - RG5.68, Protection Against Malevolent Use of Vehicles at Nuclear Power Plants
  - NUREG/CR-XXXX, Security Assessments for Nuclear Power Plant Design Certification and Combined License Application
  - NUREG/CR-1345 Rev. 1, Nuclear Power Plant Design Concepts for Sabotage Protection

# ACRS Reviews

- 73.55(m) Digital Computer and Communication Networks
- 73.58 Safety/Security Interface Requirements for Nuclear Power Plants
  - DG 5021 Safety/Security Interface
- Appendix C to Part 73 – Licensee Safeguards Contingency Plans (site response to large area fires)
  - DG 5016 Contingency Plans
- Other Security-Related Documents
  - NUREG/CR-XXXX, Security Assessments for Nuclear Power Plant Design Certification and Combined License Application
  - NUREG/CR-1345 Rev. 1, Nuclear Power Plant Design Concepts for Sabotage Protection

# Summary

- Security Rulemaking proceeding (due to EDO 1/2/08)
- Supporting Regulatory Guidance in development (summer, fall, 2007)
- ACRS reviews required for portions of rulemaking (fall, winter 2007)

7

# NUREG-1852
# Demonstrating the Feasibility and Reliability of Operator Manual Actions In Response to Fire

Erasmia Lois, PhD
Senior Risk and Reliability Engineer
Division of Risk Assessment and Special Projects
Office of Nuclear Regulatory Research

Presentation to
Advisory Committee on Reactor Safeguards
July 11, 2007

# Purpose of the Briefing

- Summarize changes made to NUREG-1852 to address ACRS comments during the June 6, 2007 meeting
- Request ACRS endorsement to publish the NUREG

# ACRS Comment #1

- Discuss adopting risk assessment and human reliability analysis tools to structure the judgment made when identifying the sources of uncertainties that could affect time margin estimates

# Changes made to NUREG-1852 to Address Comment #1

- Added text stating (section 2.2) that this report provides a deterministic approach; however
  - Risk assessment and particularly human reliability techniques may be useful for identifying the range of fire scenarios and related contexts and the possible operator manual actions that might be used.
  - The use of such risk-related techniques is not required.
  - Ultimately, the operator manual actions should meet the applicable deterministic criteria for feasibility and reliability.

# ACRS Comment #2

- Add a section in the beginning indicating that the level of analyses needed to justify meeting the criteria should be commensurate to the action proposed to be implemented

# Changes made to NUREG-1852 to Address Comment #2

- Added a paragraph in Chapter 1 stating
  - It is expected that for many cases, where extra time is clearly available and the actions are relatively simple, evaluating the criteria will be straightforward, requiring only simple justification and analysis
  - For complex cases, licensees alternatively may choose to comply with the requirements of Appendix R by performing appropriate design changes.
  - For these cases, licensees have the option to submit an exemption or license amendment request using detailed analyses of operator manual action on feasibility and reliability

# Changes made to NUREG-1852 to Address Comment #2 (cont)

- Added additional text in Chapter 3 noting that not all of the criteria will usually require significant analysis or even be applicable
  - Simple justification or analysis is sufficient if it can be shown that
    - sufficiently long time is available (e.g. several hours), and
    - there are no "unique" aspects of the fire that could prolong its extinguishment unduly, and
    - the proposed operator manual actions are relatively straightforward

# Changes made to NUREG-1852 to Address Comment #2 (cont)

- At the other extreme, a rigorous analysis and review is likely to be needed to account for all the criteria and how well each is met, if
  - the time available is relatively short (e.g., tens of minutes, at most) or
  - the operator manual actions are not straightforward or are somewhat complex (e.g., involving multiple operators or the same operator performing multiple actions), or
  - there are "unique" aspects to the fire making rapid extinguishment difficult

# ACRS Comment #3

- Discuss the combination of skills and expertise that would be appropriate for an expert panel if used to estimate time margins
- Discuss potential limitations of the approach

# Changes made to NUREG-1852 to Address Comment #3

- In Appendix B added Section B.5 summarizing the characteristics and types of expertise that would be appropriate for a panel
  - A multi-disciplinary team approach is recommended composed of
    - Independent specialists, recognized in at least one of the areas/specialties addressed
    - In general, include human reliability analysis, human factors, fire protection, operations, instrumentation and control engineering, training, procedure development, PRA, and other expertise as indicated by the fire scenarios and actions being examined
    - However, the disciplines involved may vary depending on the particular topic being analyzed

# Changes made to NUREG-1852 to Address Comment #3 (cont)

- Section B.5 also discusses advantages and disadvantages
  - Advantages
    - The participants' knowledge and expertise in the subject area
    - Can result in significant reductions in time and cost allocations compared to other evaluation techniques
    - Leverage the credibility of conclusions because of the panel members' expertise
  - Disadvantages
    - Elimination of minority view points because of consensus-based conclusions
    - The potential for the view of a "dominant" member to be overly influential in the decision making process.
    - Evidence that operators can sometimes be optimistic about action implementation times and such bias needs to be controlled
  - The section cites references for guidance controlling for various sources of bias.

8

# Protective Action Recommendation Project

## Source Term Identification Effort

Presented to the

**Advisory Committee on Reactor Safeguards**

July 12, 2007

by

**Shawn P. Burns**

Sandia National Laboratories

Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

# Identification of source term data represents a technical challenge.

- Complex phenomenology
  - Initiating event
  - Plant damage state
- Limited scope available
  - Accident progression analysis not possible
- Intellectual integrity required
  - Ad hoc source term definition to credible

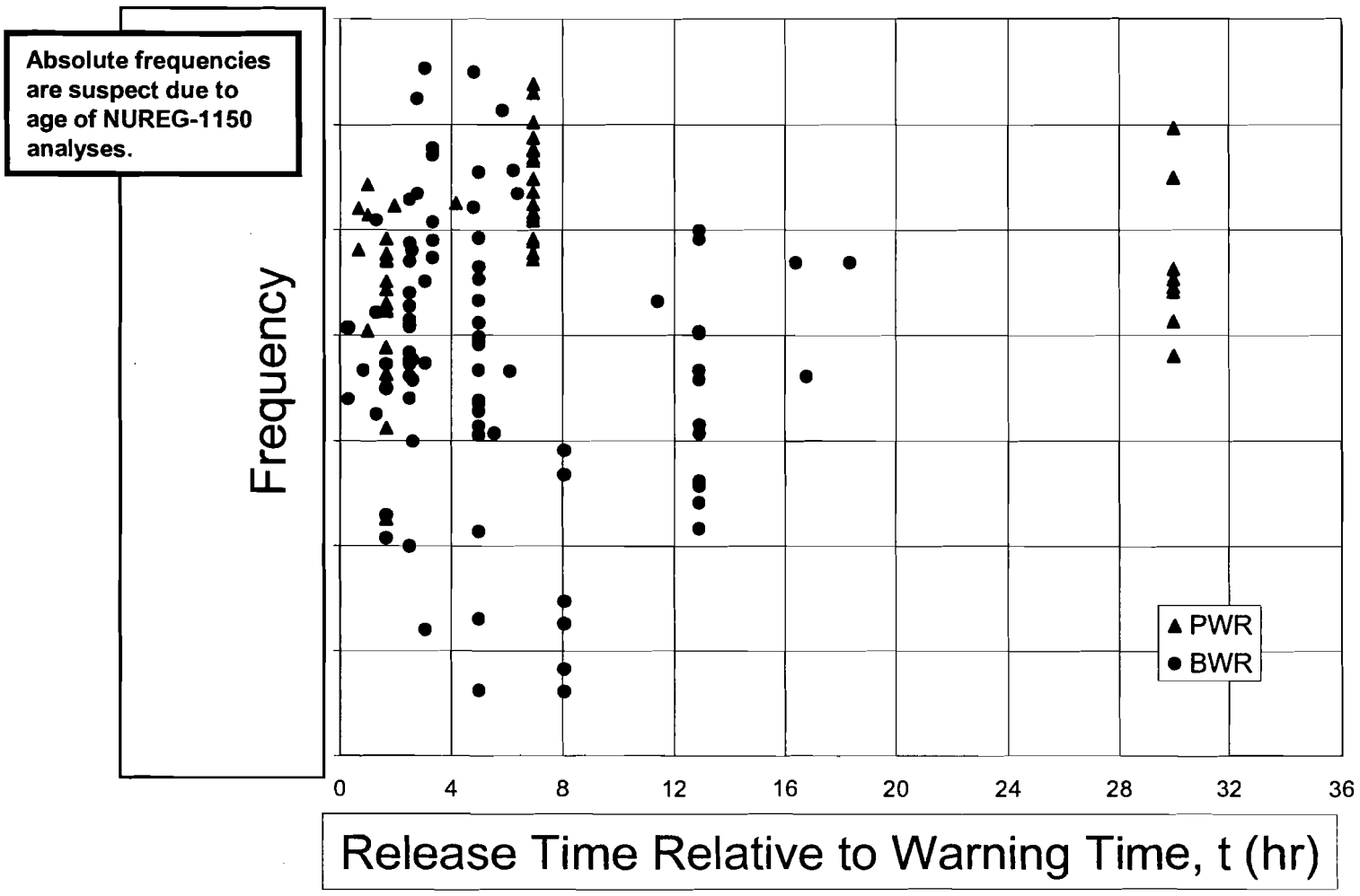
Sandia National Laboratories

# Challenge was met by mining historical source term analyses.

- Severe accident risk study
  - NUREG-1150
- Low Power and Shut Down
  - NUREG/CR-6143
  - NUREG/CR-6144
- Phenomenology and Risk Uncertainty Evaluation Program
  - NUREG/CR-5305
- Internal and externally initiated events

Sandia National Laboratories

# Accumulation of source term frequency data provides a basis for selection.

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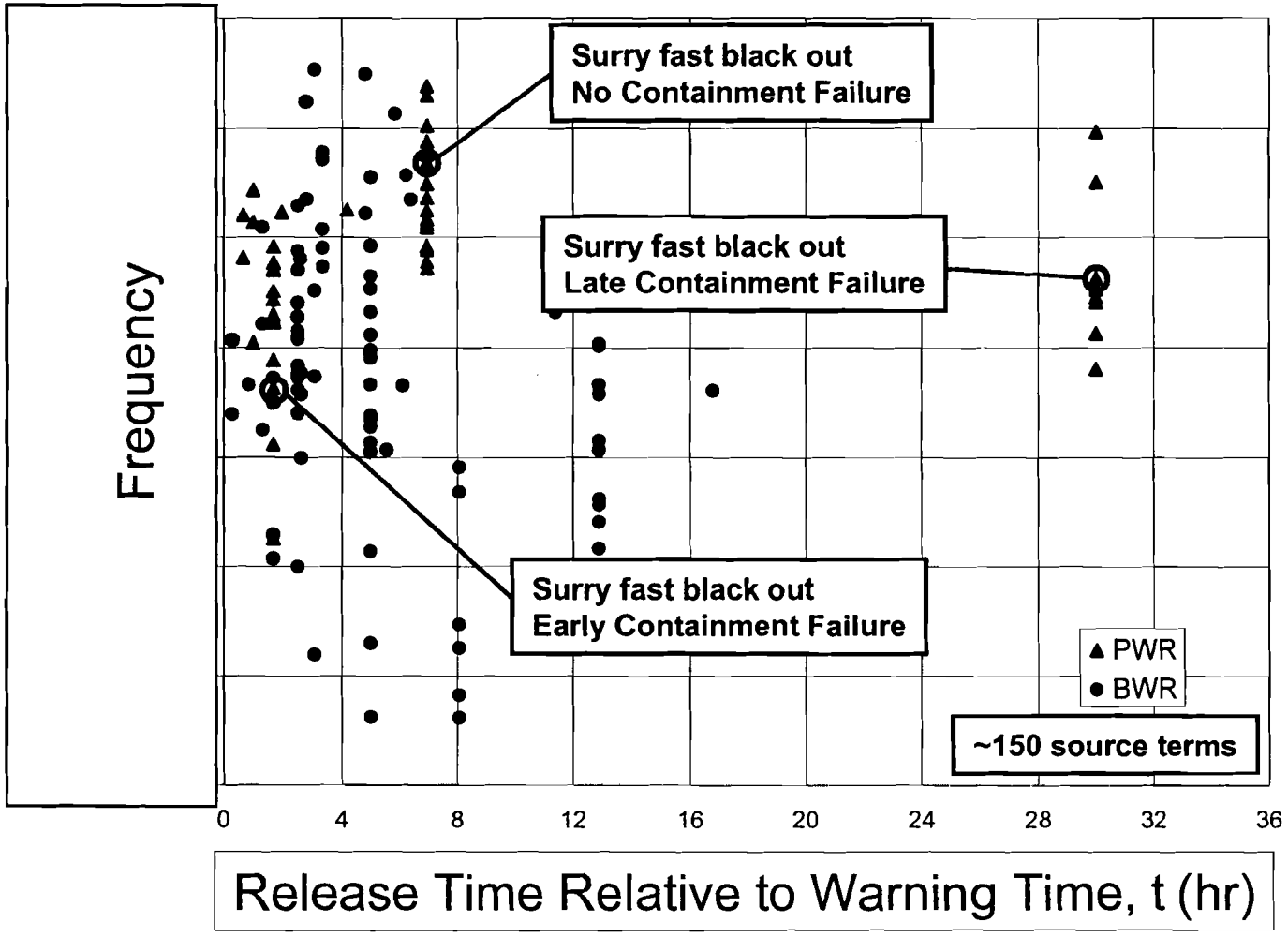
# Source term frequencies were obtained from site risk analysis documentation.

- Determine core damage frequency
  - $f_n$(plant damage state)
- Determine conditional containment failure frequency
  - $f_n$(plant damage state, accident progression)
- Identify characteristic source term

Sandia National Laboratories

# A total of 150 individual source terms were identified from reference literature.

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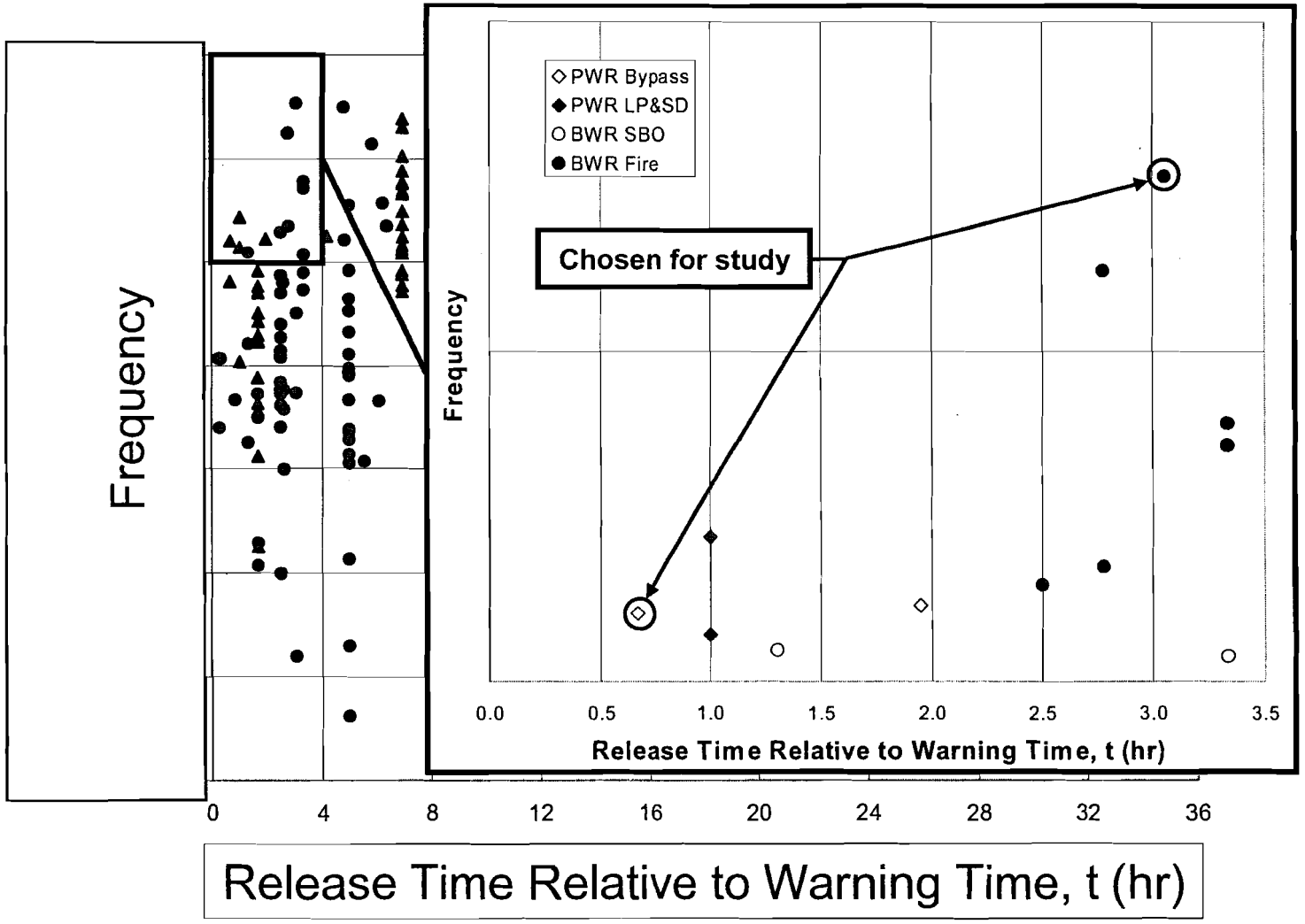
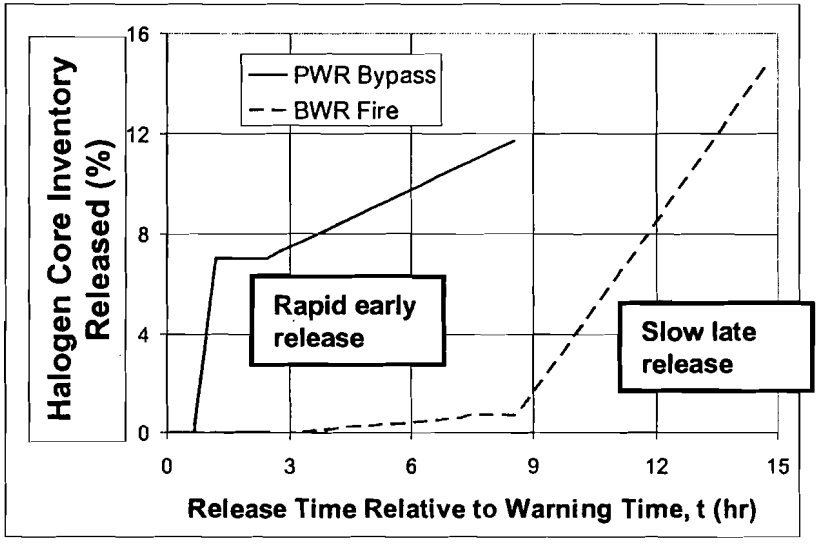
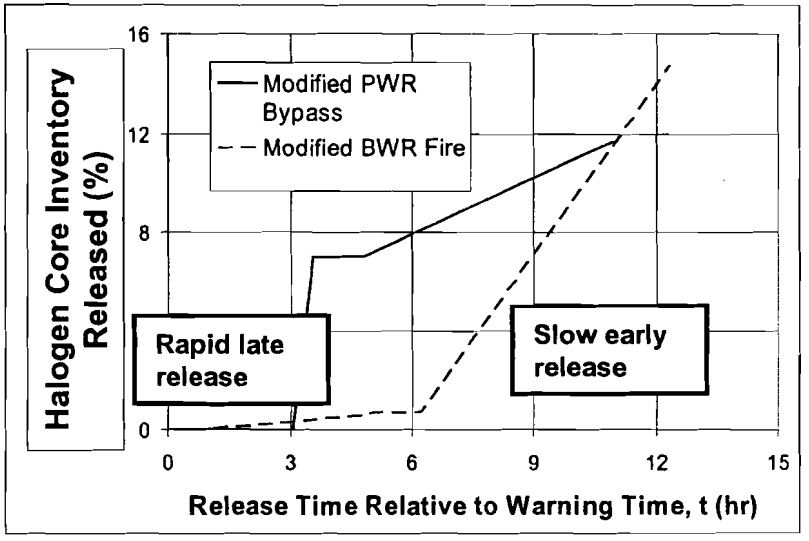
# Short time scale, high frequency events are the most compelling for this study.




Sandia National Laboratories

# Sensitivity to release details was explored by transposing release times.

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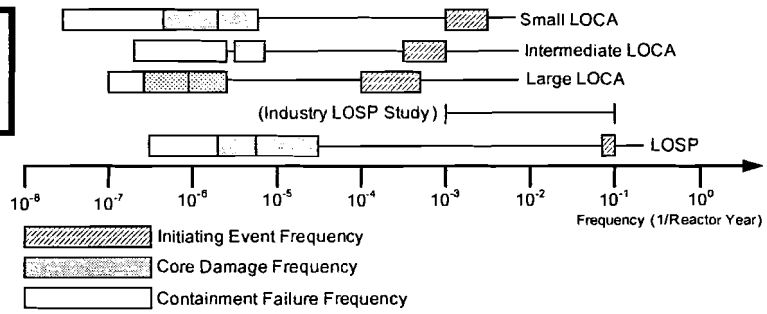
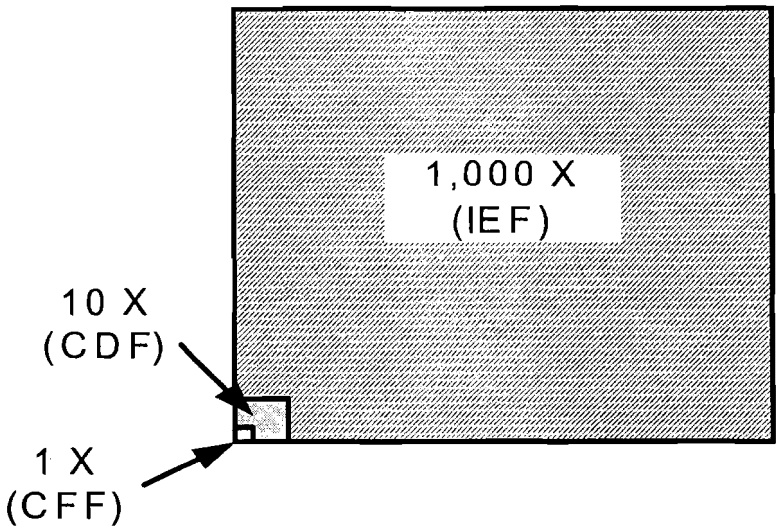
# General emergency declarations are based on emergency action levels.

**Emergency action levels correlate to initiating event frequencies.**




**Declarations of general emergencies may exceed core damage frequencies by several orders of magnitude.**

Sandia National Laboratories

# US NRC
# Protective Action Recommendation Study

## ACRS Briefing
## July 12, 2007

**Randolph L. Sullivan, CHP**
**Office of Nuclear Security and Incident Response**

# Introduction

- Staff recommended a review of protective action recommendation guidance as found in NUREG-0654, Supplement 3
- Commission directed that the study proceed
- Sandia chosen to support study
- Study began in late 2004

# Background

Commission Direction

"Continue to evaluate the NRC protective action recommendation guidance to assure that it continues to reflect our current state of knowledge with regard to evacuation and sheltering. Update the guidance, as necessary."

# Background

**Emergency Preparedness Planning Basis:**

- Key technical elements of EP planning basis:
  - Reactor accident probability is within the bounds of the Commission's Safety Goals (they are unlikely)
  - Accidental radiological releases (including security events) are no greater than identified in WASH-1400 (EPZ basis)
  - Radiological releases from accidents are no faster than those identified in WASH-1400, i.e., 30 minutes. (notification basis)

# Background

- EP is not risk informed
- Defense-in-depth measure from Safety Goal Policy
- Regulations largely prescriptive

# PAR Study

Objective

Investigate if the use of alternative protective actions can reduce public dose during severe accidents

# Technique

- Compare public dose consequences for alternative PAR regimens to the Supp 3 standard (radial keyhole evacuation)
- Absolute consequences not assessed
- Relative efficacy assessed qualitatively

# Technique

- Analyses for rapidly developing releases
- Analyses for more slowly developing releases
- Analyses for accidents w/o containment failure

# Technique

Establish source terms to be used

- Reflect EP Planning Basis (large early release)
- Used NUREG-1150 source terms
  - Desired a more current NRC reference

# Shawn Burns- Sandia

# Technique

- Used the NRC MACCS2 code
  - Models population movement
- Standard US meteorology
- Generic EPZ with about 80,000 people
- Varied Evacuation Time (ETE) from 4-10 hours
  - Varied travel speed accordingly

# Alternative PARs Tested

- Shelter in place (SIP) for various times – (within current regimen, but limited use)
- Preferred sheltering for various times (in large public buildings, etc.)
- Lateral evacuation (crosswind)
- Staged evacuation (evacuation nearby, initially shelter others)

# Stakeholder Input

- Discussed alternative PARs with State EP personnel
  - Practicality of implementation
  - Cost-benefit
  - Applicability to physical site

# Sociological Review

- Public likely to implement as directed
- Public requires consistent emergency information
- Other sociological factors for consideration

# Results for 10 Hr Evac

| Protective Action | Normalized to Total Sum | |
|---|---|---|
| | EF | LCF |
| SIP-2 hrs/Lateral evac | 0.00 | 0.00 |
| PS-2 hrs/Lateral evac | 0.00 | 0.00 |
| SIP-4 hrs/Lateral evac | 0.00 | 0.00 |
| PS-4 hrs/Lateral evac | 0.00 | 0.00 |
| Staged Evacuation | 0.00 | 0.02 |
| Radial Evacuation (constant speed) | 0.00 | 0.03 |
| SIP-2 hrs/Radial evac | 0.00 | 0.05 |
| SIP-8 hrs/Lateral evac | 0.00 | 0.05 |
| PS-2 hrs/Radial evac | 0.00 | 0.07 |
| PS-8 hrs/Lateral evac | 0.00 | 0.08 |
| SIP-4 hrs/Radial evac | 0.00 | 0.11 |
| PS-4 hrs/Radial evac | 0.00 | 0.13 |
| SIP-8 hrs/Radial evac | 0.26 | 0.23 |
| PS-8 hrs/Radial evac | 0.74 | 0.24 |

# Recommendations

- Consider revision of NUREG-0654, Supplement 3
- Evacuation remains the major element
- Consider early and staged evacuation
- Precautionary actions at Site Area Emergency are prudent
- Consider action regarding strategies that reduce evacuation times in order to reduce consequences

# Recommendations

- Enhance usefulness of ETEs for the planning process
  - Develop ETE for each potential protective action to improve the information for decision makers
- Planning for special needs groups not in special facilities should be enhanced

# Recommendations

- Shelter in place followed by evacuation is more protective than standard PAR for large early release at sites with longer evacuation times
- Sheltering of special needs individuals followed by evacuation can result in fewer consequences.
- Enhancements to emergency communication with the public were identified

# Next Steps

- ACRS Comments
- Revise draft NUREG
- Develop SECY Paper with recommendation

# SOARCA Considerations

- The SOARCA project may show that LER does not credibly exist
  - Staff may propose changes to the EP planning basis for Commission consideration
- Test efficacy of staged evacuation and sheltering in SOARCA project

U.S.NRC
UNITED STATES NUCLEAR REGULATORY COMMISSION
*Protecting People and the Environment*

# Questions?

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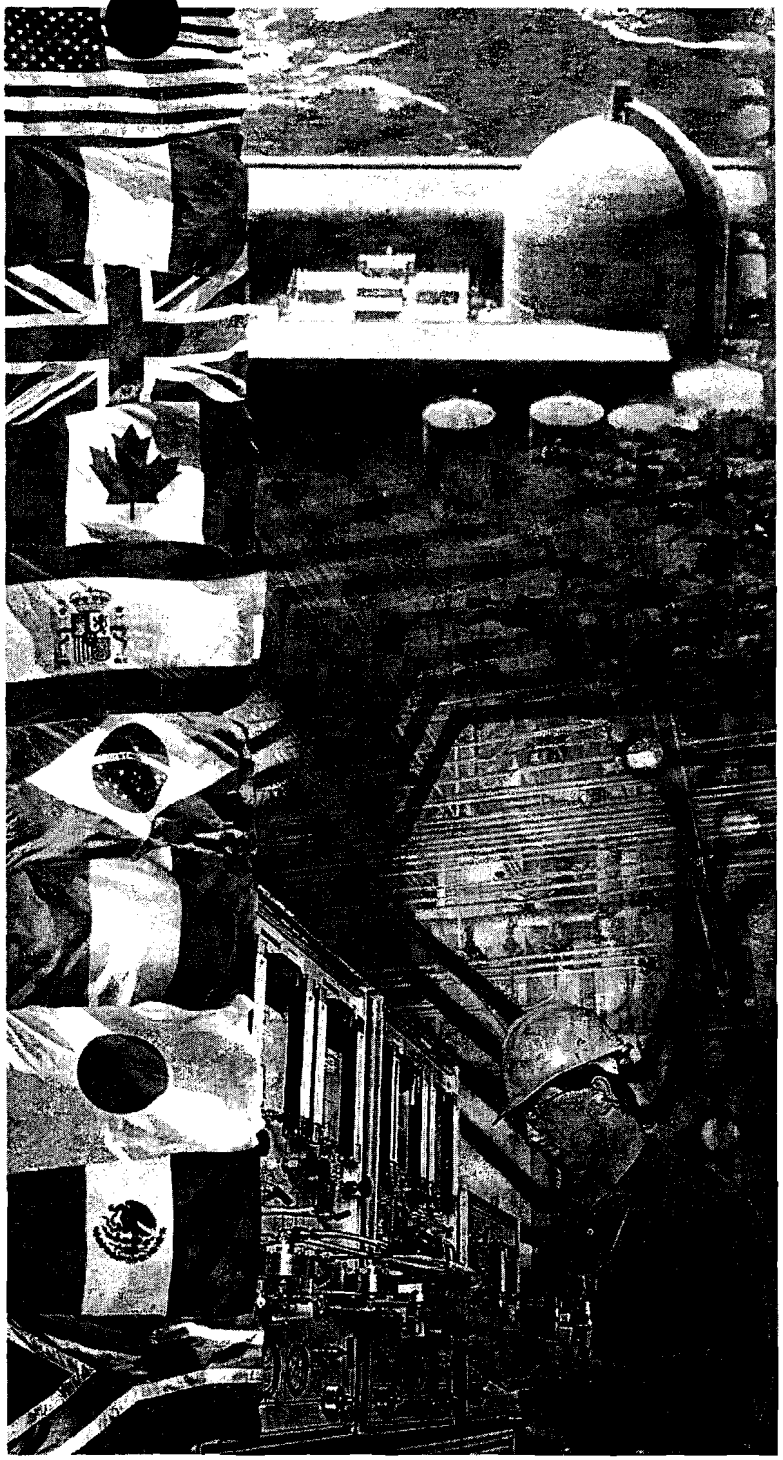
rxs3@nrc.gov



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# Risk-Informed Evaluation of Protective Action Strategies for Nuclear Plant Offsite Emergency Planning

**Presented to Advisory Committee on Reactor Safeguards – 12 July 2007**

**Dr. David E. Leaver - Polestar Applied Technology, Inc.**
**Dr. Stephen M. Hess – Electric Power Research Institute**
**Mr. Alan P. Nelson – Nuclear Energy Institute**

# EP Technical Basis

- Existing EP technical basis is contained in NUREG-0396.
  - Employs technology and state of knowledge that is over 30 years old.
  - Results significantly overestimate the risks associated with nuclear plant radiological accidents.
- Basis for the NUREG-0396 10-mile plume exposure planning distance:
  - Not risk-informed: uses conditional probability and does not reflect PRA results from the last 30 years.
  - Uses out-of-date source terms and a MACCS2-type peak dose, both of which are unrealistic.
  - Impact of EP actions not addressed: approach does not credit implementation of protective actions.

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# Objectives

1. Conduct initial research to develop a risk-informed (R-I) methodology for quantifying the relative effectiveness of offsite Protective Action Strategies (PAS).
   - Provide framework for potential implementation in offsite emergency planning (EP) process.
   - Support guidance clarification for protective action recommendations and decisions.
   - Take advantage of advanced communication technologies.

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# Objectives, continued

2. Provide framework for updated technical basis for EP, including consideration of a R-I approach and quantification of the margin in the 10-mile emergency planning zone (EPZ).
3. Provide technical input / insights to NUREG 0654 Supplement 3 revision.

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# Approach

1. Model utilized generic site and source terms.
2. Risk-informed using the following risk metrics:
   a. Early fatality risk.
   b. Latent cancer fatality risk.
   c. Early injury risk.
3. Model developed (DoRMET) to extend MACCS2 plume dispersion modeling to provide:
   - More detailed (and realistic) distribution of activity.
   - More realistic movement of population.
   - Coupling of PAS to conditions at time of accident (e.g., wind direction).
4. Evaluate PAS on basis of relative risk.
5. Provide evaluation of 10-mile plume exposure EPZ margin on basis of absolute risk.

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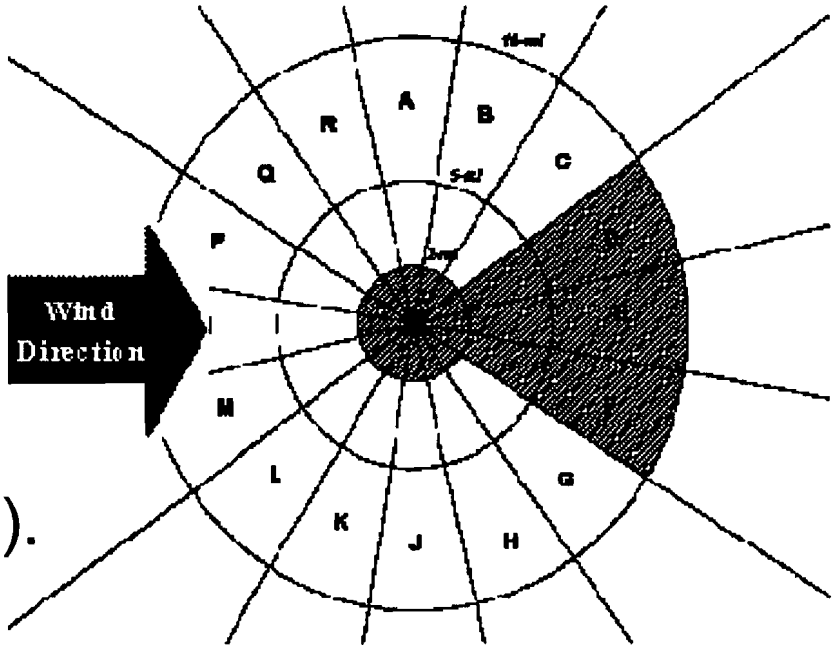
# Protective Action Strategies

## Four Primary Strategies

1. Shelter-in-Place.
2. Away from Reactor Evacuation (evac. along radial streamlines).
3. Away from Plume Evacuation (used to approximate realistic road networks which essentially always have a lateral component).
4. "Keyhole" Evacuation.

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EPRI ELECTRIC POWER RESEARCH INSTITUTE

# Study PAS Conclusions

- All PAS reduce Early Fatality Risk 1 to 2+ orders of magnitude per mile distance from reactor.
- Evacuation provides ~2 orders of magnitude lower Early Fatality Risk than Shelter-in-Place for region inside 5 miles.
- Away from Plume Strategy provides 1 to 2 orders of magnitude lower Early Fatality Risk than the Away from Reactor strategy near the site.
  - Away from Plume more like actual road network.
  - Away from Reactor overestimates dose.

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# Study PAS Conclusions (cont.)

- Keyhole Strategy is relatively ineffective from 2 to 5 miles compared to other evacuation strategies due to wind shift.
- Delayed evacuation start for far field has potential advantages and should be investigated further:
  - Increases in evacuation speed for those most at risk (inside 4 miles).
  - May avoid unnecessary evac. for those outside 4 miles.
- Breathing Masks provide some reduction in health risks.
- Preferred Shelter does not offer significant risk reduction.

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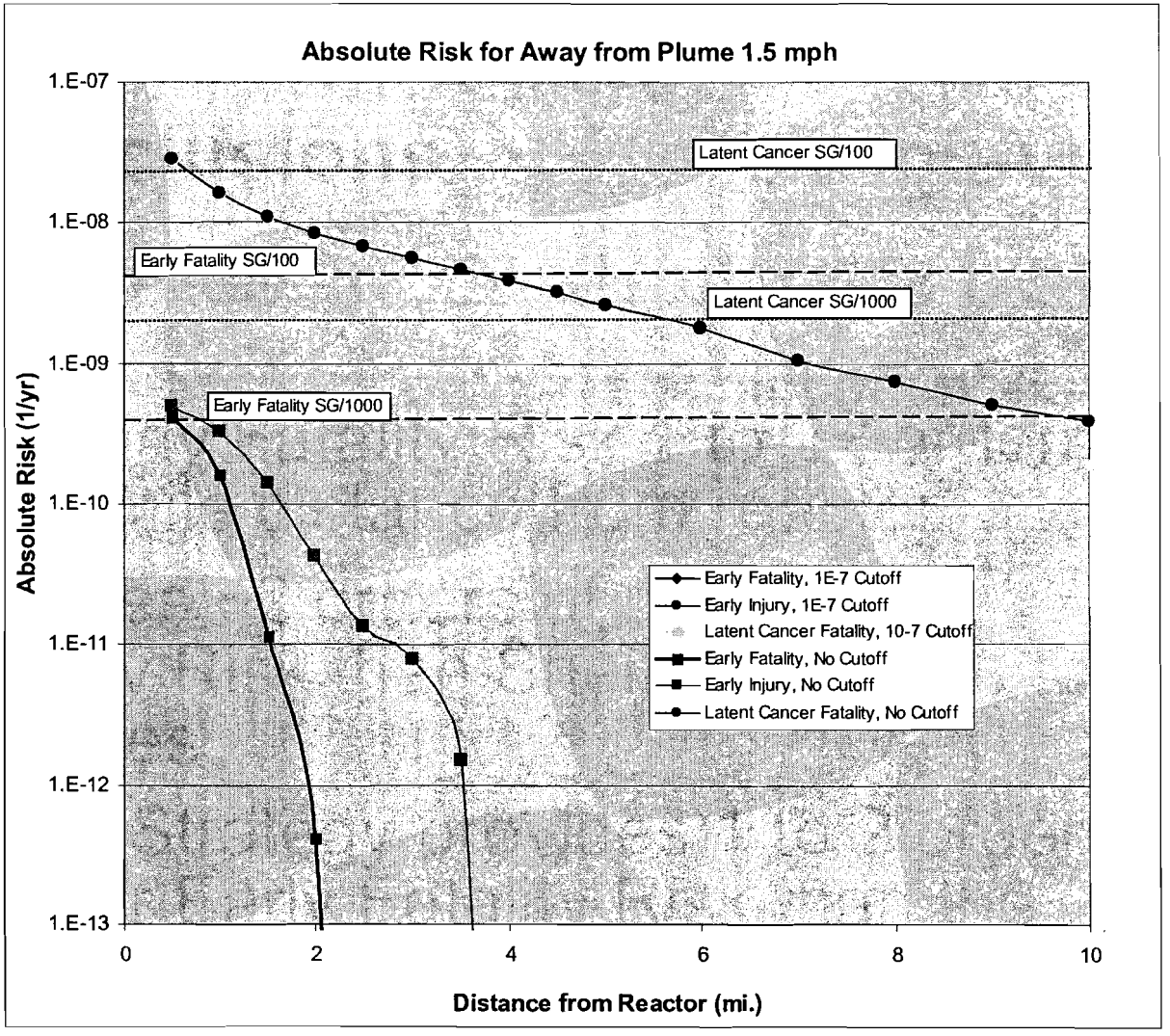
# EP R-I Tech. Basis Example Results

**Risk vs. Distance (Away from Plume Evacuation – 1.5 mph).**

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# Status / Next Steps

- EPRI report in final draft – to be published in August.
- Next steps under consideration:
  - Add model for a coarse, realistic road network.
  - Couple traffic engineering studies to evacuation speeds.
  - Perform site-specific pilot applications.
  - Investigate technical research necessary to support risk-informed EPZ specification.

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# Items for ACRS Consideration

- Public and industry could both benefit from development of a modern, R-I technical basis for EP.
  - Update EP basis to incorporate knowledge / experience obtained over past three decades of plant operation and severe accident research.
  - Replace assumptions and conservative bounding analyses with updated models, improved analytical methods, and operating data.
  - Incorporate knowledge obtained from plant PRAs into EP decision-making framework.
  - Present R-I EP basis in a way that properly characterizes risks and avoids unfounded fears on the part of the public.
- Would welcome opportunity for detailed presentation at future ACRS meeting.

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U.S.NRC

UNITED STATES NUCLEAR REGULATORY COMMISSION

*Protecting People and the Environment*

# Browns Ferry Unit 1 Restart/Recovery Summary and Plant Status

July 12, 2007

Presented by: Malcolm T. Widmann
Branch Chief, Region II/DRP

U.S.NRC

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# Agenda

- Restart History
- Restart Oversight Program
- Licensing
- Inspection
- Restart Process

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# Restart History

8/01/1974 – U1 Commercial Operation

**March 1985 - All 3 BF Units shutdown**

May 1991- U2 Restart

November 1995- U3 Restart

May 2007- U1 Restart

1974 1982 1991 1999 2007

9/17/1985 - SALP Letter

4/01/1992 – NRC letter: Return to service for U1 and U3

8/14/2003 – NRC Regulatory Framework Letter for Restart of U1

5/15/2007- NRC Authorized U1 Restart

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# Restart Agreement

"You currently have the units at Browns Ferry…in cold shutdown to correct various plant specific deficiencies and management problems. Through verbal agreements between Region II and TVA, we understand that none of these units will be restarted without NRC concurrence…"

September 17, 1985 - Systematic Assessment of Licensee Performance Letter

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# Restart Regulatory Framework

- Established in August 2003
- Identified actions to be completed by TVA prior to NRC consideration of restart authorization
  - Special Programs
  - NRC Generic Communications
  - TMI Action Items
  - License Amendments

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# NRC Restart Oversight

- Inspection Manual Chapter 2509
  - Issued September 2003
  - Policies and Requirements
- Ten Specific NRC Oversight Objectives
- NRC Restart Oversight Panel

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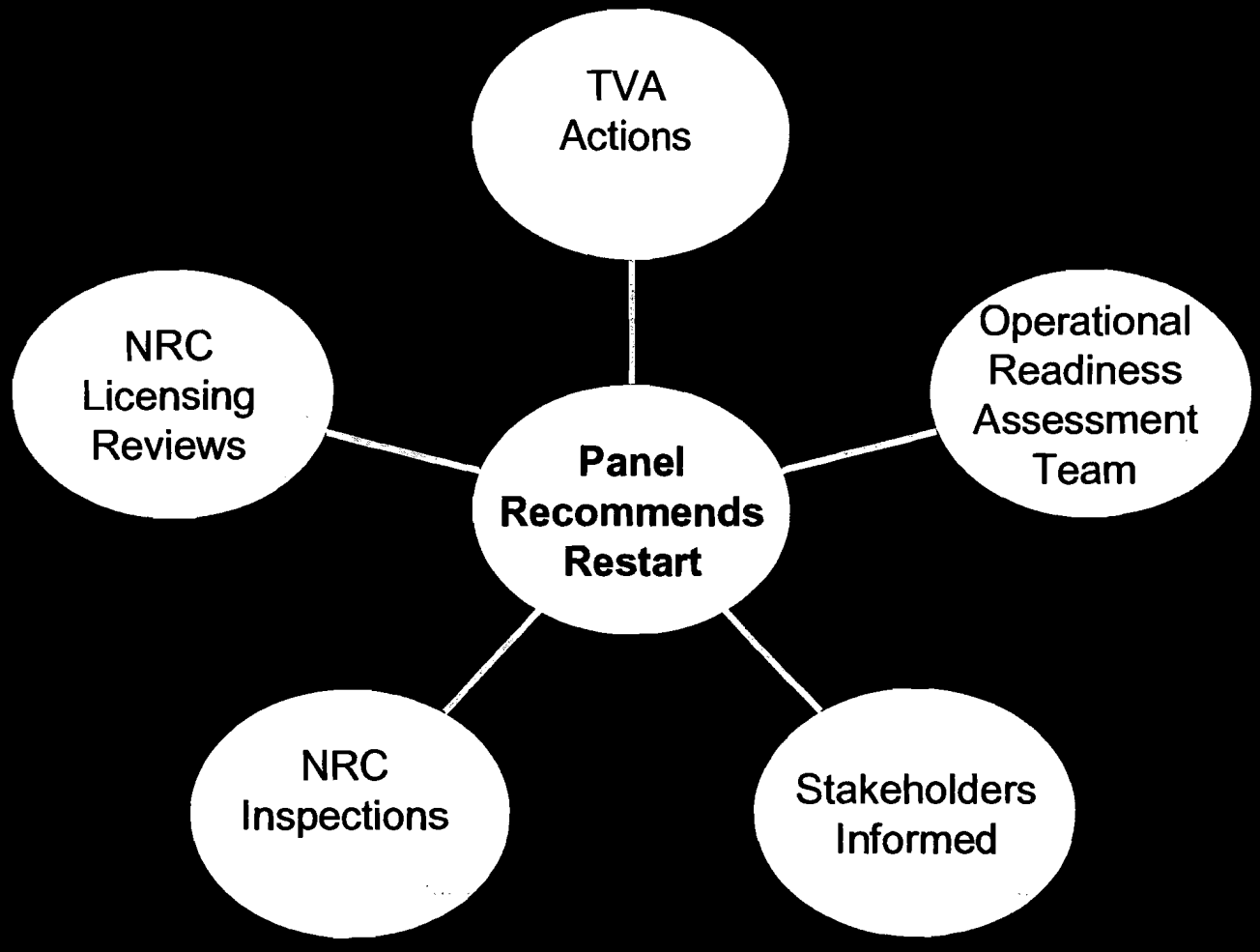
# Basis for Recommendation



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# NRC Licensing Reviews

- Status
  - Complete
  - Approximately 30,000 staff hours
- Scope
  - License Amendments
  - Exemptions
  - Conditions
  - Responses to Generic Communications
  - Commitments

U.S.NRC

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# NRC Restart Inspection

- Scope
  - Generic Communications
  - Special Programs
  - Plant Modifications
  - Renovation Work
  - System Pre-Operability Checklist (SPOC) Process
  - Area Turnover

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# NRC Restart Inspection (cont'd)

- Status
  - Restart Items Complete
  - Post-Restart Ongoing
  - Approximately 30,000 staff hours
  - Resident Inspectors continue to monitor ongoing TVA activities

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# Operational Readiness Assessment Team

- Status
  - Complete
  - Inspection Report issued May 1, 2007
  - Multi-Regional Team
- Report Conclusion
  - "TVA has adequately prepared Browns Ferry for a return to three unit operation"

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# TVA Implementation Actions

- Status
  - Complete
- TVA Completion Letter
  - May 12, 2007
  - Letter Certified that all items defined in the regulatory framework letters including testing associated with the Restart Test Program were complete

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# Stakeholder Interaction

- Public Panel Meetings
- Public Website
- Department of Homeland Security
- FEMA
- Local Officials
- State Officials

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# Current Status

- Restart authorized on May 15, 2007
- Reactor critical on May 22
- All three units operating
- Assessment under the Reactor Oversight Process
- Three resident inspectors onsite

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# Startup Issues/Transients

- Manual scram on 5/24 from 3% power due to failed electro hydraulic control fitting separated on #6 CIV

- Auto trip on 6/9 from 80% power due to false hi level indication on moisture separator 2A drain tank.

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# Startup Testing

- Turbine over speed test (6/2)
- Reactor core isolation cooling injection (6/13)
- High pressure coolant injection / reactor pressure vessel injection (6/19)
- FW, condensate & boosters pump trip test (6/23)
- MSIV closure (6/23)

- Pending: load reject test (TS amendment submitted)

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# Upcoming Activities

- Document Lessons Learned
- Termination of IMC 2509 and Restart Oversight Panel
- Ongoing Performance Assessments under Reactor Oversight Process
- Ongoing enhanced performance indicator (PI) inspections

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# QUESTIONS

# PROPOSED ASSIGNMENTS

| Topic | Lead | Partner |
|---|---|---|
| Digital I&C | Apostolakis | Bonaca |
| Fire Safety | Abdel-Khalik | Apostolakis |
| Reactor Fuel | Powers | Armijo |
| Neutronics and Criticality | Powers | Corradini |
| Human Factors | Bonaca | Maynard |
| Materials and Metallurgy | Armijo | Shack |
| Operations | Maynard | Apostolakis |
| Severe Accident Phenomenology & Consequence Analysis | Corradini | Abdel-Khalik |
| Thermal Hydraulics | Banerjee | Abdel-KhaliK |
| PRA | Apostolakis | Bonaca |
| Seismic & Structural Engineering | Shack | Powers |
| Future Plant Designs | Corradini | Powers |
| Special Projects | | |
| - PWR Sump Performance | Banerjee | Maynard |
| - SOARCA | Shack | Apostolakis |
| Long-term Research Needs | Powers | All Members |

13

G:\pphandout.wpd

# ACRS MEETING HANDOUT

| Meeting No. | Agenda Item | Handout No.: |
|---|---|---|
| 544th | 10 | 10.1 |

**Title: PLANNING & PROCEDURES/ FUTURE ACRS ACTIVITIES**

**Authors:**
**Sam Duraiswamy**

| List of Documents Attached | |
|---|---|
| | 10 |

| Instructions to Preparer | From Staff Person |
|---|---|
| 1. Paginate Attachments<br>2. Punch holes<br>3. Place Copy in file box | Sam Duraiswamy |

July 11, 2007 (4:22pm)
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**INTERNAL USE ONLY**

SUMMARY/MINUTES OF THE
ACRS PLANNING AND PROCEDURES SUBCOMMITTEE MEETING
July 10, 2007

The ACRS Subcommittee on Planning and Procedures held a meeting on July 10, 2007, in Room T-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 8:45 am and adjourned at 10:00 am.

ATTENDEES
W. Shack
M. Bonaca
S. Abdel-Khalik

ACRS STAFF
F. Gillespie
S. Duraiswamy
H. Nourbakhsh
G. Hammer
D. Fischer
J. Gallo
T. Santos
M. Afshar-Tous
Z. Abdullahi
M. Banerjee

1) Review of the Member Assignments and Priorities for ACRS Reports and Letters for the July ACRS meeting

Member assignments and priorities for ACRS reports and letters for the July ACRS meeting are attached (pp. 8). 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 July ACRS meeting be as shown in the attachment (pp. 8).

2) Anticipated Workload for ACRS Members

The anticipated workload for ACRS members through October 2007 is attached (pp. 9-11). 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 also discussed and developed recommendations on items requiring Committee action (pp. 12).

RECOMMENDATION

The Subcommittee recommends that the members provide comments on the anticipated workload. Changes will be made, as appropriate.

3) Appointment of New Members

In a Staff Requirements Memorandum (SRM), dated June 15, 2007, (pp. 13) the Commission states the following:

- The Commission has approved the appointment of Mr. John W. Statkar, Mr. Lew W. Myers, and Dr. Dennis C. Bley to the ACRS.
- The Commission expressed the need for urgency in securing expertise in digital instrumentation and control for the ACRS.
- The Commission also supported solicitation of additional candidates with expertise in materials engineering and seismic and structural engineering.

On June 27, 2007, Mr. Myers declined the offer to become an ACRS member due to personal issues. Also, Mr. Sieber offered his resignation from the Committee on June 27, 2007, but he has agreed to become a consultant. Mr. Sieber's resignation will become effective upon his conversion to a consultant. As a result of these developments, the Committee needs to have members with operating experience.

The ACRS staff is in the process of preparing draft Federal Register Notice and Press Release soliciting candidates with expertise in the areas of Digital I&C, Materials Engineering, and Plant Operations. The draft Federal Register Notice and Press Release will be sent to the Commission for approval after review by the Planning and Procedures Subcommittee.

RECOMMENDATION

The Subcommittee recommends that the Committee decide on the need for members with expertise in the areas of Structural and Seismic engineering and whether the Committee's expertise in these areas could be augmented through the use of consultants.

4) SRM Resulting from the ACRS Meeting with the Commission

In an SRM dated June 22, 2007, (pp. 14-15) resulting from the ACRS meeting with the Commission on June 7, 2007, the Commission states the following:

- The Commission supports the Committee's recommendations in its letter dated May 18, 2007 concerning digital I&C systems. In response, prior to the July 18, 2007 Commission meeting, the staff should assure that the following actions are included in the Digital I&C Project Plan with appropriate completion dates to support development of the final regulatory guidance on diversity and defense in depth:

  - Develop an inventory and classification (e.g., by function or other characteristics) of the various types of digital hardware and software systems that are being used and are likely to be used in nuclear power plants.

  - Evaluate the operating experience with digital systems in the nuclear and other industries to obtain insights regarding potential failure modes.

- The staff should continue to evaluate digital I&C designs against current or interim guidance, as applicable, including the requirement for backup features. The staff should provide the interim guidance to the Commission by September 30, 2007.

- The Commission values ACRS' biennial review of NRC's Safety Research Program. In its next report, due March 2008, the Committee should identify any gaps it perceives in the research program and provide recommendations on redirecting funding to high priority areas. In addition, the Committee should identify areas where the research needs are considered to have been satisfied.

RECOMMENDATION

The Subcommittee recommends the following:

- The ACRS staff should obtain copies of the digital I&C interim guidance, when available, which is due to the Commission on September 30, 2007. Subsequent to receiving this document, Dr. Apostolakis should decide whether the Committee should review this document during the September ACRS meeting.

- Members responsible for providing input to the ACRS report on the NRC Safety Research Program should address the Commission request when preparing the draft Chapters in their assigned areas of responsibility.

5) SRM Related to Combined License Renewal Application Review

In an SRM dated June 22, 2007, (pp. 16-18), stemming from the Commission's review of the Combined License Review Task Force Report, the Commission states the following:

> The Advisory Committee on Reactor Safeguards (ACRS) should consider pursuing efficiencies and effectiveness in the review of subsequent COLs by adopting a "delta" review approach but only after the completion of the first COL of each design type. The ACRS, with staff input from an expanded acceptance review, could focus their reviews on the significant differences between the reference COLs and subsequent COLs. These differences would include the site-specific design features of the facility, including security design features and emergency plans.

It should be noted that several members have already discussed the use of the "delta" review approach. The above Commission direction is consistent with the approach previously discussed by the members in reviewing COL applications.

RECOMMENDATION

The Subcommittee recommends that the members take note of the Commission direction which is consistent with the approach previously discussed by the members.

6) ACNW&M Meeting on Spent Nuclear Fuel Recycle White Paper

In an SRM dated February 7, 2006, stemming from the Commission's review of the ACNW Action Plan for FY 2006 and 2007, the Commission stated that the ACNW should remain abreast of industry, technical and legal developments in the areas of spent fuel storage, disposal, and reprocessing to ensure that members will be ready to provide advice in these areas, should the need arise.

In response, the ACNW&M prepared a White Paper to:

- Capture the historical approaches to the development, design, and operation of spent nuclear fuel recycle facilities
- Summarize the potential advanced spent nuclear fuel recycle technologies
- Identify technical regulatory issues to be faced if advanced spent nuclear fuel recycle technologies are implemented

A draft of this White Paper had been issued for comment and also sent to the ACRS members on June 28, 2007. The ACNW&M plans to discuss the Paper and solicit comments during the meeting on Wednesday, July 18, 2007.

In an SRM dated June 28, 2007 related to Regulatory Options for Licensing Facilities Associated with the Global Nuclear Energy Partnership (GNEP) (pp. 19-20), the Commission states:

The ACRS should be the lead advisory committee for the burner reactor and reprocessing facility and should work jointly with the ACNW&M on matters of common interest. The staff should note the discussions the Commission had with the ACRS about the potential difficulties in coming up with a framework for licensing co-located closed fuel cycle facilities.

Interested members of the ACRS should consider attending the ACNW&M meeting on July 18, 2007.

RECOMMENDATION

The Subcommittee recommends that those members who are interested in attending the ACNW&M meeting on July 18, 2007 inform John Flack.

7) Quadripartite Working Group Meeting

Germany's Reaktor-Sicherheitskommission (RSK) will host the first Quadripartite Working Group (WG) meeting on the topic of "Sump Screen Blockage" on October 17-18, 2007, in Erlangen, Germany. An agenda for this meeting is attached (pp. 21-22). During the April meeting, the Committee authorized Dr. Banerjee, Dr. Bonaca, Dr. Abdel-Khalik, and Dr. Wallis to attend this WG meeting. [Note: Drs. Bonaca and Abdel-Khalik will inform Mugeh within two weeks whether or not they will attend this meeting.]

The members who are scheduled to attend this WG meeting should identify topics for their papers and should also provide their travel plans.

RSK is considering hosting another WG meeting to be held concurrently with the first WG meeting on the topic of digital I&C. RSK is requesting feedback.

RECOMMENDATION

The Subcommittee recommends the following:

- Drs. Bonaca and Abdel-Khalik should inform Mugeh whether or not they will attend the meeting.

- Members scheduled to attend the WG meeting should identify topics for their papers and provide their travel plans to Mugeh and Mugeh should keep the members informed of the schedule for submitting papers.

- Members should provide feedback regarding a second WG meeting on the topic of digital I&C.

8) Scheduling Subcommittee Meetings

During last month's meeting, Members discussed establishing the second week after each Full Committee meeting as preferred dates for Subcommittee meetings. The preferred meeting days would be Thursday and Friday of that week. Since ACNW&M meetings are usually held this week, ACRS Subcommittee meetings may have to be held in the Commissioner's Conference Room or the Subcommittee room. Currently, the day before each Full Committee meeting is used for Subcommittee meetings.

RECOMMENDATION

The Subcommittee recommends that the ACRS staff:

- Schedule Subcommittee meetings during the second week after each Full Committee meeting.

- Schedule multiple Subcommittee meetings on back-to-back days.

- Continue to schedule Subcommittee meetings the day before each Full Committee meeting.

9) ACRS/ACNW&M Self-Assessment

Based on an August 6, 1999 SRM (Self Assessment of ACRS and ACNW Performance) the periodic Self-Assessment Report and the ACRS and ACNW Operating Plan can be combined into one annual report to the Commission. This report is due on November 1, 2007. As part of the Self-Assessment process, the ACRS and ACNW, by choice, have utilized surveys as a means of obtaining stakeholder input. At this time, this survey duplicates other methods (semiannual office assessments and stakeholder feedback forms) of obtaining stakeholder input. In addition, the survey does not seem to provide high level comments that would add value to the processes set forth by the Agency and utilizes the office's contract funds. The ACRS/ACNW&M staff recommends that the Committees eliminate the survey tool and use the other methods required by the Agency to obtain stakeholder input. These methods would be supplemented by quarterly meetings between the Committee Chairmen and Commissioners as well as follow-up meetings between the Executive Director and Office Directors.

Results of the 2007 self-assessment survey are attached (pp. 23-95) Internal and external stakeholders' comments in response to the survey will be discussed.

RECOMMENDATION

The Subcommittee recommends that the Committee provide feedback on the recommended elimination of the survey as part of the self-assessment process.

10) Member Issue

Dr. Sam Armijo requests Committee approval and support to attend the 2007 International LWR Fuel Performance meeting from September 30 to October 3, 2007 in San Francisco, California. (pp. 96-109)

RECOMMENDATION

The Subcommittee recommends that the Committee approve the travel request.

# ANTICIPATED WORKLOAD
## July 11-13, 2007

| LEAD MEMBER | BACKUP | LEAD ENGINEER/ BACKUP | ISSUE | PRIORITY | BASIS FOR REPORT PRIORITY | SUB. MTG DATES |
|---|---|---|---|---|---|---|
| Apostolakis | — | Junge | Revisions to Draft Final NUREG-1852, "Demonstrating the Feasibility and Reliability of Operator Manual Actions in Response to Fire" | A | To support staff schedule | — |
| Bonaca | — | Banerjee | Draft NUREG-0654, Rev. 3, Criteria for Protective Action Recommendations for Severe Accidents | A | To support staff schedule | — |
| | | Banerjee | Activities in the Safeguards and Security Areas (Open/Closed) **[INFORMATION BRIEFING]** | — | — | — |
| Corradini | — | Fischer | Response to the 5/16/07 SRM Related to the Feasibility of the ACRS Review of the Sampling Methodology and Statistical Thresholds Associated with ITAAC. | A | To respond to Commission SRM | — |
| Kress | — | Fischer | ACRS Report on Technology Neutral Framework for Future Plant Licensing | A | Commitment made to the Commission at the June 7 ACRS/Commission meeting that a report will be issued in July. | — |
| Maynard | — | Junge | Browns Ferry Unit 1 Restart Panel's Report **[INFORMATION BRIEFING]** | — | — | — |
| Powers | Banerjee/ Shack/ Maynard | Nourbakhsh | Preliminary Results of the Quality Assessment of Selected NRC Research Projects | — | Report to be completed in October | — |

# ANTICIPATED WORKLOAD
## July 11-13, 2007 (Cont'd)

| LEAD MEMBER | BACKUP | LEAD ENGINEER/ BACKUP | ISSUE | PRIORITY | BASIS FOR REPORT PRIORITY | SUB. MTG DATES |
|---|---|---|---|---|---|---|
| Shack | — | Hammer<br><br>Nourbakhsh | Dissimilar Metal Weld Issue<br><br>State-of-the Art Reactor Consequence Analysis **[SUBCOMMITTEE REPORT]** | Report as needed<br><br>— | — | —<br><br>**7/10/07** |
| | | | | | | |

# ANTICIPATED WORKLOAD
## September 6-8, 2007

| LEAD MEMBER | BACKUP | LEAD ENGINEER/ BACKUP | ISSUE | PRIORITY | BASIS FOR REPORT PRIORITY | SUB. MTG DATES |
|---|---|---|---|---|---|---|
| Bonaca | — | Hammer | License Renewal Application and Final SER for the Vermont Yankee Nuclear Power Station | A | To support staff schedule | **6/5/07** |
| | — | Hammer | **Subcommittee** Report - Interim Review of the License Renewal Application for the FitzPatrick Nuclear Plant | — | — | **9/5/07** |
| Maynard | — | Banerjee | License Renewal Application and the Final SER for the Pilgrim Nuclear Power Station | A | To support staff schedule | **4/4/07** |
| Powers | Shack/ Banerjee/ Maynard | Nourbakhsh | Draft Report on the Quality Assessment of the Research Projects on: Fatigue Crack Flaw Tolerance in Nuclear Power Plant Piping; Cable Response to Live Fire (CAROLFIRE) Testing; and Technical Review of On-line Monitoring Techniques for Performance Assessment | B | Report to be completed in October | — |
| | — | Nourbakhsh | Draft Report on the NRC Safety Research Program | B | Report to be completed in December | — |
| Shack | — | Bessette | Proposed RES Recommendation for Resolving GSI-156.6.1, Pipe Break Effects on Systems and Components Inside Containment | A | To support staff schedule | — |
| | — | Nourbakhsh | State-of-the-Art Reactor Consequence Analysis | A | To support staff schedule | **7/10/07** |

# ANTICIPATED WORKLOAD
## October 4-6, 2007

| LEAD MEMBER | BACKUP | LEAD ENGINEER/ BACKUP | ISSUE | PRIORITY | BASIS FOR REPORT PRIORITY | SUB. MTG DATES |
|---|---|---|---|---|---|---|
| Apostolakis | — | Nourbakhsh | Draft Guidance on Performance of Sensitivity and Uncertainty Analyses of PRA Results for Risk-Informed Activities **[TENTATIVE]** | A | To support staff schedule | TBD |
| Banerjee | — | Abdullahi | Extended Power Uprate Application for the Susquehanna Nuclear Plant | A | To support staff schedule | **9/20/07 - 9/21/07** |
| Corradini | — | Hammer | Review of Selected Chapters of the SER Associated with the ESBWR Design Certification | Report as needed | — | — |
| Maynard | — | Banerjee | Industry Activities **[INFORMATION BRIEFING]** | — | — | — |
| Powers | Shack/ Banerjee/ Maynard | Nourbakhsh | Draft Final Report on Quality Assessment of the NRC Research Projects on: Fatigue Crack Flaw Tolerance in Nuclear Power Plant Piping; Cable Response to Live Fire (CAROLFIRE) Testing; and Technical Review of the Online Monitoring Techniques for Performance Assessment | A | To support pre-established schedule | — |
| | Cognizant Members | Nourbakhsh | Draft Report on the NRC Safety Research Program | B | Report to be completed in December | — |

# Items Requiring Committee Action

1 **SRP 19, Probabilistic Risk Assessment** (Open)

**Member:** George Apostolakis **Engineer:** Hossein Nourbakhsh

**Estimated Time:**

**Purpose:** Determine a Course of Action

**Priority:** High

**Requested by:** NRR

The staff proposes revisions to NUREG-0800, Standard Review Plan (SRP), Section 19.0, Rev. 2, "Probabilistic Risk Assessment and Severe Accident Evaluation for New Reactors," and the initial issuance of Section 19.2, "Review of Risk Information Used to Support Permanent Plant specific Changes to the Licensing Basis: General Guidance."

The Planning and Procedures Subcommittee requests that Dr. Apostolakis be prepared to make a recommendation at the July Full Committee Meeting on whether or not the Committee should review these revisions.

June 15, 2007

MEMORANDUM TO: Frank P. Gillespie, Executive Director
Advisory Committee on Reactor Safeguards

FROM: Andrew L. Bates, Acting Secretary **/RA/**

SUBJECT: STAFF REQUIREMENTS - COMSECY-07-0016 - RECOMMENDATION OF THE ACRS MEMBER CANDIDATE SCREENING PANEL FOR APPOINTMENT OF ACRS MEMBERS

The Commission has approved the appointments of Mr. John W. Stetkar, Mr. Lew W. Myers, and Dr. Dennis C. Bley to the Advisory Committee on Reactor Safeguards (ACRS).

As the next step in appointment process, Mr. Stetkar, Mr. Myers, and Dr. Bley should be requested to complete the appropriate personnel and Confidential Financial Disclosure Report (SF 450) for review by the General Counsel and the Office of Human Resources. Subject to resolution of any concerns expressed by HR and OGC, the staff should forward to SECY letters of appointment for the Chairman's signature.

The Commission expressed the need for urgency in securing expertise in digital instrumentation and control for the ACRS. The Commission also supported solicitation of additional candidates with expertise in materials engineering and structural and seismic engineering.

cc: Chairman Klein
Commissioner McGaffigan
Commissioner Merrifield
Commissioner Jaczko
Commissioner Lyons
OGC
OHR

IN RESPONSE, PLEASE
REFER TO: M070607

June 22, 2007

MEMORANDUM TO: Frank P. Gillespie, Executive Director
Advisory Committee on Reactor Safeguards

Luis A. Reyes
Executive Director for Operations

FROM: Annette L. Vietti-Cook, Secretary **/RA/**

SUBJECT: STAFF REQUIREMENTS - MEETING WITH ADVISORY COMMITTEE ON REACTOR SAFEGUARDS (ACRS), THURSDAY, JUNE 7, 2007, COMMISSIONERS' CONFERENCE ROOM, ONE WHITE FLINT NORTH, ROCKVILLE, MARYLAND (OPEN TO PUBLIC ATTENDANCE)

The Commission met with the Advisory Committee on Reactor Safeguards (ACRS) to discuss the Committee's activities and current focus.

The Commission supports the Committee's recommendations in its letter dated May 18, 2007, concerning digital instrumentation and control systems (ADAMS ML071380437). In response, prior to the July 18, 2007, Commission meeting, the staff should assure that the following actions are included in the Digital I&C Project Plan with appropriate completion dates to support development of the final regulatory guidance on diversity and defense in depth:

1. Develop an inventory and classification (e.g., by function or other characteristics) of the various types of digital hardware and software systems that are being used and are likely to be used in nuclear power plants.

2. Evaluate the operating experience with digital systems in the nuclear and other industries to obtain insights regarding potential failure modes.

(EDO) (SECY Suspense: 7/18/07)

In the interim (prior to development of the final regulatory guidance), the staff should continue to evaluate digital I&C designs against current or interim guidance, as applicable, including the requirement for backup features. The staff should provide its interim guidance to the Commission by September 30, 2007.

The Commission values ACRS's biennial review of NRC's safety research program. In its next report, due March 2008, the Committee should identify any gaps it perceives in the research program and provide recommendations on redirecting funding to high priority areas. In addition, the Committee should identify areas where the research needs are considered to have been satisfied.

cc: Chairman Klein
Commissioner McGaffigan
Commissioner Merrifield
Commissioner Jaczko
Commissioner Lyons
OGC
CFO
OCA
OIG
OPA
Office Directors, Regions, ACRS, ACNW, ASLBP (via E-Mail)
PDR

June 22, 2007

MEMORANDUM TO: Luis A. Reyes
Executive Director for Operations

Karen D. Cyr
General Counsel

Frank P. Gillespie, Executive Director
Advisory Committee on Reactor Safeguards

FROM: Annette L. Vietti-Cook, Secretary **/RA/**

SUBJECT: STAFF REQUIREMENTS - COMDEK-07-0001/COMJSM-07-0001 - REPORT OF THE COMBINED LICENSE REVIEW TASK FORCE

The Commission has approved (in part and disapproved in part) the recommendations of the Combined License Review Task Force. The staff should expeditiously provide the Commission with plans for implementing the recommendations, as noted in the comments below.

The staff shall conduct a public meeting with external stakeholders to roll out its combined license (COL) review approach and to provide an overview of the New Reactor Licensing Program Plan. These discussions should occur prior to implementation of the recommendations. The Task Force Report should be released to the public.

Recommendation (1) The Commission has approved the proposal that the Commission itself will conduct the mandatory hearing (in the absence of legislation eliminating the requirement for a hearing even if a request for hearing is not made). The Commission continues to have the authority and discretion to request that the ASLBP conduct a hearing in a particular case. OGC should prepare a plan for the conduct of these hearings by the Commission modeled after the Browns Ferry restart meeting and the Calvert Cliffs and Oconee license renewal meetings.

Recommendation (2) The Commission has approved expansion of the scope and duration of the COL application acceptance review to include completeness and technical sufficiency reviews. The staff should ensure that the criteria used for this expanded scope of review are clear and transparent. In extending the duration of the application for acceptance review from 30 to 60 days, the staff should consider the start of the safety and environmental reviews from the date when the application is docketed (i.e., after the acceptance review when the application is determined to be complete and technically sufficient); not when the application is initially submitted by the applicant.

Recommendation (3) The Commission has disapproved the establishment of a 45-day public comment period for the Environmental Scoping Process and the draft Environmental Impact Statement.

Recommendation (4) The Commission has approved of the staff seeking additional opportunities to use Environmental Impact Statements completed by other government agencies for NRC COL reviews, to the extent they are appropriate and applicable.

Recommendation (5) The Commission has disapproved the Task Force's recommendation to create an Environmental Review Working Group at this time. A better use of staff resources would be augmentation of staff management and oversight of the national lab contractors. The NRC staff should conduct a public meeting with industry representatives and other stakeholders to give the public and stakeholders an opportunity to present their views on how to enhance the efficiency and effectiveness of the environmental review process.

Recommendation (6) The Commission has approved maximizing the use of electronic document management to eliminate the processing time for bound reports from the critical path on the schedule.

Additional Recommendation (1) The Commission has approved obtaining legislative authority from Congress to eliminate, from Section 189a of the Atomic Energy Act, the statutory requirement to conduct a hearing even if no one has asked for a hearing.

Additional Recommendation (2) The Commission has approved rulemaking to resolve issues that are generic to COL applications. The staff should propose to the Commission those rulemakings that will provide the greatest efficiencies, on such subjects as non-proliferation risks of nuclear power, the need for power, long term storage of spent fuel, reprocessing, and waste confidence and assess the impact of pursuing such rulemaking initiatives on the staff's ability to complete the COL reviews in a timely manner. Where appropriate, OGC should be given the lead on completing these rulemaking activities with whatever support from the appropriate staff offices may be needed.

Areas Needing Further Consideration In addition, the staff should investigate the following items as noted in Enclosure 4 to the Task Force Report.

1. The staff should consider applying Lean Six Sigma, or other appropriate techniques to identify additional process improvements in the safety portion of the COL licensing review.

2. The staff should consider how the schedule duration for the environmental scoping phase may be improved for COL applicants that reference an early site permit or a new plant site that is co-located with an existing nuclear power plant.

3. The staff should consider re-establishing environmental expertise on the staff when the workload becomes more predictable.

4. The Advisory Committee on Reactor Safeguards (ACRS) should consider pursuing efficiencies and effectiveness in the review of subsequent COLs by adopting a "delta" review approach but only after the completion of the first COL of each design type. The ACRS, with staff input from an expanded acceptance review, could focus their reviews on the significant differences between the reference COLs and subsequent COLs. These differences would likely include the site-specific design features of the facility, including security design features and emergency plans.

5. The staff should consider the use of public forums for constructive discussions on the New Reactor Licensing Plan and its proposed use. The purpose of these discussions would be to solicit additional recommendations on process improvements.

cc: Chairman Klein
Commissioner McGaffigan
Commissioner Merrifield
Commissioner Jaczko
Commissioner Lyons

June 28, 2007

MEMORANDUM TO: Luis A. Reyes
Executive Director for Operations

Frank P. Gillespie, Executive Director
Advisory Committee on Reactor Safeguards

FROM: Annette L. Vietti-Cook, Secretary /RA/

SUBJECT: STAFF REQUIREMENTS - SECY-07-0081 - REGULATORY OPTIONS FOR LICENSING FACILITIES ASSOCIATED WITH THE GLOBAL NUCLEAR ENERGY PARTNERSHIP (GNEP)

The Commission has approved proceeding with only Phase I of Option 1, subject to the comments noted below, to develop the regulatory framework by preparing the technical basis documentation to support rulemaking for Part 70 with revisions to Part 50 as appropriate, and a gap analysis for all NRC regulations (10 CFR Chapter I) to identify changes in regulatory requirements that would be necessary to license a reprocessing facility and advanced recycling reactor. At this time, the Commission does not support the plan to shift to Option 3 next year. As part of Phase I, the staff should provide the Commission with supplemental information that discusses how this regulatory framework and gap analysis will be performed and coordinated among the NRC organizations. The staff should provide the gap analysis and the technical bases document with recommended options on a path forward and an associated rulemaking plan, if appropriate, in a separate Commission paper after the DOE Secretary provides his June 2008 decision for the Global Nuclear Energy Partnership (GNEP) program and Congress determines the FY 2009 appropriations for GNEP.

During Phase I, the Office of Nuclear Material Safety and Safeguards (NMSS) should have the lead on the materials issues, but the reactor regulatory licensing review and oversight should be conducted by the Office of New Reactors (NRO) in concert with the Office of Nuclear Regulatory Research (RES), and other offices as appropriate. In addition, there will be security concerns that will need to be addressed in this effort by the Office of Nuclear Security and Incident Response (NSIR). As part of Phase I, the staff should clearly recommend with appropriate justification how the regulatory licensing review and oversight should be coordinated within the NRC organization.

For FY 2007, the staff resources should be limited to only the resources necessary to support initiation of Phase I. The Commission decided not to seek supplemental appropriations for FY 2008, but the Commission has no objection to very modest NRC funds being reprogrammed in FY 2008 consistent with the normal budget process. NRC FY 2008 funds for GNEP should be 1 to 2 FTE and the work should cover a first order gap analysis. Specifically for the advanced burner reactor, the first order gap analysis should use Clinch River as the starting point, and tabulate what rules clearly apply, what rules clearly do not apply and whether a gap exists and its relative size or complexity. No phenomena identification and ranking table analysis should

be conducted and staff should not identify any proposed regulatory resolutions because the U.S. Department of Energy has not yet defined the advanced technology nor the scope of its GNEP program. The staff should continue to pursue reimbursable agreements with DOE, which allows interactions with DOE and industry to learn about evolving GNEP technology.

Prior to commencing work on Phase II, the staff should submit another SECY paper which should include clear identification of how the staff would propose to accomplish implementation of the proposed regulatory structure within the NRC organization and address issues such as the applicability of the technology neutral framework for new reactors being developed by RES.

Given the uniqueness of these facilities and the licensing and communication challenges they will present, the staff should ensure appropriate outreach activities are conducted to obtain the view of relevant stakeholders such as local communities.

Separate from the rulemaking efforts, the Commission supports the RES's efforts in long-term research to develop and maintain technical expertise relevant to facilities of the type envisioned in GNEP, commensurate with DOE activities and subject to available funding.

In the coming years, the staff should ensure that the Offices of New Reactors, Nuclear Reactor Regulation and Nuclear Regulatory Research receive appropriate resources in future budget proposals to take the lead on examining those issues, commensurate with any progress DOE makes on development of the ABR.

The Advisory Committee for Reactor Safeguards should be the lead advisory committee for the burner reactor and reprocessing facility, and should work jointly with the Advisory Committee on Nuclear Waste and Materials on matters of common interest. The staff should note the discussions the Commission had with ACRS about the potential difficulties in coming up with a framework for licensing co-located closed fuel cycle facilities.

cc: Chairman Klein
Commissioner McGaffigan
Commissioner Merrifield
Commissioner Jaczko
Commissioner Lyons
OGC
CFO
OCA
OPA
Office Directors, Regions, ACRS, ACNW, ASLBP (via E-Mail)
PDR

RSK

Geschäftsstelle der
Reaktor-Sicherheitskommission

RSK-Geschäftsstelle beim
Bundesamt für Strahlenschutz (BfS)
Hausanschrift:
Robert-Schuman-Platz 3, 53175 Bonn

Az.:
Datum: 29.06.2007
Bearbeiter/in: Guenter Weimer
Durchwahl: 01888/305-3720
Telefax: 0228 / 67 03 88
e-Mail: gweimer@bfs.de

RSK-Geschäftsstelle beim BfS • Postfach 12 06 29 • 53048 Bonn

**Tentative Agenda**

**Quadripartite-Working Group on "Sump Screen Blockage"**
**Meeting October 17 th to 18 th 2007**
**Erlangen, Germany**

**October 17th**

08:30 **Welcome and Opening Remarks** — Bandholz (RSK-chairman), Waas (AREVA)

**Introduction**

- Events leading to Sump Screen Blockage — RSK, AREVA,....
- Overview on investigations and analyses in
  - Germany — RSK, AREVA
  - *France?* — *GPR?*
  - *Japan?* — *NSC?*
  - *USA?* — *ACRS?*

14:00 **Technical Issues and Results**

- Parameters influencing Sump Screen Blockage

| | |
|---|---|
| · influence of isolation material containers | RSK, AREVA,... |
| · influence of isolation material type (e. g. rockwool, glasswool) | RSK, AREVA,... |
| · downstream and chemical effects | ACRS,... |
| · installation of sump screens | RSK, AREVA,... |
| · detection and removal of Sump Screen Blockage | RSK, AREVA,... |

**October 18th**

09:00 **VISIT to test facilities (AREVA NP)**

11:00 • Technical Amendments/Changes in NPP´s

| | |
|---|---|
| · procedures and changes in NPP´s in Germany | AREVA |
| · procedures and changes in NPP´s in | |
| *France?* | *GPR?* |
| *Japan?* | *NSC?* |
| *USA?* | *ACRS?* |

14:00 **Summary of Working Group meeting**

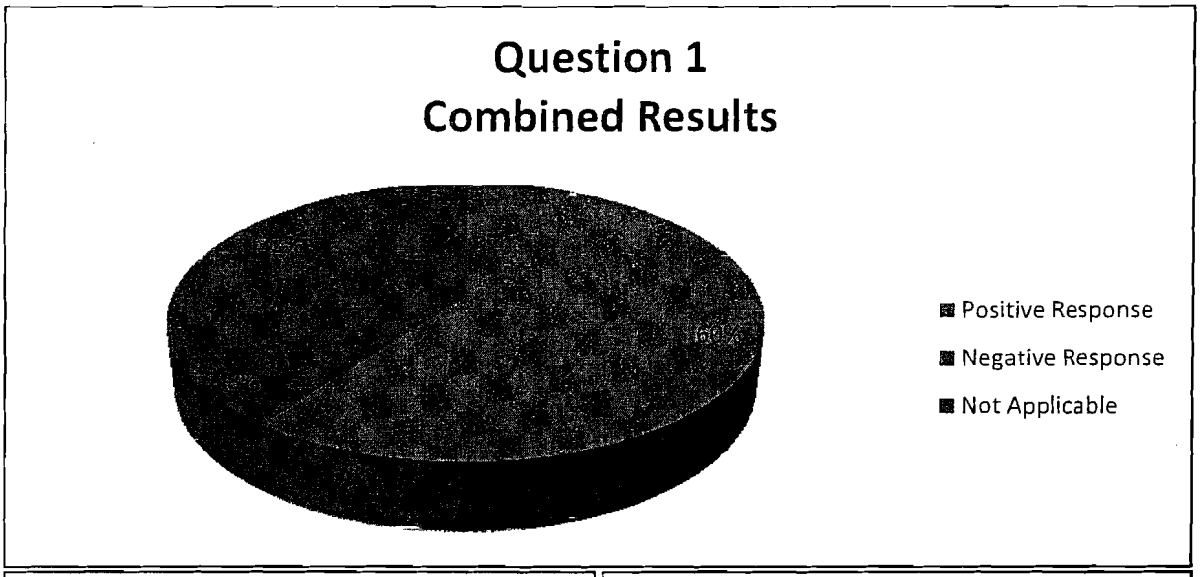
- general conclusions
- recommendations

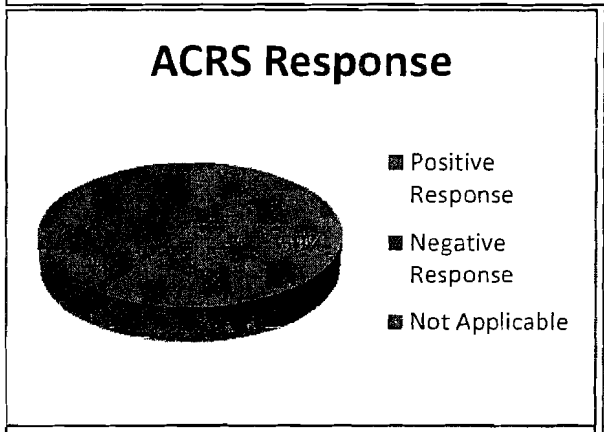
15:00 **Other Issues related to Quadripartite Activities**

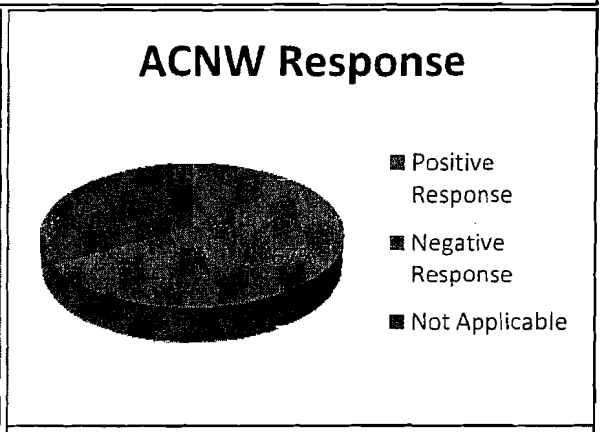
| | |
|---|---|
| · Technical Topics of Interest since the last Quadripartite Meeting | NSC,... |
| · Preparation of a Working Group Meeting on EPR | GPR |
| · Preparation of a Working Group Meeting on Digital I&C-Systems | Bandholz,... |
| · Miscellaneous | |

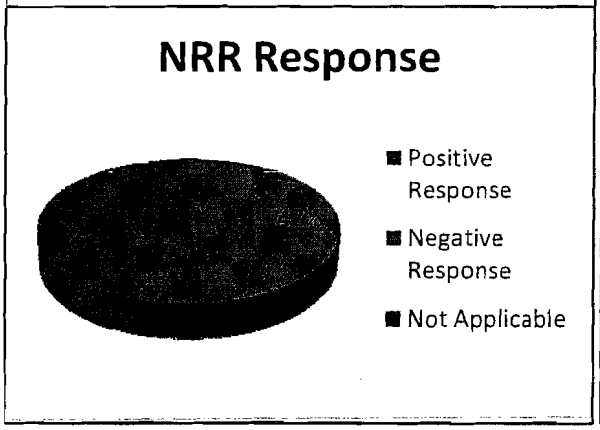
17.00 – 18.00 End of meeting

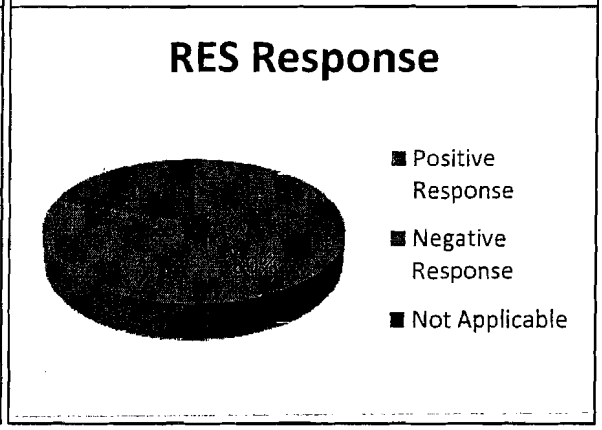
***Question 1 - Are ACRS/ACNW reports clear, concise, and timely?***



## *Optional Comments For Question 1 - Are ACRS/ACNW reports clear, concise, and timely?*

**RES Responses**

*Mary Drouin, Senior Program Advisor , RES*
Generally they are clear and timely, but not 100%

*N. Prasad Kadambi, Sr. Reactor Engineer, RES*
Not timely; see below (Question #2)

**NRR Responses**

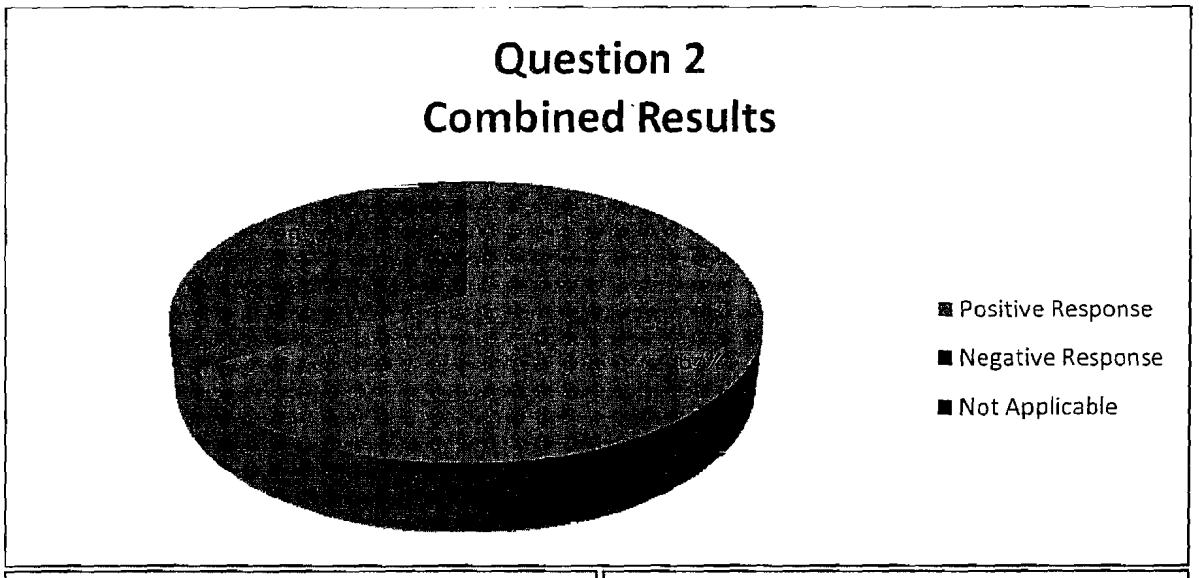
*Rani Franovich, Chief, REBB/DLR/NRR*
The ACRS does not review the staff

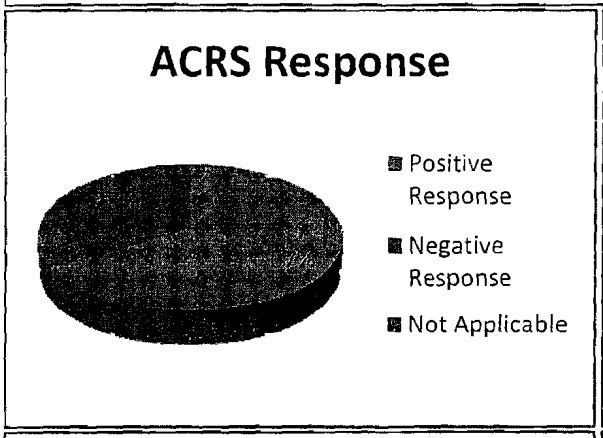
*Anonymous*
ACRS does not review environmental impact statements for license renewal. ACRS does not advise the Commission on environmental impacts associated with license renewal.

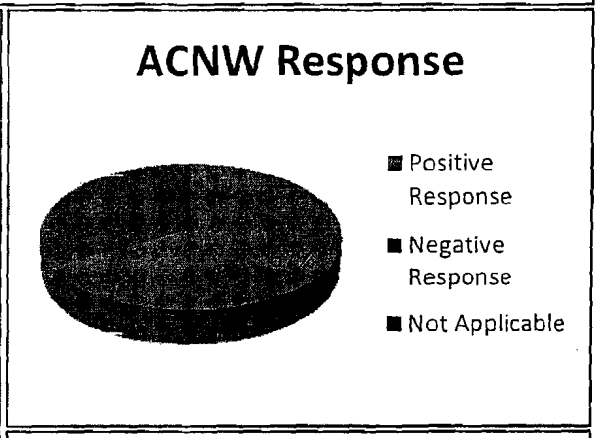
*Anonymous*
varies, sometimes significance of issues seem overstated

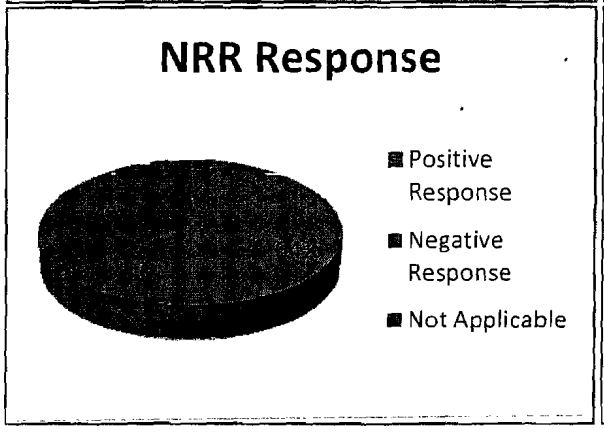
*Jon Hopkins, Sr. Project Manager, NRR*
Note: This response is an overall NRR response based on multiple inputs from NRR staff.

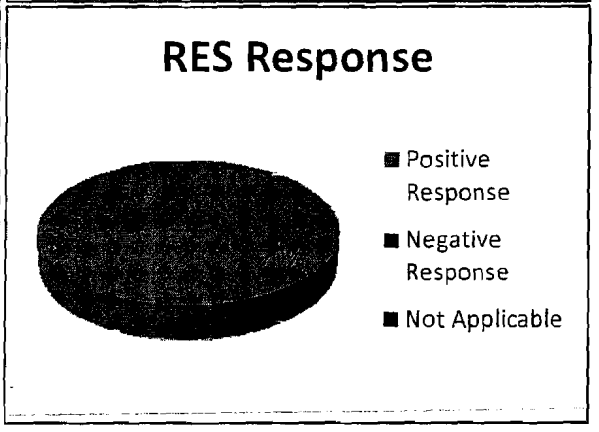
***Question 2 – Are ACRS/ACNW reports timely?***



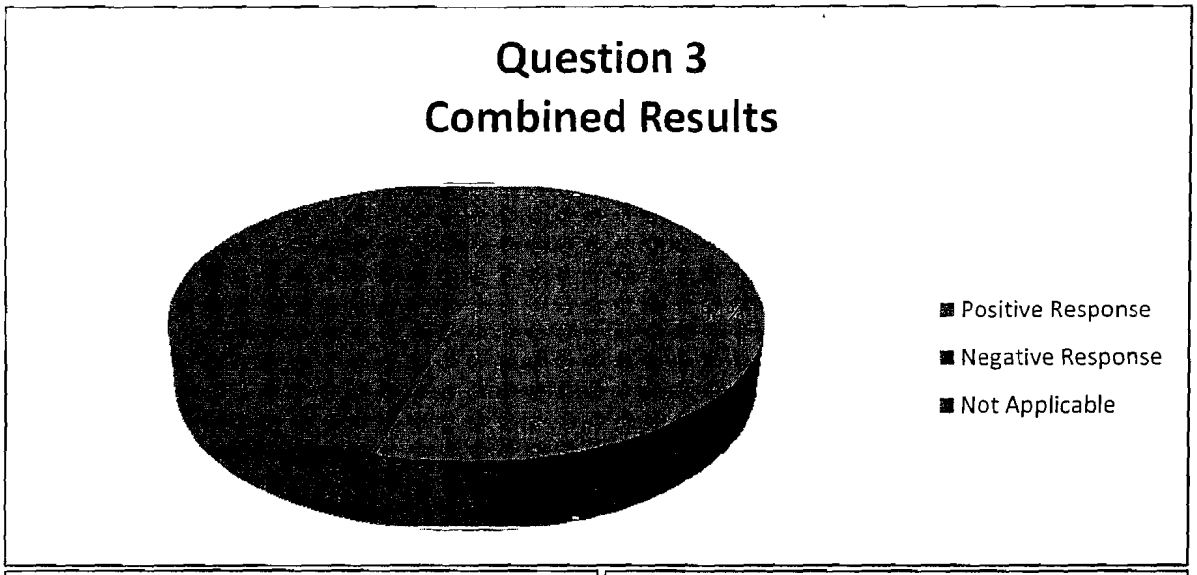
## *Optional Comments For Question 2 – Are ACRS/ACNW reports timely?*

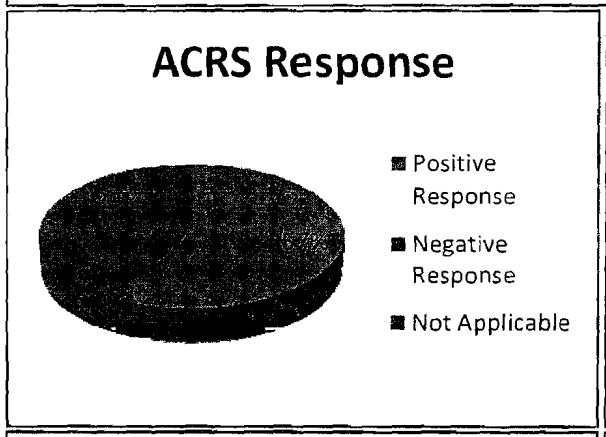
**RES Responses**

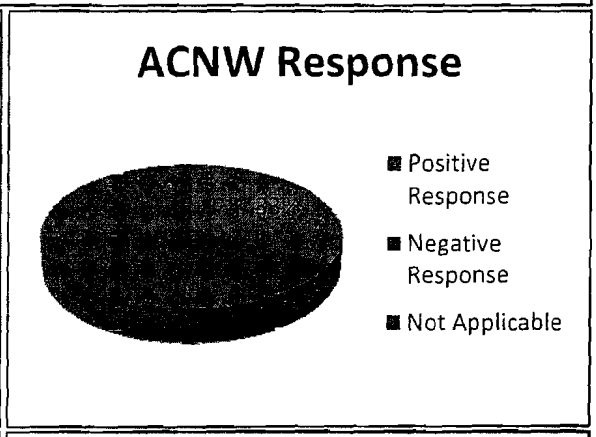
*Mary Drouin, Senior Program Advisor , RES*
Almost always

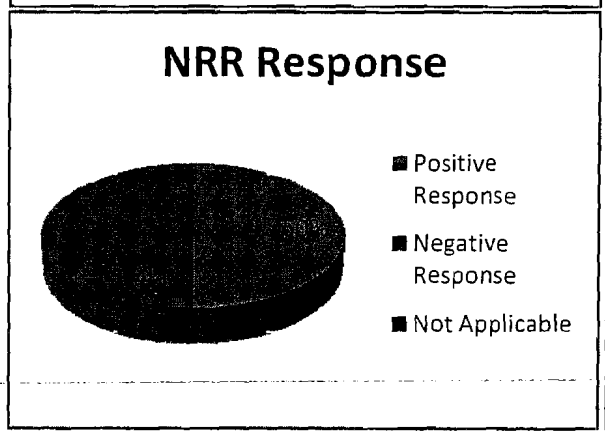
*N. Prasad Kadambi, Sr. Reactor Engineer, RES*
It is too much of a guessing game as to what technical issues may be of concern to ACRS, considering the late stages when they get involved.

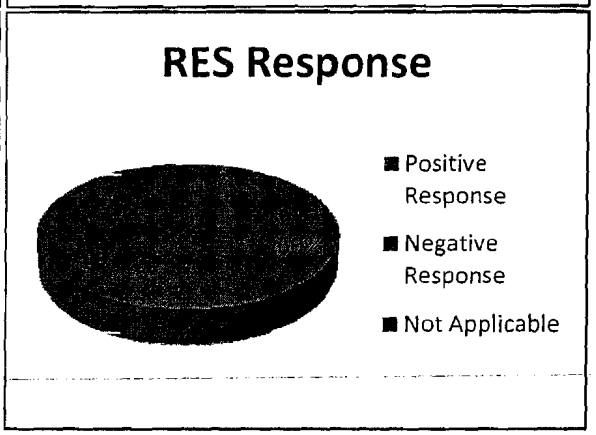
***Question 3 - Do the ACRS/ACNW reports provide adequate background and basis for the Committees' advice?***



***Optional Comments For Question 3 - Do the ACRS/ACNW reports provide adequate background and basis for the Committees' advice?***

**RES Responses**

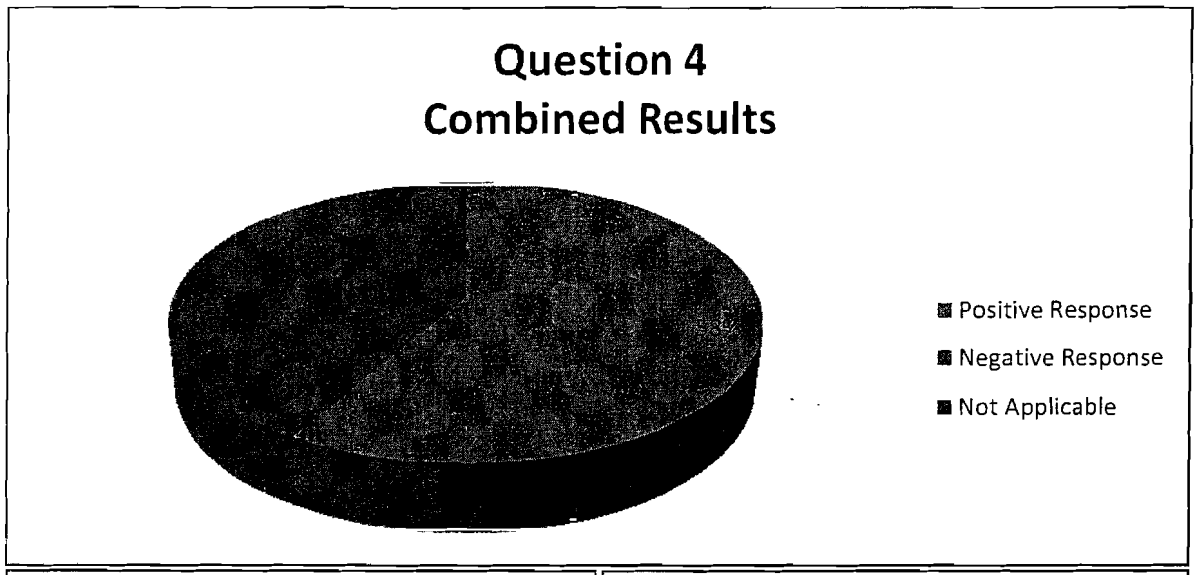
*Mary Drouin, Senior Program Advisor , RES*
Too many times the members have not read the staff's report and rely on the briefing discussion which result in misunderstanding of the staff's work.

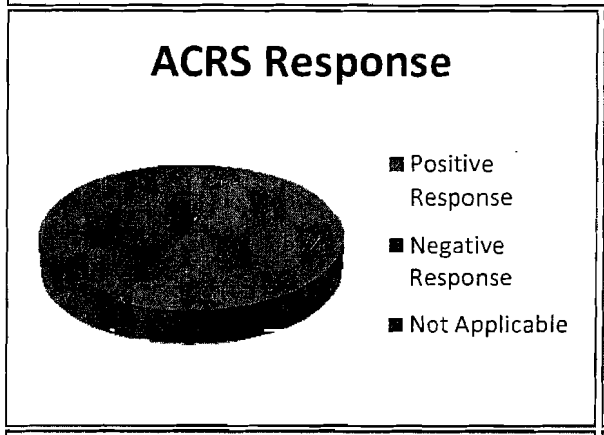
*Bill Ott, Branch Chief, RPERWM/DFERR/RES*
At some point the committee bases their letters on their professional judgment of information that they have reviewed. Their reports generally indicate the technical basis and reasons for their conclusions. Sometimes the information itself may not be adequate and that Committee members must use their own professional knowledge and judgment to provide advice. Adequate background material is not always available.

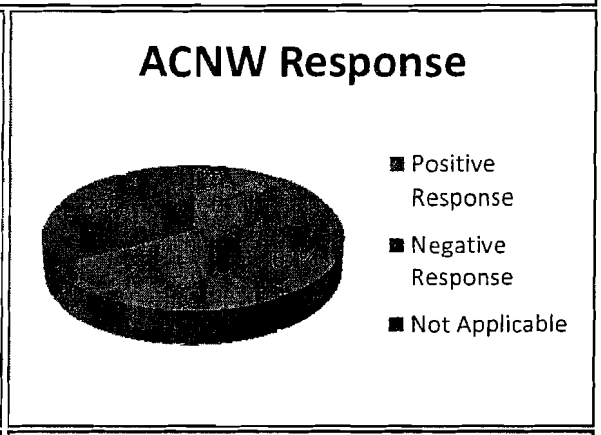
**NRR Responses**

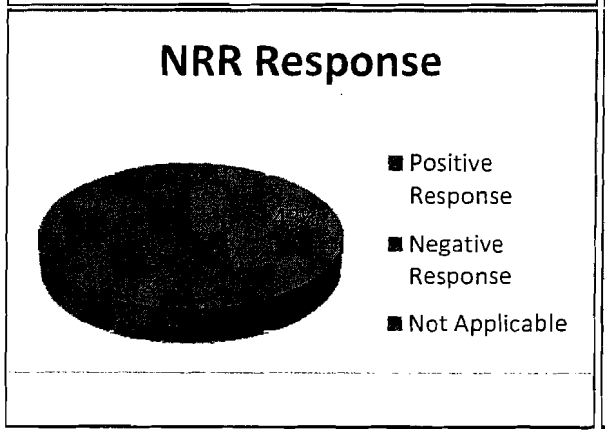
*Anonymous*
Safety basis and significance of issues not always apparent.

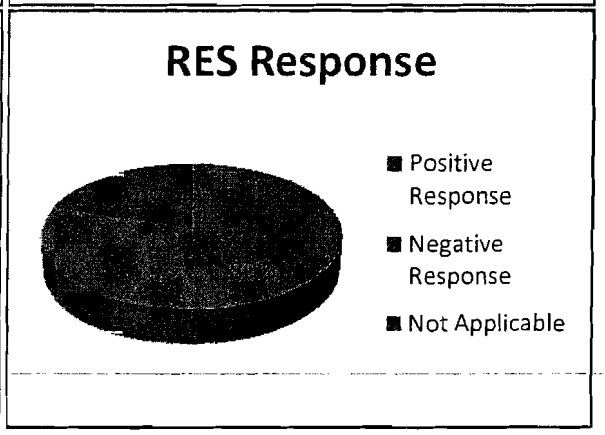
***Question 4 - Does the ACRS/ACNW adequately focus on areas/issues that are of importance to the NRC staff?***



***Optional Comments For Question 4 - Does the ACRS/ACNW adequately focus on areas/issues that are of importance to the NRC staff?***

**RES Responses**

*Mary Drouin, Senior Program Advisor , RES*
Sometimes, but too many times it is like there is an issue that is of "concern" to a member in which the Commission has provided their position but the member keeps bringing it up and bringing it up, putting the staff in an awkward position.

*N. Prasad Kadambi, Sr. Reactor Engineer, RES*
The ACRS works best when it brings to bear an independent technical perspective to help the staff improve its problem solving capability.

*Erasmia Lois, Senior Risk and Reliability Analyst, RES*
The ACRS has been instrumental in focusing on important issues needed to be addressed in human reliability analysis.

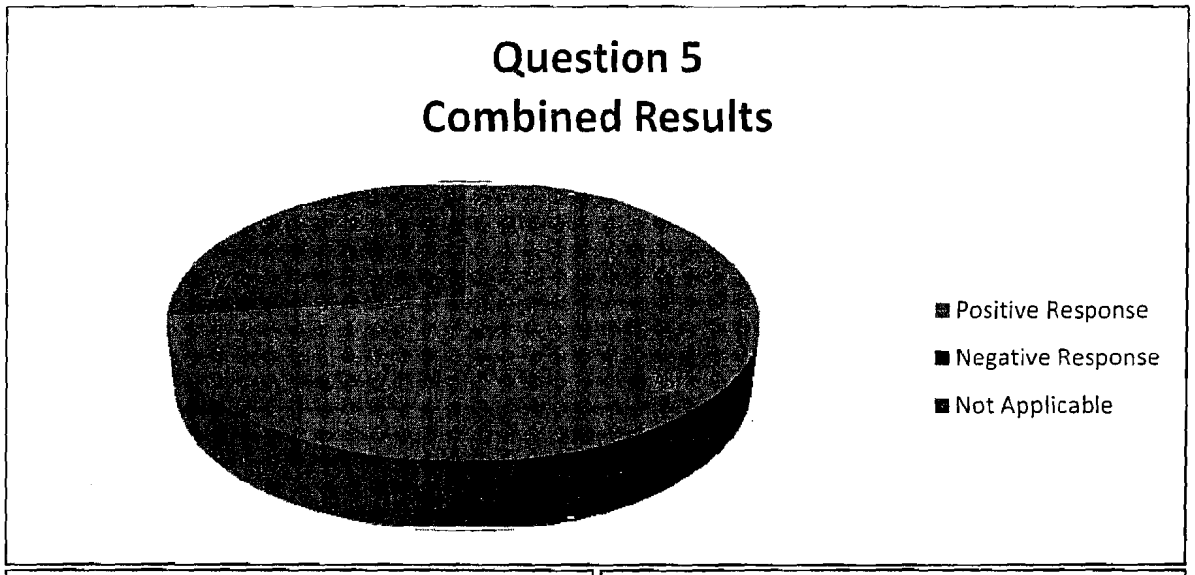
**NRR Responses**

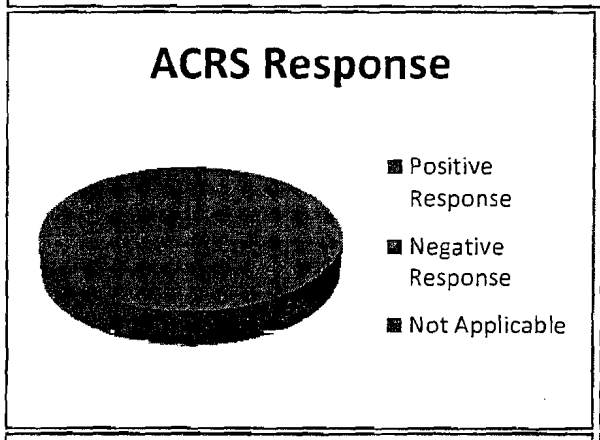
*Anonymous*
They often reopen issues that they have already rendered an opinion on.

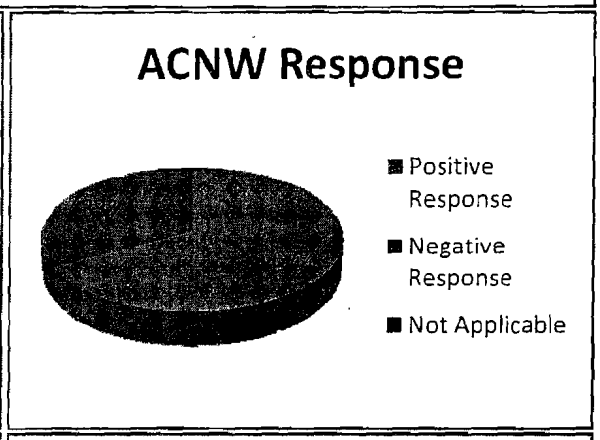
*Anonymous*
Sometimes.

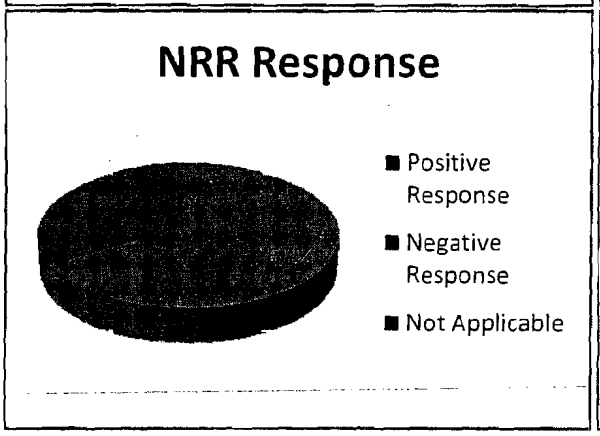
*Anonymous*
Sometimes ACRS reopens issues that it have already established an opinion.

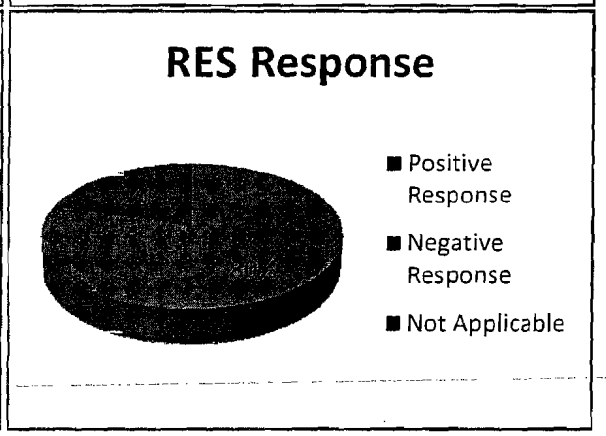
***Question 5 - Is the ACRS/ACNW sufficiently proactive in their interactions with your staff and in addressing your needs?***



***Optional Comments For Question 5 - Is the ACRS/ACNW sufficiently proactive in their interactions with your staff and in addressing your needs?***

**RES Responses**

*N. Prasad Kadambi, Sr. Reactor Engineer, RES*
There are too many barriers to more informal and frequent interaction.

*Peggy Bennett, Management Analyst , RES/PMDA/AMT*
As far as I can tell.

*Erasmia Lois, Senior Risk and Reliability Analyst, RES*
The ACRS interactions have been very systematic, including letting the staff know in advance of desired interactions.

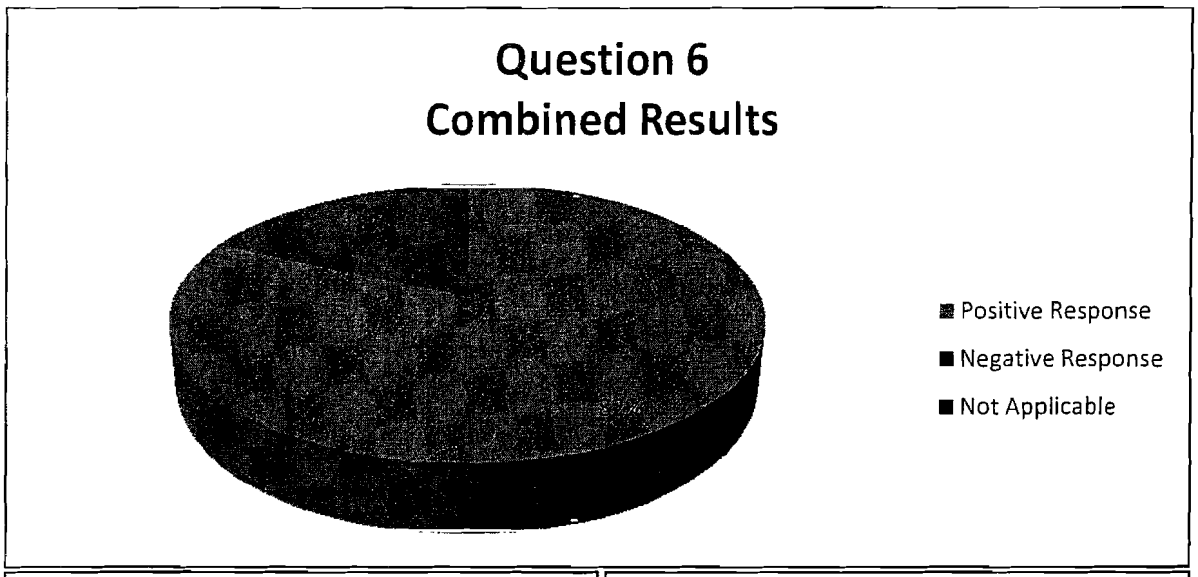
*Bill Ott, Branch Chief, RPERWM/DFERR/RES*
Sometimes the staff is too proactive, i.e. seeking presentation outlines and detailed information on content far in advance of when the information will likely be available.

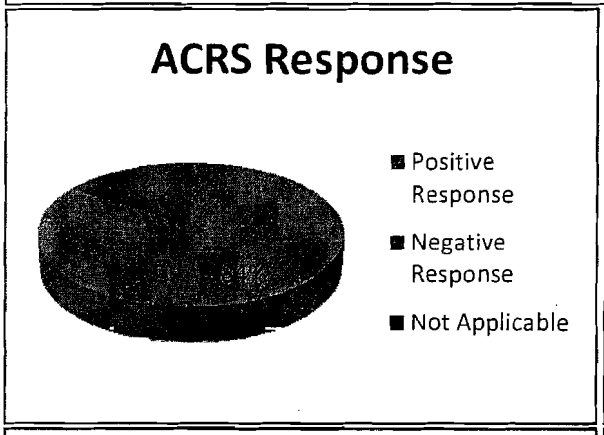
**NRR Responses**

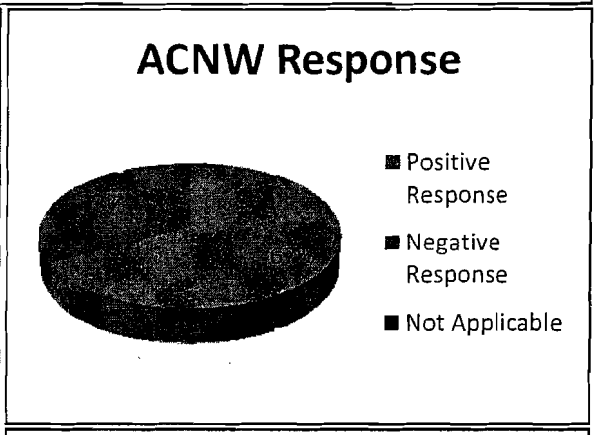
*Anonymous*
Some members provided advanced questions

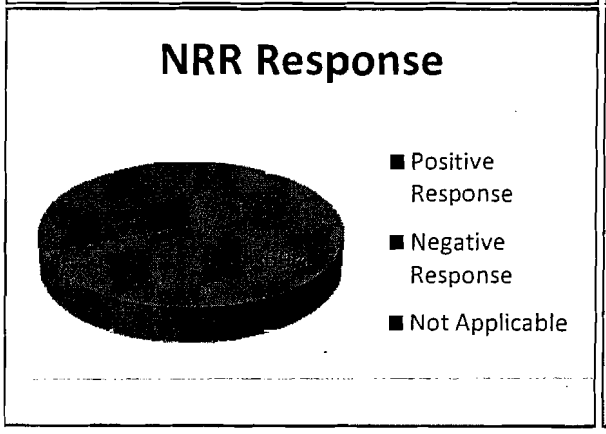
*Jon Hopkins, Sr. Project Manager, NRR*
Better interface for issue prioritization is needed.

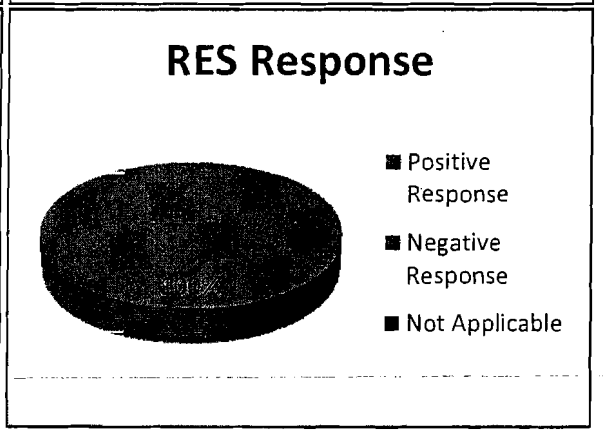
***Question 6 - Are the communications between the ACRS/ACNW Office and your staff adequate?***



***Optional Comments For Question 6 - Are the communications between the ACRS/ACNW Office and your staff adequate?***

**RES Responses**

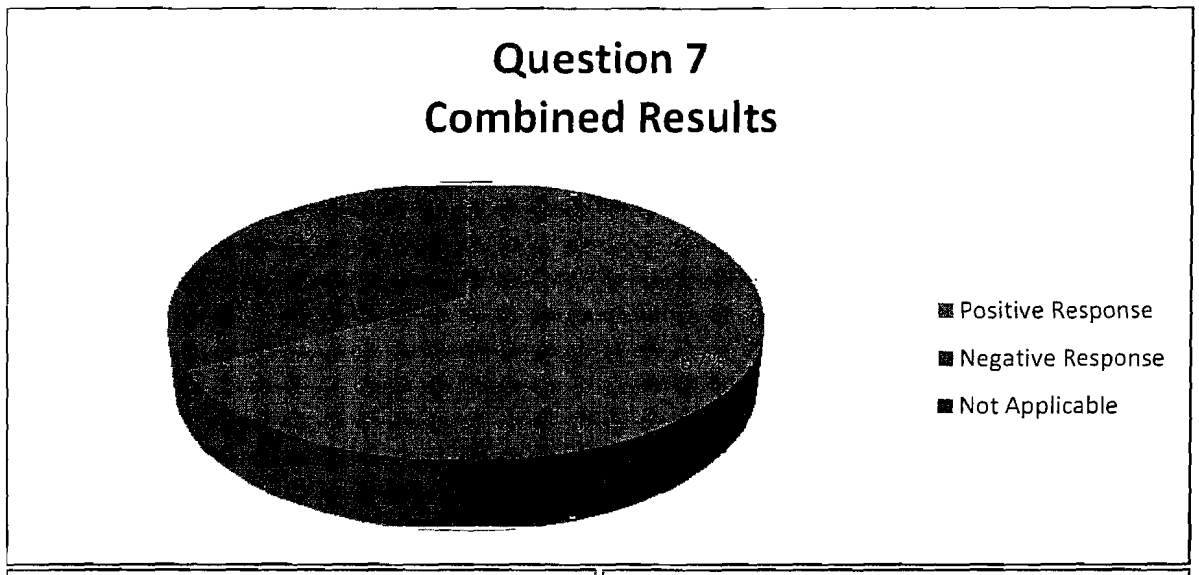
*Mary Drouin, Senior Program Advisor , RES*
almost 100%

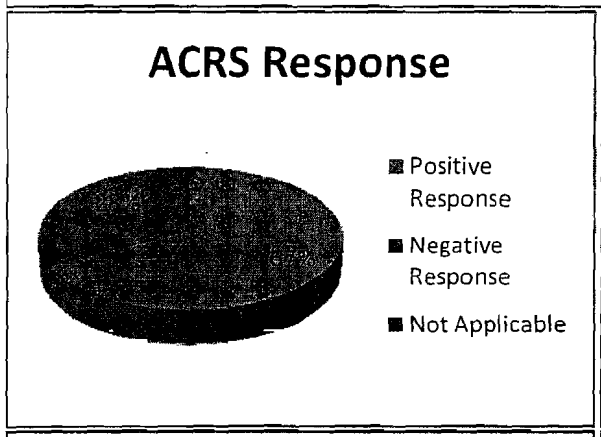
*Peggy Bennett, Management Analyst , RES/PMDA/AMT*
As far as I can tell.

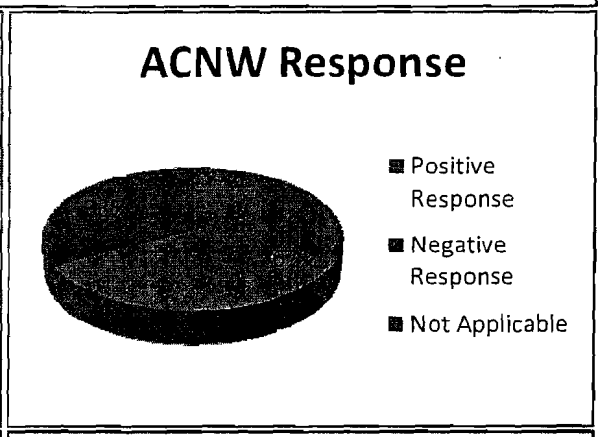
**NRR Responses**

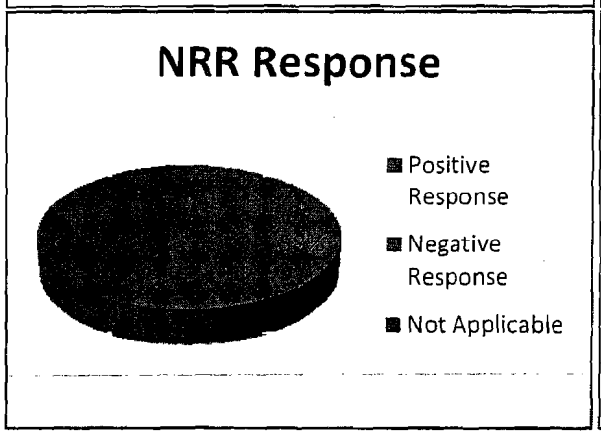
*Jon Hopkins, Sr. Project Manager, NRR*
In-depth discussions outside ACRS public meeting has helped staff to understand ACRS' perspective better.

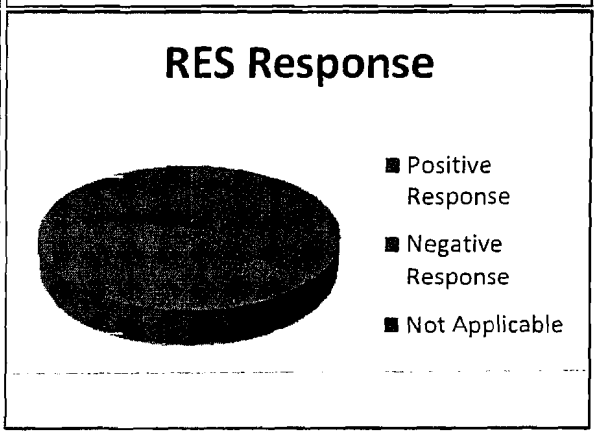
***Question 7 - Do the ACRS/ACNW interactions with your staff and advice appropriately consider emerging technical and regulatory issues?***



***Optional Comments For Question 7 - Do the ACRS/ACNW interactions with your staff and advice appropriately consider emerging technical and regulatory issues?***

**RES Responses**

*N. Prasad Kadambi, Sr. Reactor Engineer, RES*
The ACRS is too often a "rubber stamp" for the status quo, rather than a force for change.

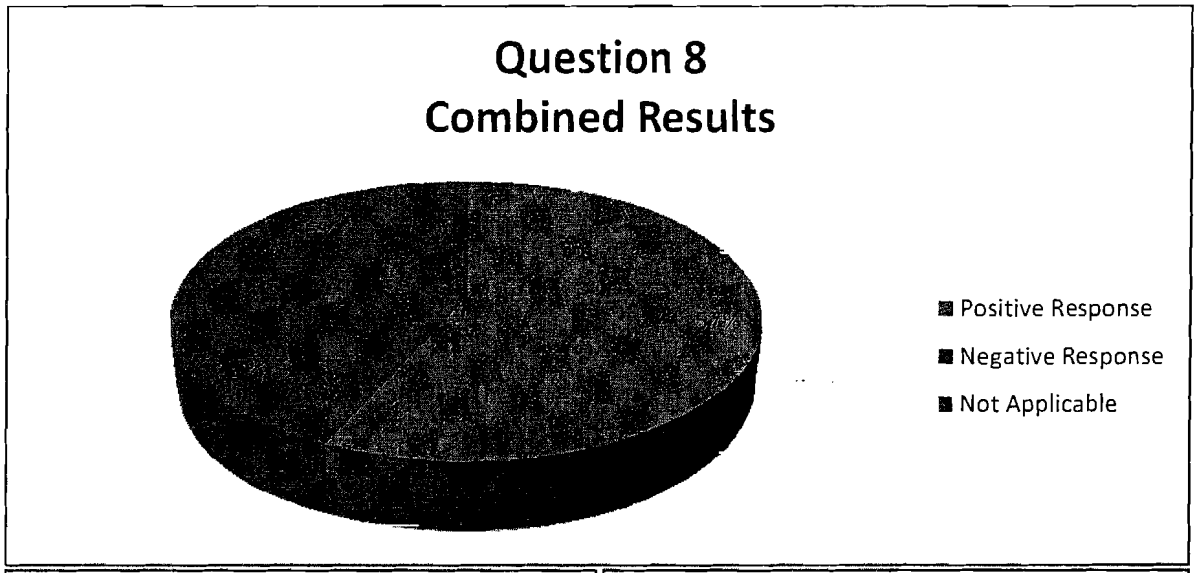
*Erasmia Lois, Senior Risk and Reliability Analyst, RES*
The ACRS has been instrumental in focusing the staff to address outstanding as well as emerging regulatory needs

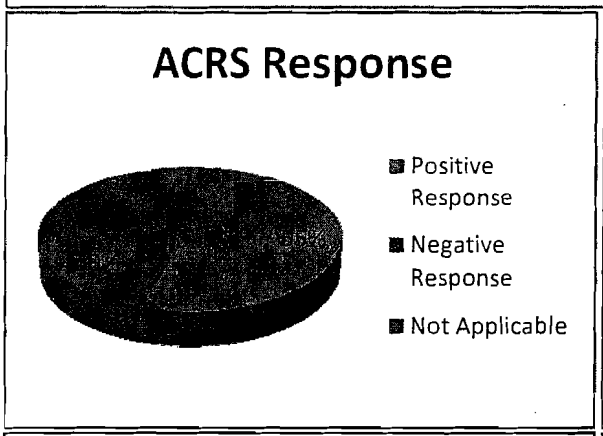
**NRR Responses**

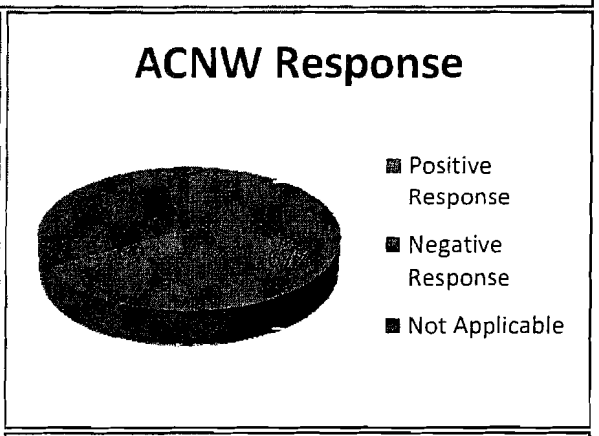
*Anonymous*
Although, sometimes ACRS is expecting NRR staff to move more quickly with new or preliminary information than we believe is appropriate for regulatory and licensing activities.

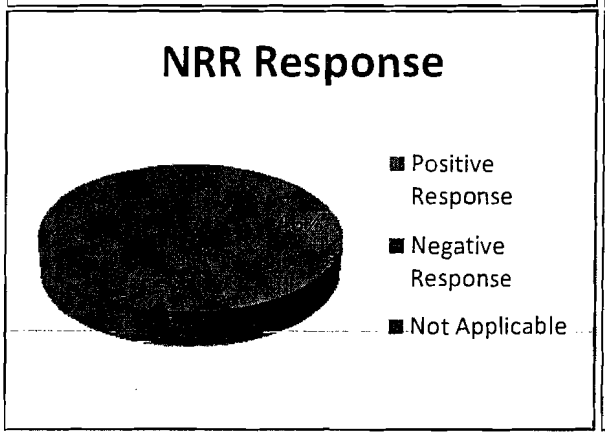
*Jon Hopkins, Sr. Project Manager, NRR*
Pzr nozzle weld flaws is a good example.

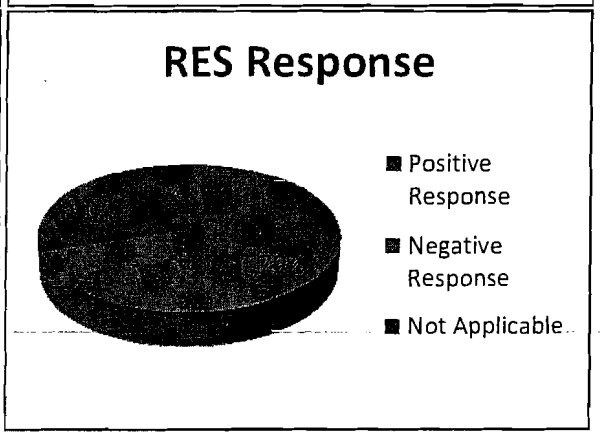
***Question 8 - Were the interactions that you had with the ACRS/ACNW members and staff helpful to you in developing recommendations/positions on the matters that you brought the Committee for review?***



***Optional Comments For Question 8 - Were the interactions that you had with the ACRS/ACNW members and staff helpful to you in developing recommendations/positions on the matters that you brought the Committee for review?***

**RES Responses**

*Mary Drouin, Senior Program Advisor , RES*
Sometimes, too many times the members get hung up on the words on a vg and argue it to death, overly criticize the staff on their choice of wording on the vg, instead of focusing on what the staff is trying to say and what is actually written in the staff report or staff letter

*N. Prasad Kadambi, Sr. Reactor Engineer, RES*
Related to timeliness, in that by the time ACRS comes in, there is too much inertia in a set of positions.

**NRR Responses**

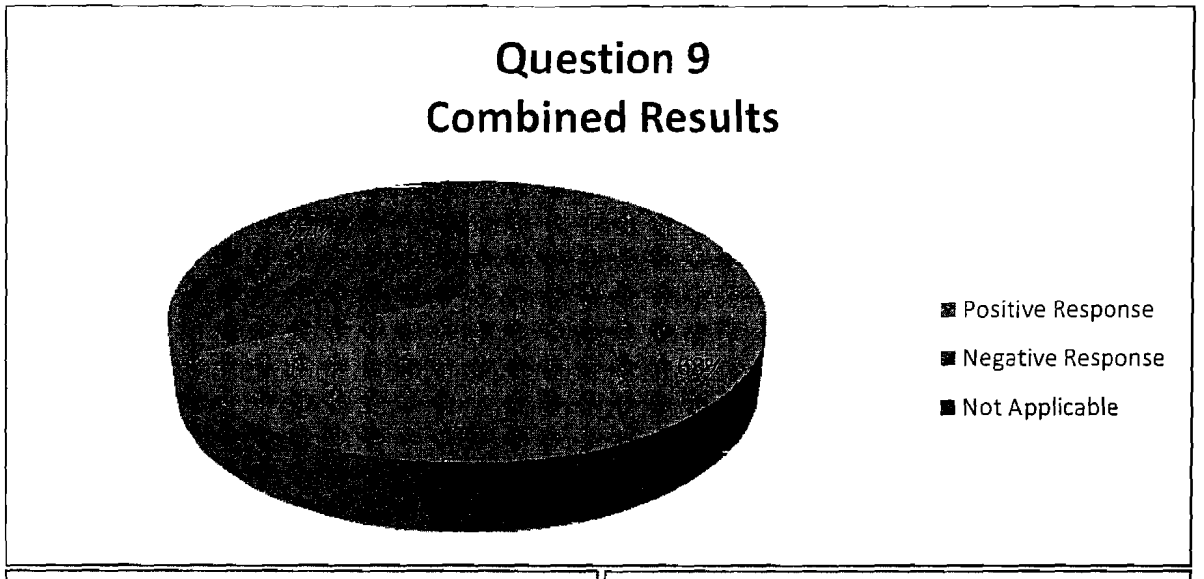
*Anonymous*
Pilgrim license renewal questions.

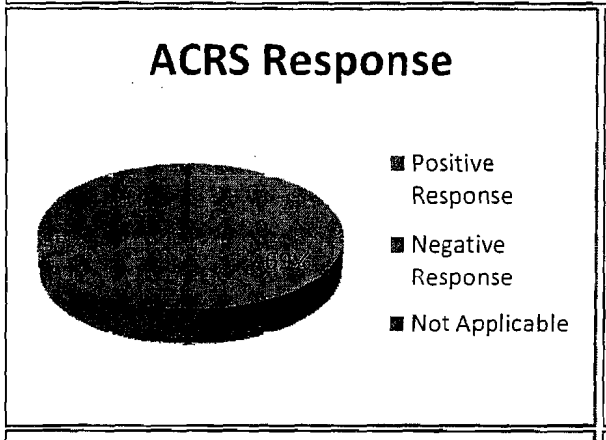
*Anonymous*
variable, depending on issue.

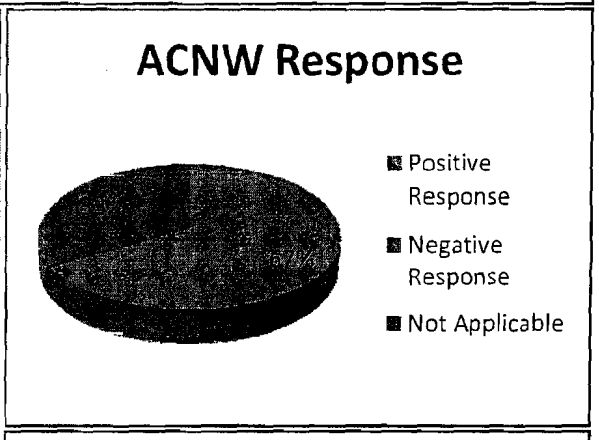
*Jon Hopkins, Sr. Project Manager, NRR*
Pilgrim license renewal and pzr nozzle weld flaw.

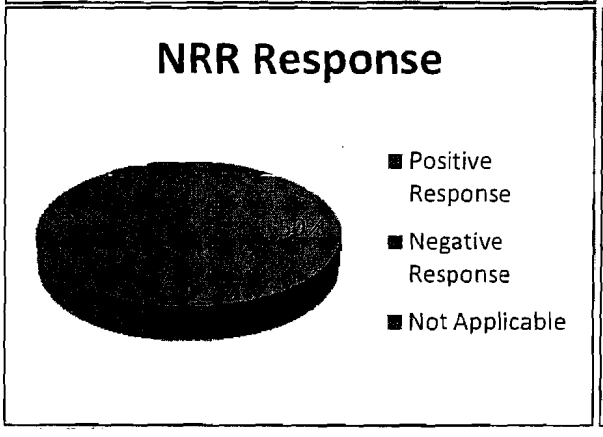
*Anonymous*
Sometimes the safety basis and significance of issues are not always apparent in ACRS discussions.

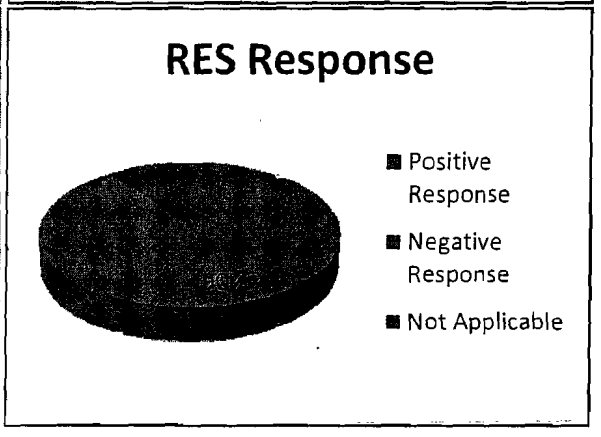
***Question 9 - Does the ACRS/ACNW meet the critical milestones established in your schedules?***



***Optional Comments For Question 9 - Does the ACRS/ACNW meet the critical milestones established in your schedules?***

**RES Responses**

*Mary Drouin, Senior Program Advisor , RES*
Most of the time.

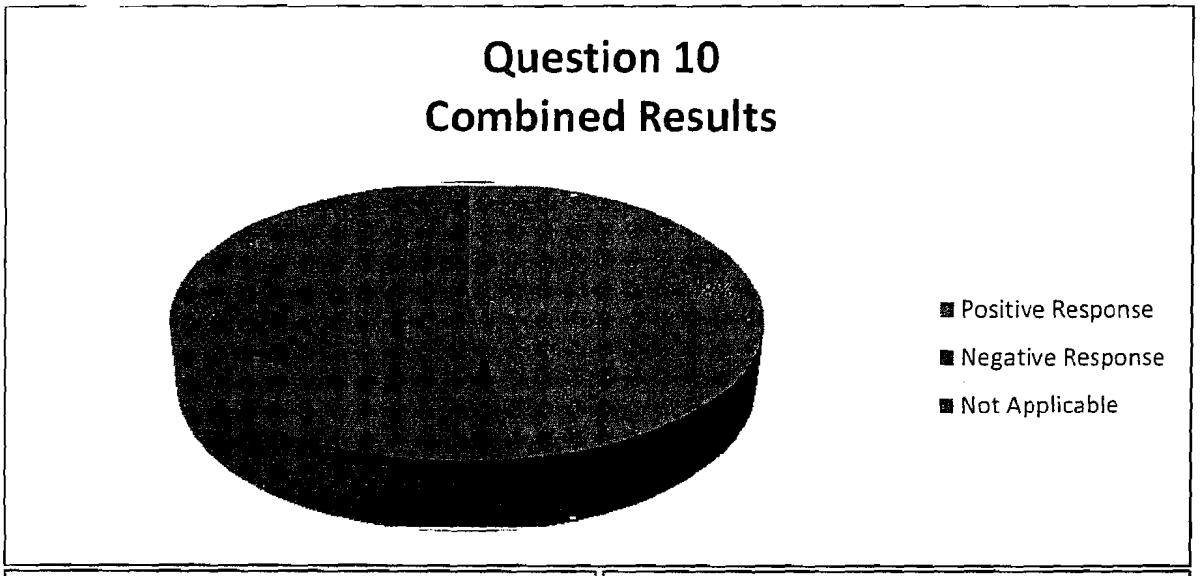
*Peggy Bennett, Management Analyst , RES/PMDA/AMT*
I believe so. I have never seen any justification on the Op Plan for ACRS lateness.

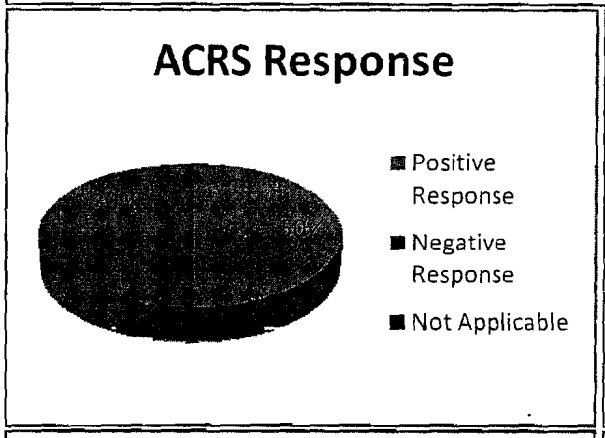
**NRR Responses**

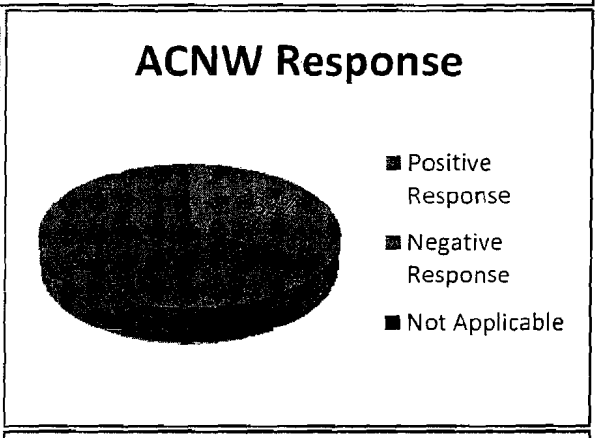
*Anonymous*
Not always.

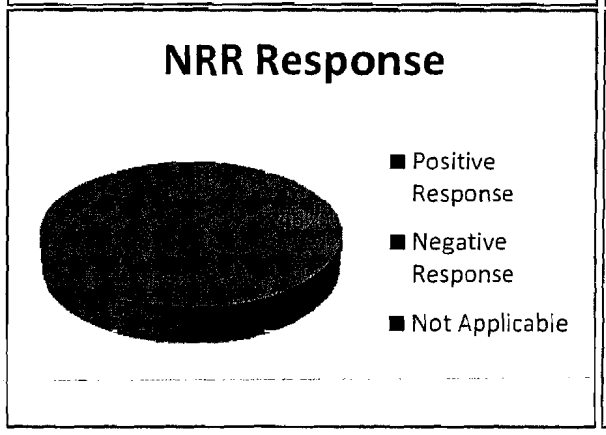
*Jon Hopkins, Sr. Project Manager, NRR*
ACRS was accommodating for the additional mtgs. for Oyster Creek license renewal.

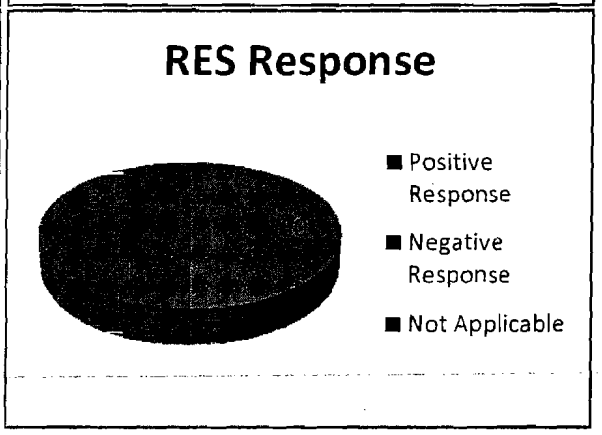
***Question 10 - Does the ACRS/ACNW review facilitate the resolution of the regulatory issues being addressed?***



***Optional Comments For Question 10 - Does the ACRS/ACNW review facilitate the resolution of the regulatory issues being addressed?***

**RES Responses**

*Mary Drouin, Senior Program Advisor , RES*
Not always, and generally it is because a or more members want to go back and revisit decisions where the Commission has been very clear on their position, again not being helpful to the staff.

*N. Prasad Kadambi, Sr. Reactor Engineer, RES*
The tough regulatory issues are institutional and cultural. ACRS does not have a mechanism to follow through on sensible recommendations.

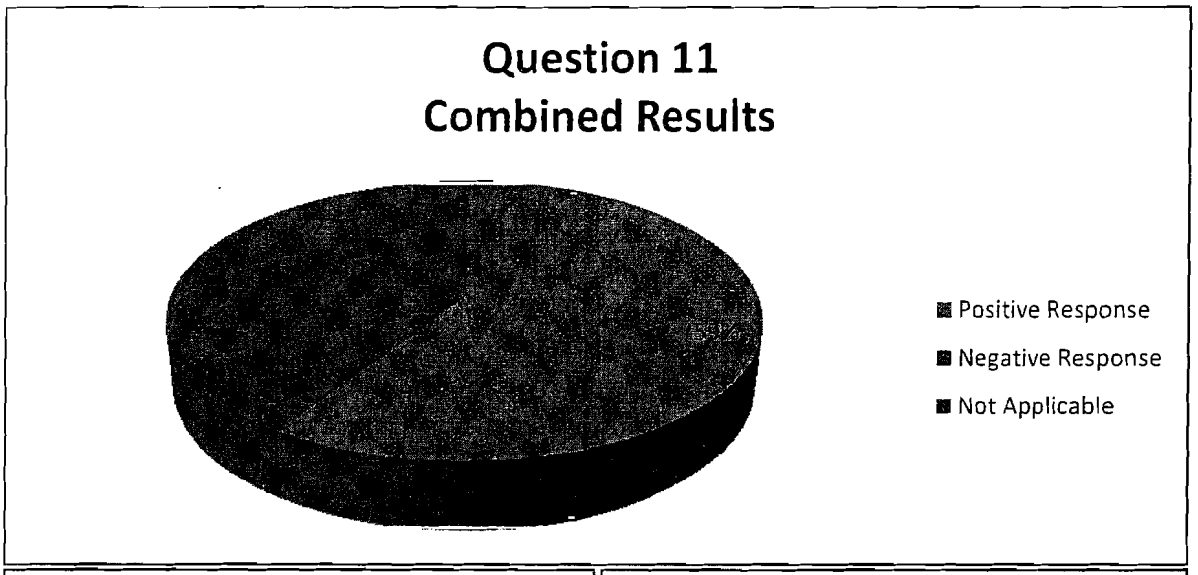
*Bill Ott, Branch Chief, RPERWM/DFERR/RES*
It provides another factor to consider. It contributes to the resolution but does not necessarily facilitate that resolution.

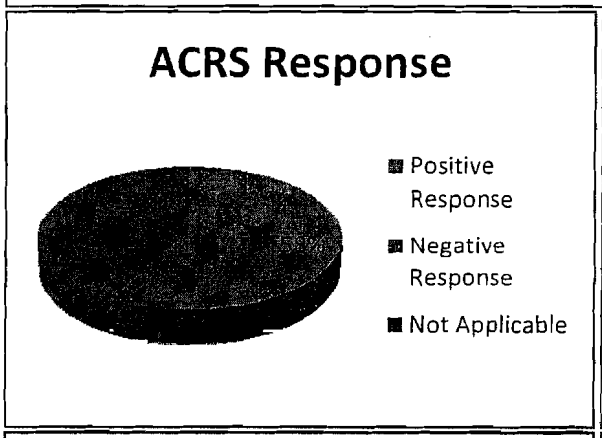
**NRR Responses**

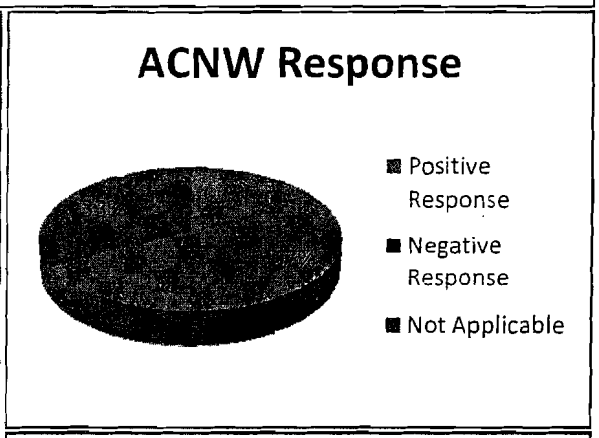
*Anonymous*
Not always.

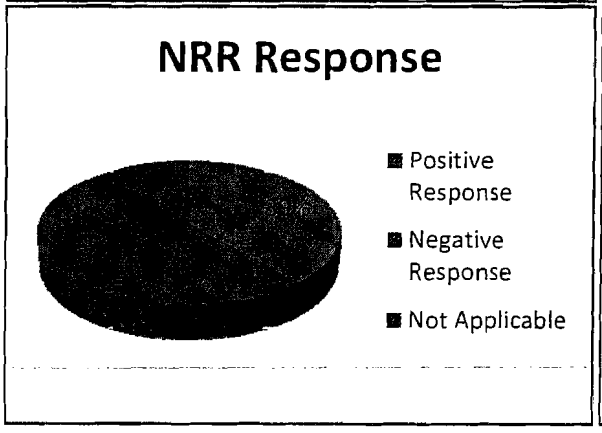
*Jon Hopkins, Sr. Project Manager, NRR*
In some instances, ACRS' positions seem to be unrealistic for what is reasonably achievable and practical.

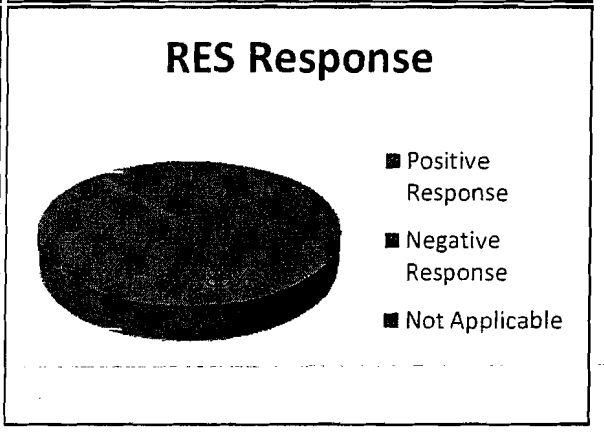
***Question 11 - Do you find the ACRS/ACNW Subcommittee and Working Group processes useful in the resolution of technical and regulatory issues?***



## *Optional Comments For Question 11 - Do you find the ACRS/ACNW Subcommittee and Working Group processes useful in the resolution of technical and regulatory issues?*

**RES Responses**

*Mary Drouin, Senior Program Advisor , RES*
See response to #10 above.

*N. Prasad Kadambi, Sr. Reactor Engineer, RES*
However, the ACRS spreads itself too thin to pursue effective resolutions.

*Erasmia Lois, Senior Risk and Reliability Analyst, RES*
Subcommittee meeting s are very important for technical exchange and developing directions for work needed to address regulatory issues

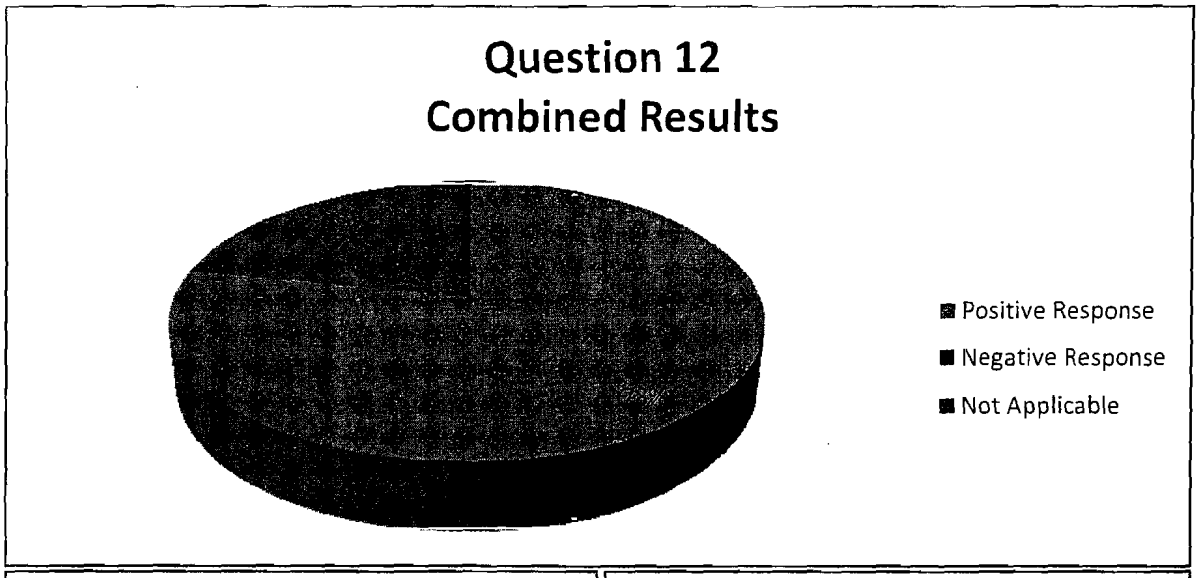
**NRR Responses**

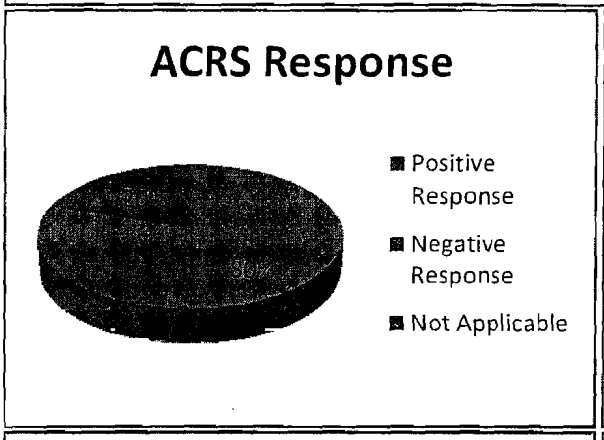
*Anonymous*
Issues resolved during subcommittee meetings are often reopened in full committee with very different conclusions.

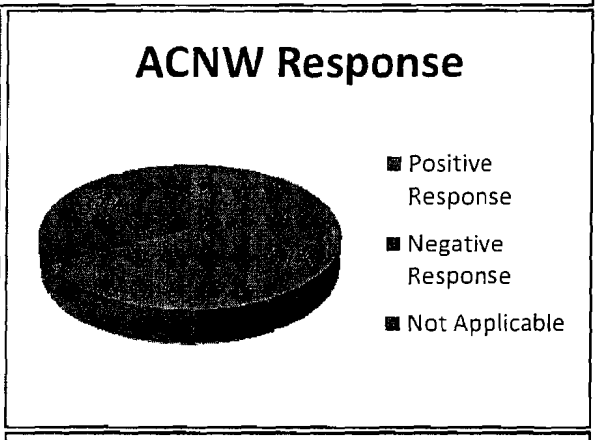
*Jon Hopkins, Sr. Project Manager, NRR*
The additional point-of-view from outside the staff and industry is useful.

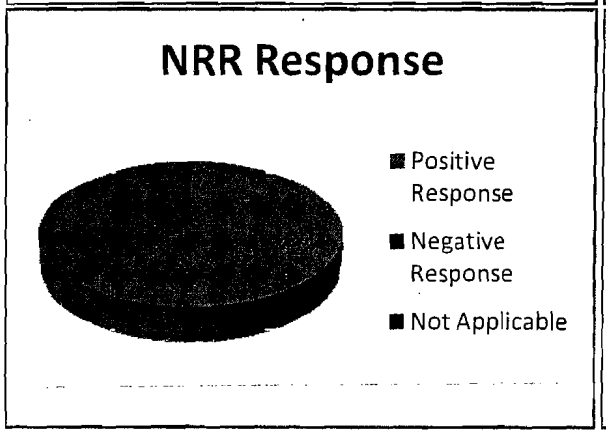
*Anonymous*
Issues resolved during subcommittees are sometimes reopened in full committee with very different conclusions.

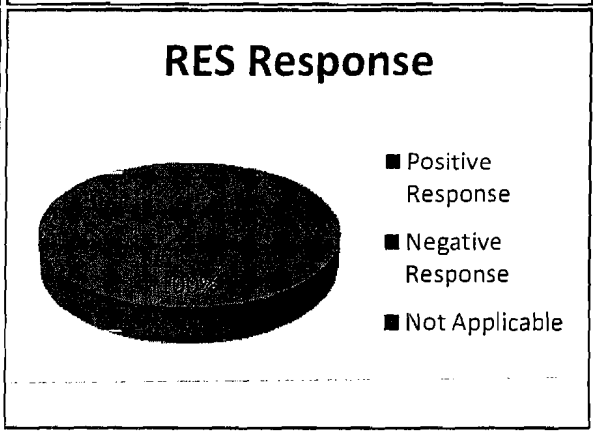
***Question 12 - Do you find the logistical arrangements provided by the ACRS/ACNW Office (meetings rooms, meeting assistance, audio/visual equipment, etc.) to be adequate?***



***Optional Comments For Question 12 - Do you find the logistical arrangements provided by the ACRS/ACNW Office (meetings rooms, meeting assistance, audio/visual equipment, etc.) to be adequate?***

**RES Responses**

*Mary Drouin, Senior Program Advisor , RES*
Absolutely, and it keeps getting better.

*Peggy Bennett, Management Analyst , RES/PMDA/AMT*
I think the round table is an excellent idea. However, it would be improved if the audience was seated around the circle like an amphitheater.

**NRR Responses**

*Jon Hopkins, Sr. Project Manager, NRR*
Videoconferencing is helpful for staff contractor participation.

***Question 13 - Are there areas that you believe ACRS/ACNW should be addressing in their reviews and, if so, what are they?***

**RES Responses**

*Mary Drouin, Senior Program Advisor , RES*
The staff goes to a tremendous amount of effort to send the ACRS their letters/reports 30 days in advance to then come to the meeting to find that many of the members have not read the information. This is very demoralizing to the staff, and then spend time critiquing vg wording instead of the actual report sent to them.

*N. Prasad Kadambi, Sr. Reactor Engineer, RES*
The ACRS should periodically step back to review the goals in the Commission's Strategic Plan and determine how they can help the Commission make more progress on key issues.

*Peggy Bennett, Management Analyst , RES/PMDA/AMT*
?????????

**NRR Responses**

*Anonymous*
In the license renewal area, the ACRS members should focus their review only on the license renewal issues and not current licensing basis issues.

*Mike Franovich, Branch Chief , NRR/DRA.APOB*
None

***Question 14 - Are there ways in which the ACRS/ACNW members or staff could be more effective in their interactions with the NRC staff and in resolving the matters under review?***

**RES Responses**

*Mary Drouin, Senior Program Advisor , RES*
I think that communication would improve greatly if the meetings transpired more like Commission briefings. Allow the staff to go through their presentation uninterrupted, of course leaving sufficient time for technical discussion. Too many times, the meetings go out of control eating up a tremendous amount of time, and many of the technical issues are not discussed because of the lack of time, and the staff does not receive the benefit of the member views.

*N. Prasad Kadambi, Sr. Reactor Engineer, RES*
There should be ways for NRC staff to "pick the brains" of the tremendous expertise available on the ACRS without getting into conflicts of interests, etc. ACRS staff should have more effective information retrieval tools so that they can help ACRS members and NRC staff go back in ACRS review history. NRC staff sometimes needs to know what issues were brought up by ACRS many years ago, and other than personal memory, there is no way to do that.

*Peggy Bennett, Management Analyst , RES/PMDA/AMT*
Often the presenter is not able to complete his presentation because of all the interruptions. Would it be better to finish the presentation and have questions at the end? Initial review questions could be given to presenter prior to presentation, so presentation would be more effective, right.

*Bill Ott, Branch Chief, RPERWM/DFERR/RES*
ACNW working groups and workshops are particularly useful because they generally bring in distinguished experts to address topics of current interest. The information is generally of high quality and helps to shape staff technical views. Occasionally they are deserving of more formal and referencable documentation than they receive.

**NRR Responses**

*Anonymous*
The advanced questions asked by the ACRS members are really helpful for the staff to address ACRS' questions, and provide effective interaction between the staff and the ACRS members.

*Anonymous*
See question 5. It was very helpful when ACRS members provided questions in advance.

*Jon Hopkins, Sr. Project Manager, NRR*
ACRS reports on license renewal plants and ACRS letter on RMTs initiative 4b dated April 23, 2007.

***Question 15 - Were there ACRS/ACNW reports that were particularly helpful in the resolution of technical and regulatory issues?***

**RES Responses**

*Mary Drouin, Senior Program Advisor, RES*
Can not think of one.

*N. Prasad Kadambi, Sr. Reactor Engineer, RES*
In my personal experience, the ACRS has contributed significantly to make technical progress on performance-based regulatory principles. Unfortunately, there is no follow up.

*Peggy Bennett, Management Analyst, RES/PMDA/AMT*
??????????????????

*John Monninger, Deputy Director, RES/DRASP/PRA*
ACRS has provided very insightful and positive recommendations regarding the NRC's human reliability analysis program. The ACRS has been very proactive at working with the NRC staff in addressing this topic.

*Erasmia Lois, Senior Risk and Reliability Analyst, RES*
The ACRS has been instrumental in focusing the staff to address the issue of variability and inconsistency in human reliability analysis models and establish programs and priorities to address this issue.

**NRR Responses**

*Anonymous*
Report on Oyster Creek license renewal SER and Report on Pilgrim license renewal SER.

*Jon Hopkins, Sr. Project Manager, NRR*
ACRS reports on license renewal plants and ACRS letter on RMTs initiative 4b dated April 23, 2007.

***Question 16 - Were there particular ACRS/ACNW work products that did not meet your expectations and, if so, in what ways?***

**RES Responses**

*Mary Drouin, Senior Program Advisor , RES*
Yes, the letter did not address what the staff had requested in terms of what was being asked to be reviewed, and the letter more served as a forum to forward personal agenda items.

*N. Prasad Kadambi, Sr. Reactor Engineer, RES*
The diversity of views expressed by members on the difficult issues related to developing a new regulatory framework for non-LWRs is sad. At the caliber of intellect ACRS represents, they surely can articulate key principles that they can agree upon, and on the issues they cannot agree, they should frame the policy issues that only the Commission can address. They should challenge the Commission with crisp questions to answer. This will help the whole technical community.

**NRR Responses**

*Anonymous*
Members were highly critical of a staff position. Yet when the ACRS letter was written, it was a positive letter.

*Anonymous*
None.

***Question 17 - Are there improvements that can be made to the ACRS/ACNW reviews/reports that would enhance their value to the OEDO?***

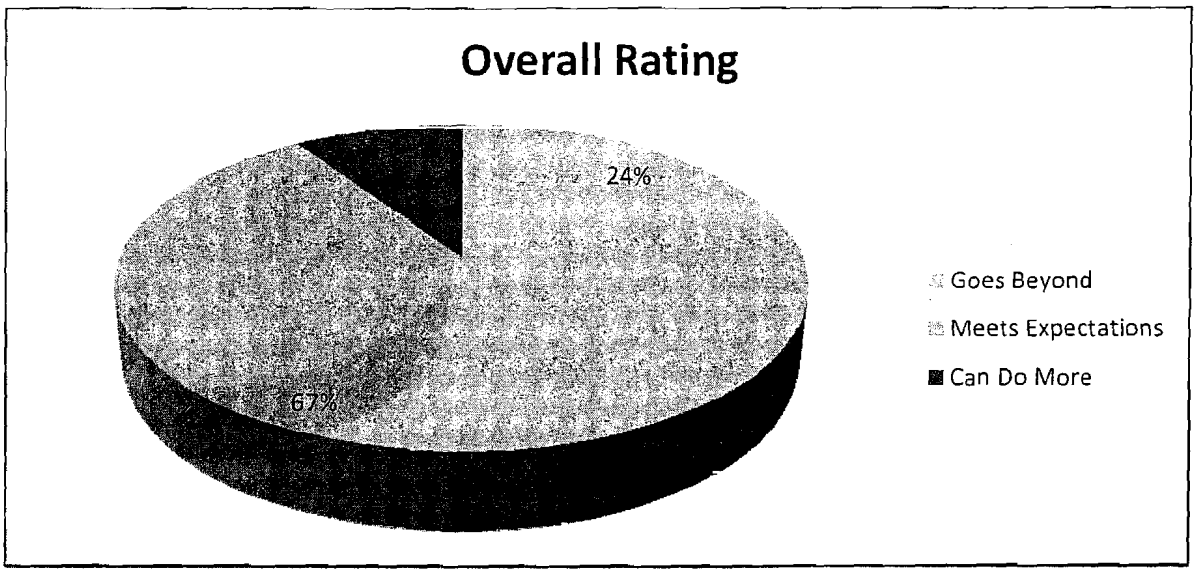
**RES Responses**

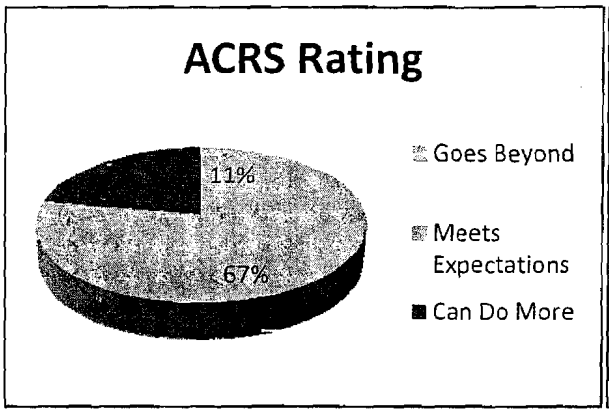
*Mary Drouin, Senior Program Advisor , RES*
Generally, the format of the reviews and reports is very good.

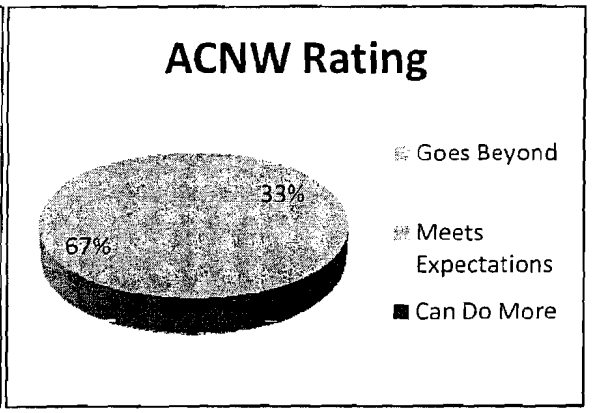
*N. Prasad Kadambi, Sr. Reactor Engineer, RES*
The reports should take note of previous ACRS recommendations and what was or was not done about them. This should be considered the most important contribution of the ACRS staff in helping members.

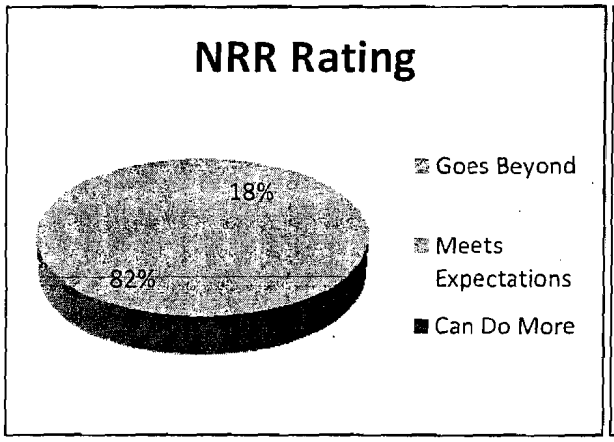
*Erasmia Lois, Senior Risk and Reliability Analyst, RES*
I believe that new members should have training as soon as they are hired on regulatory processes as well as on the issues they are reviewing/briefed by the staff. It may take some effort, but it is not helpful when members are not well informed on the technical issues they are involved and therefore, cannot provide appropriate advise. Knowledge of regulatory processes is equally important. For example, understanding compliance, enforcement, and inspection, as well as how the rules are developed and applied is needed.

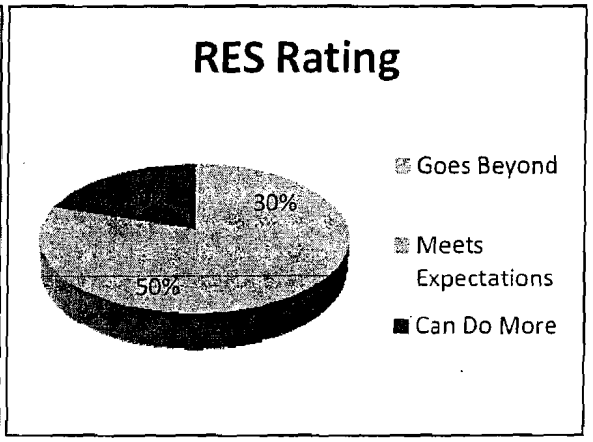
***Question 18 – Please provide an overall rating for the ACRS/ACNW***



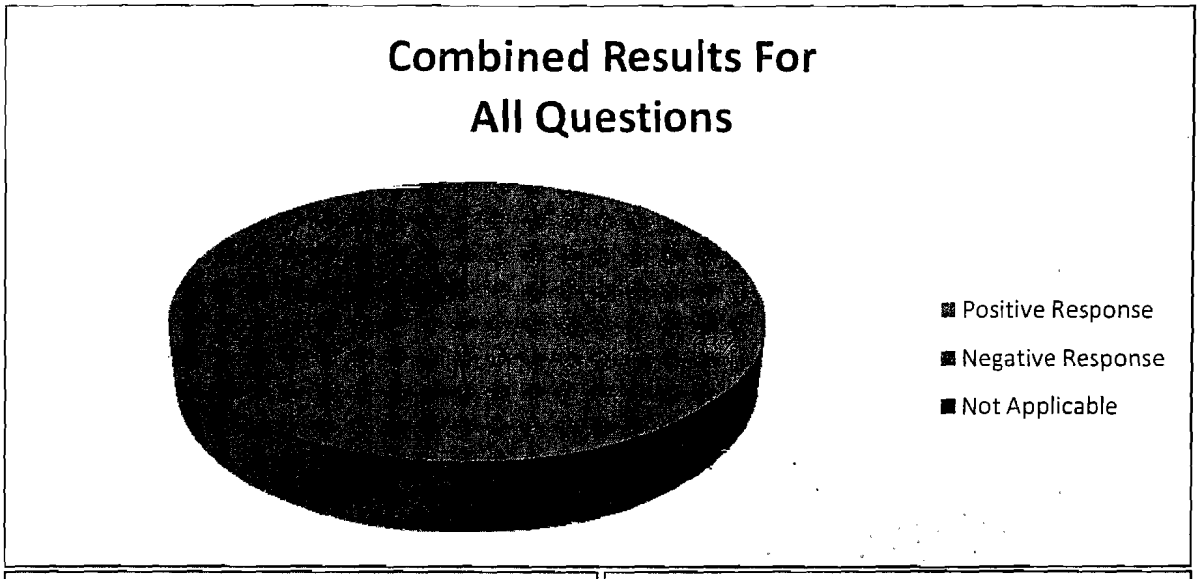



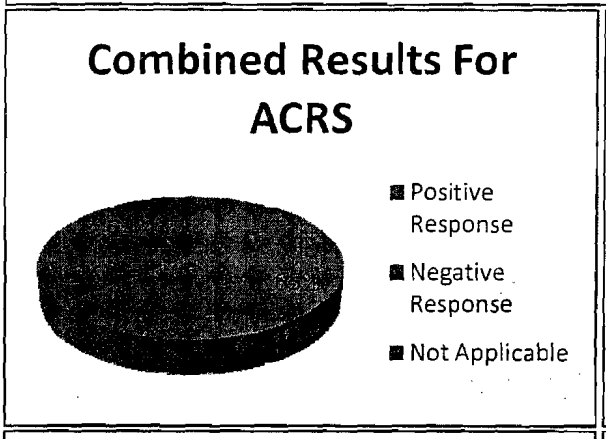



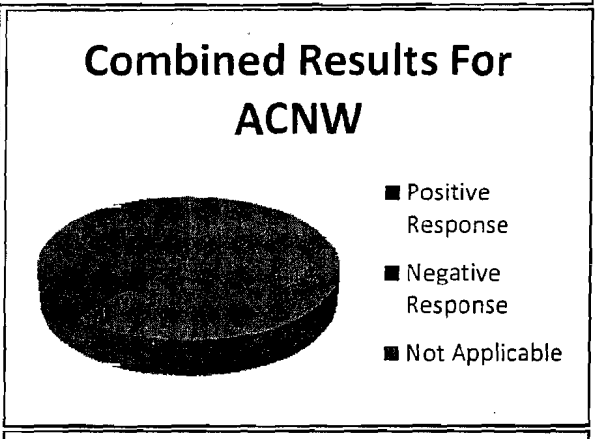



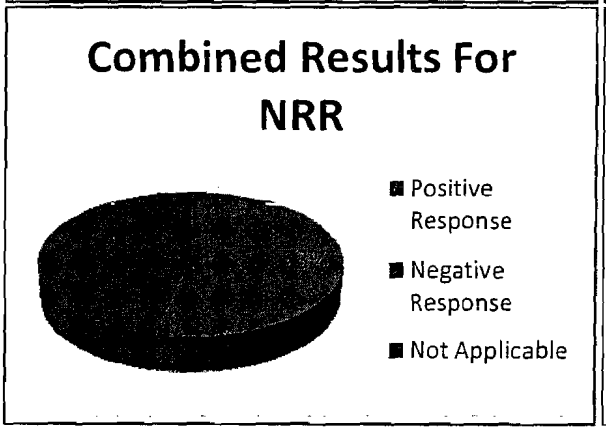



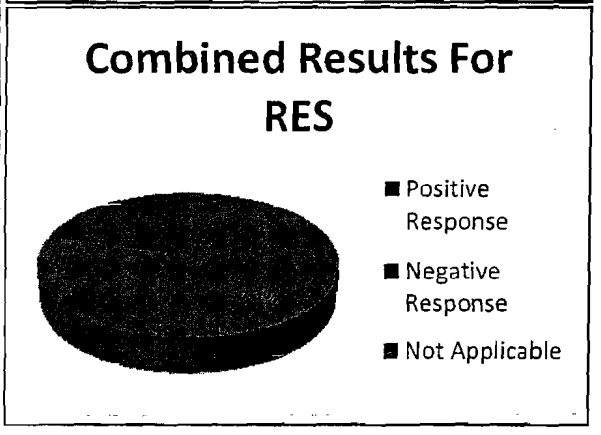
***Combined Results of Question 1 – Question 12***



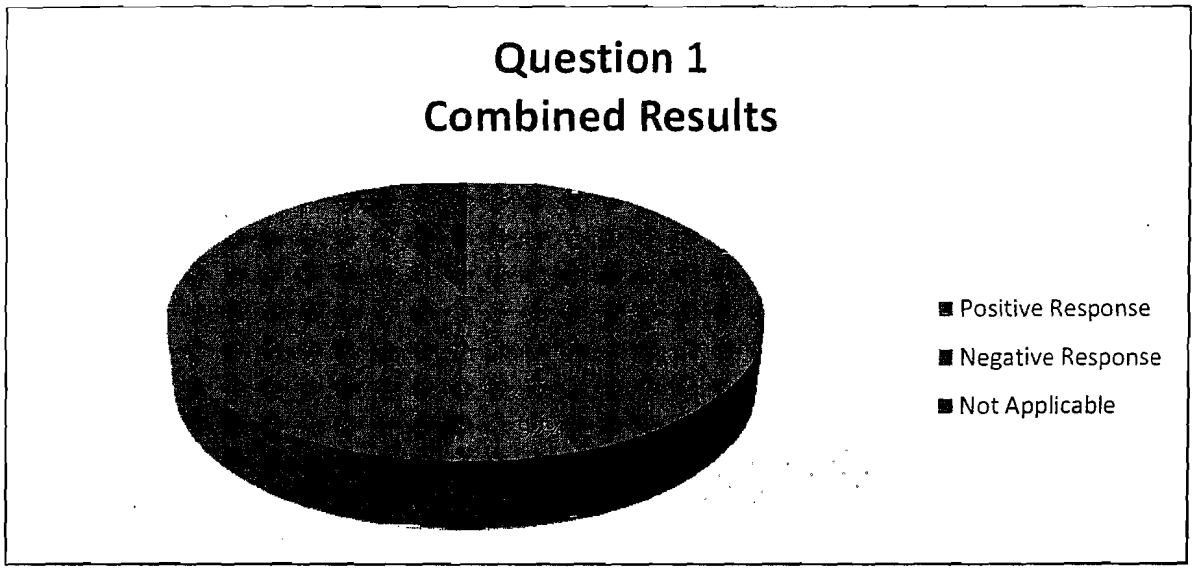



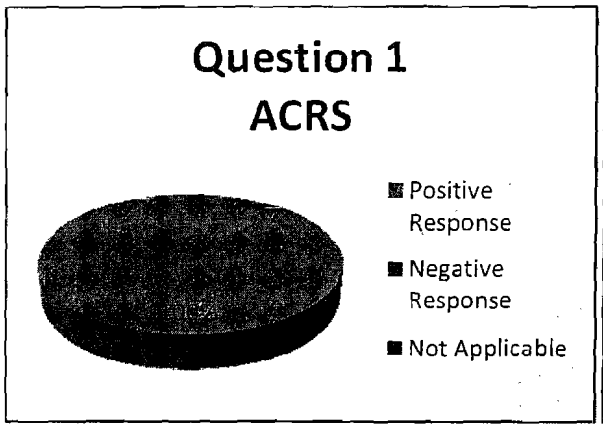



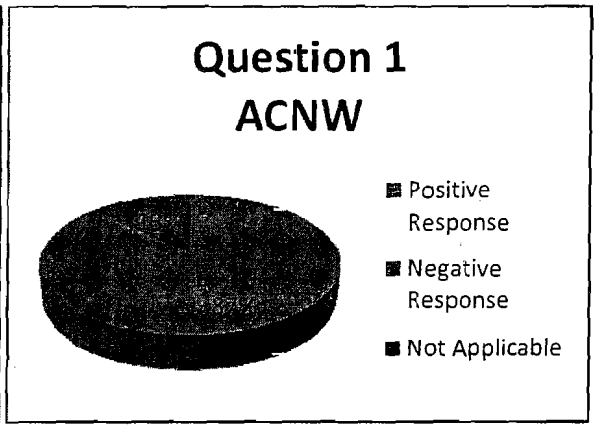



*Question 1 - Are ACRS/ACNW reports clear, concise, and timely?*



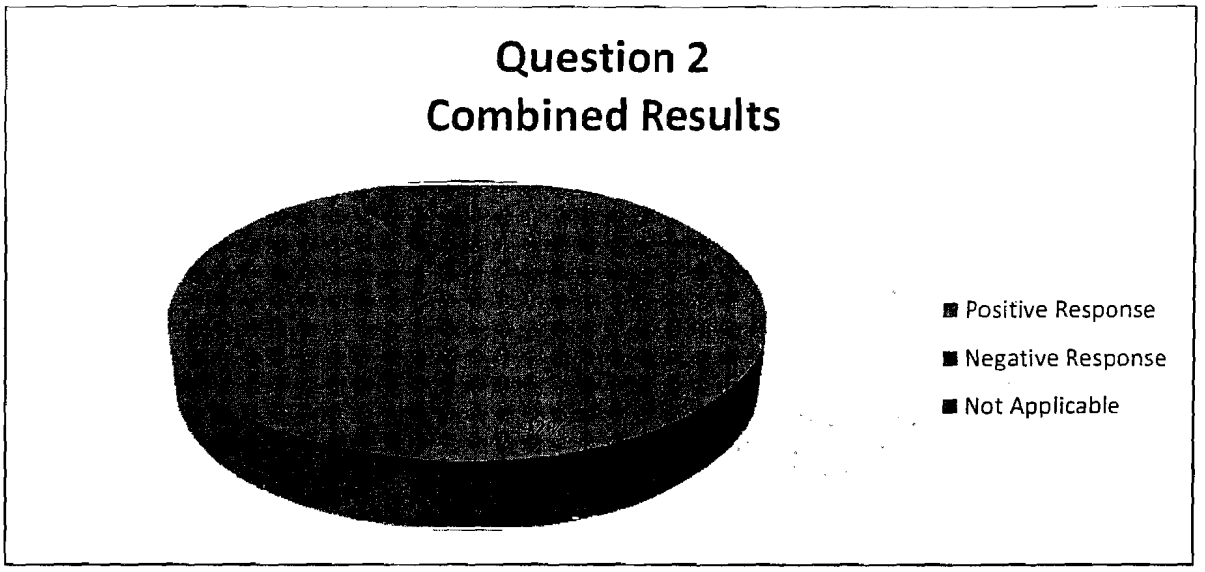



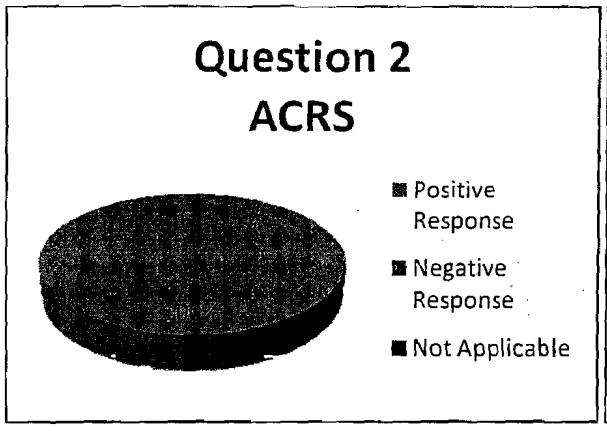



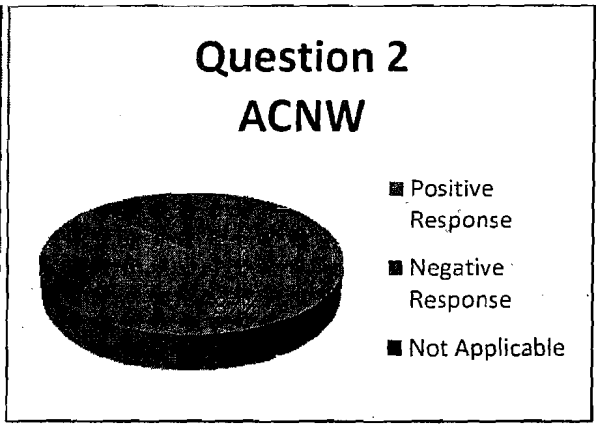

**Optional Comments:**

*Meena Khanna, Technical Assistant, NRO/DNRL*
Generally, the reports have been quite clear, concise and timely.

***Question 2 - Do ACRS/ACNW reports provide adequate background and basis for the Committees' advice?***



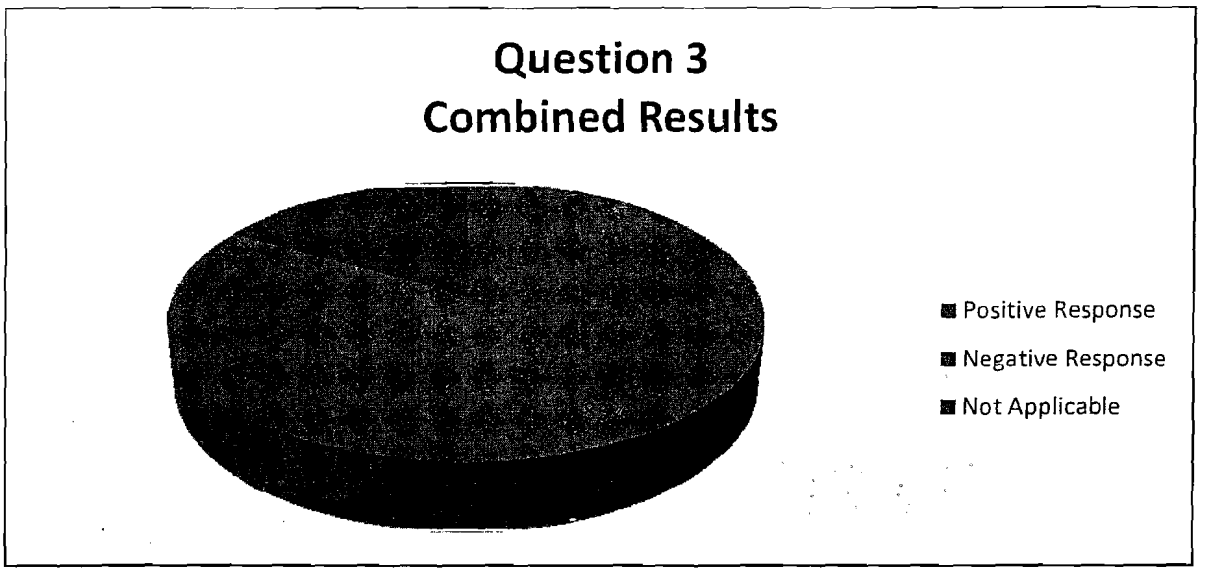



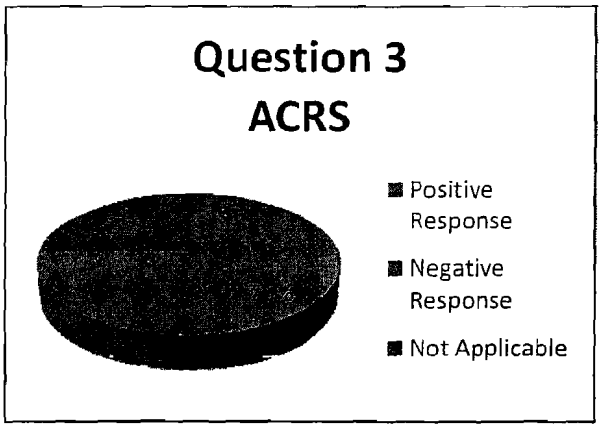



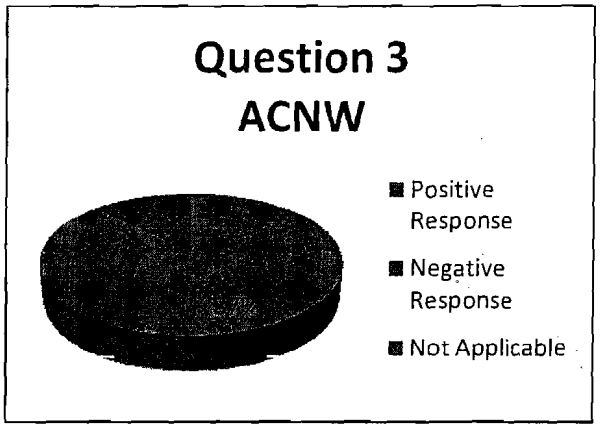

**Optional Comments:**

*Meena Khanna, Technical Assistant, NRO/DNRL*
The reports have always been thorough in providing backgrounds and bases for the Committees' advice.

***Question 3 - Does the ACRS/ACNW adequately focus on areas/issues that are of importance to the OEDO?***



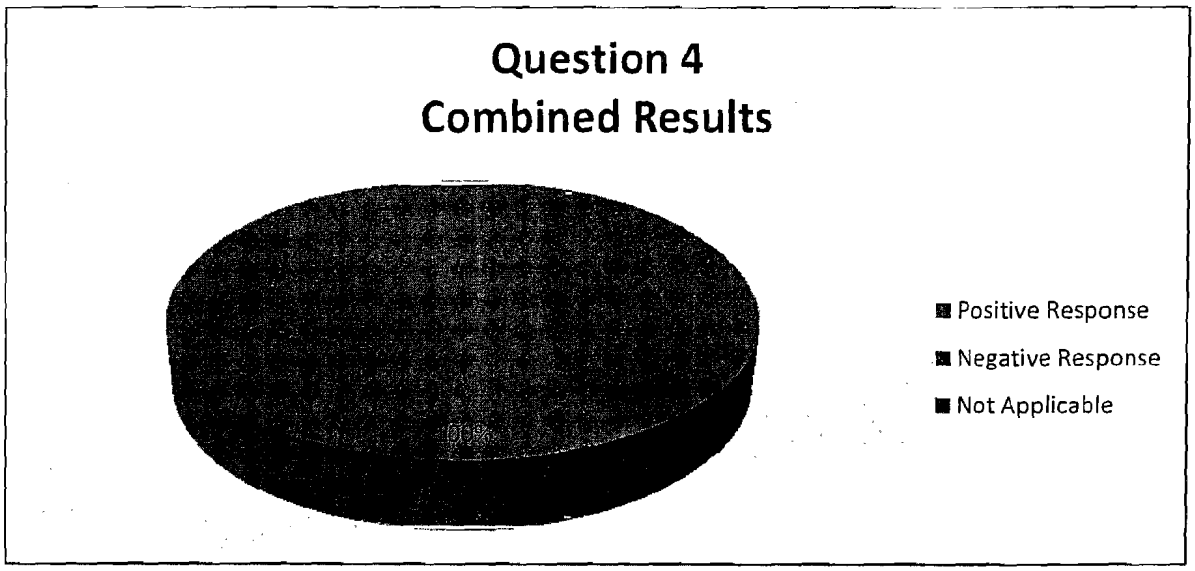




**Optional Comments:**

*Tim McCartin, SLS for Performance Assessment, NMSS*
I assume so - not really qualified to address this question.

*Meena Khanna, Technical Assistant, NRO/DNRL*
Generally, the ACRS has adequately focused on areas and issues that are of importance to the OEDO.

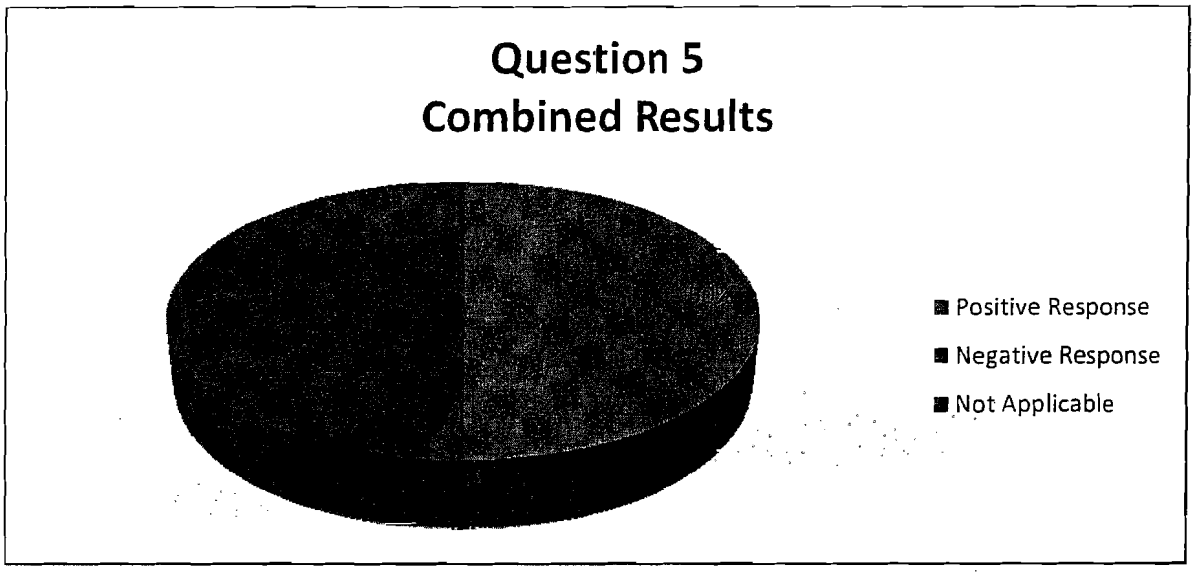
***Question 4 - Do the ACRS/ACNW interactions with the NRC staff address staff's needs and facilitate the resolution of issues under review?***

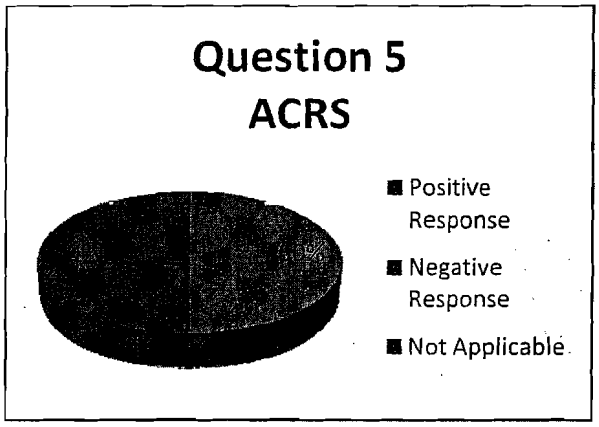


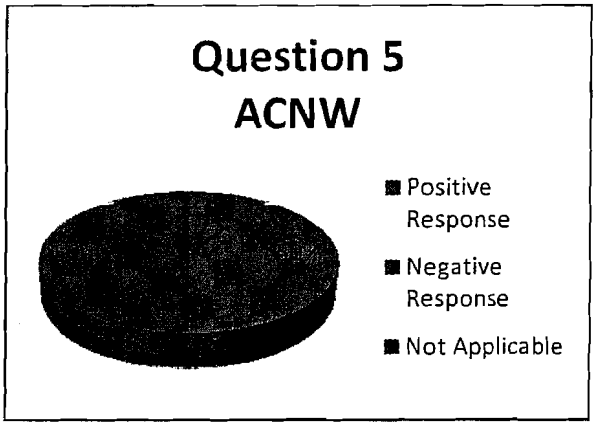

**Optional Comments:**

*Meena Khanna, Technical Assistant, NRO/DNRL*
ACRS interactions with NRC staff have successfully addressed staff's needs and have successfully facilitated the resolution of issues under review.

*Question 5 - Are the* communications *between the ACRS/ACNW Office and OEDO adequate?*



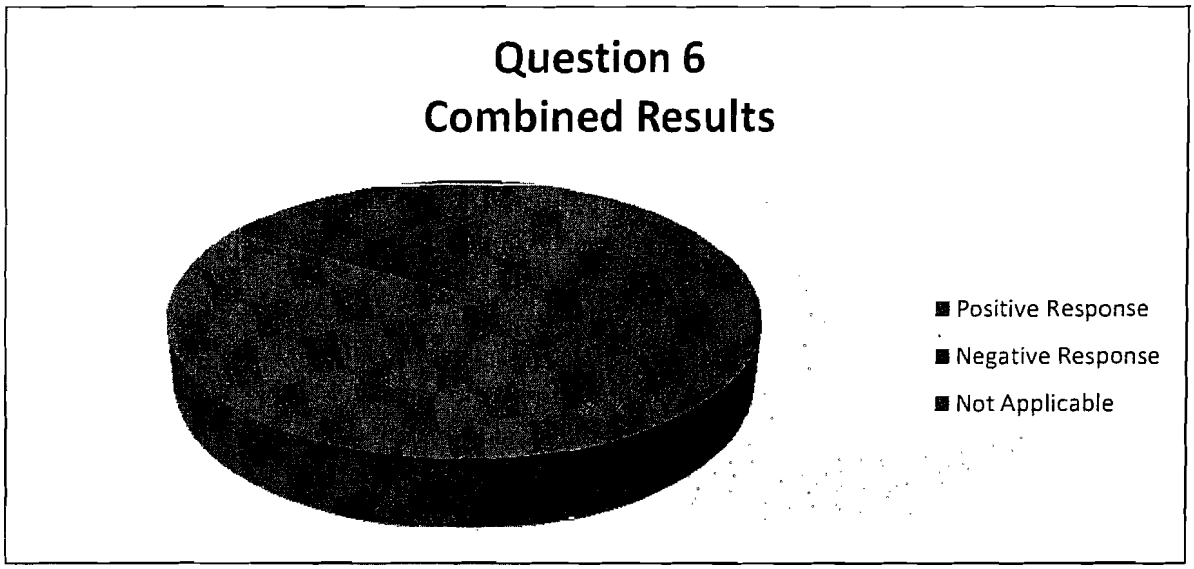



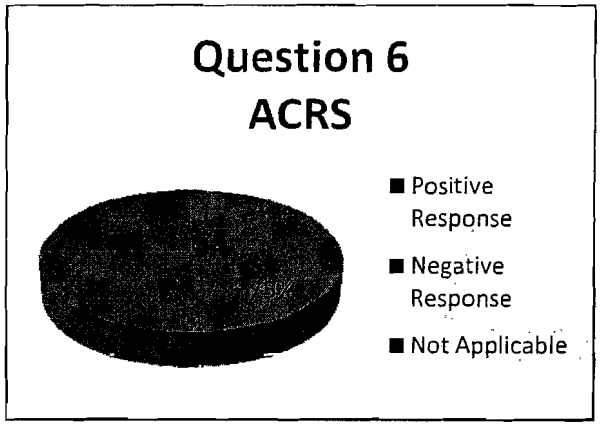

**Optional Comments:**

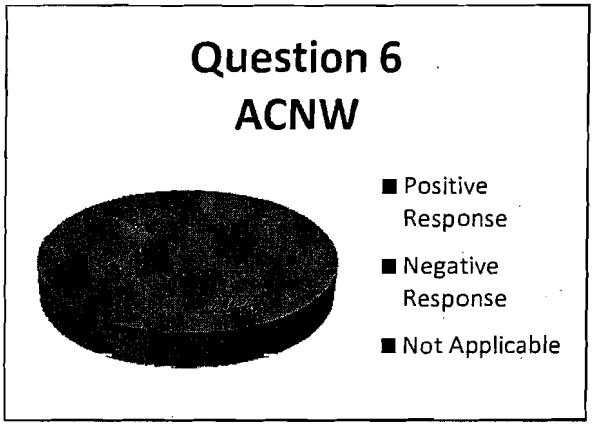
*Bernard White, Technical Assistant, NMSS/SFST*
Not sure what are those communications.

*Tim McCartin, SLS for Performance Assessment, NMSS*
Not qualified to address this question.

***Question 6 - Does the ACRS/ACNW advice and interactions with the NRC staff adequately consider the technical and regulatory issues and proper focus on the relevant regulatory issues?***




**Optional Comments:**

*Tim McCartin, SLS for Performance Assessment, NMSS*
This is always a challenge.

*Meena Khanna, Technical Assistant, NRO/DNRL*
Generally, the advice and interactions of ACRS members to NRC staff have adequately considered the technical and regulatory issues and have generally focused on the relevant regulatory issues.

***Question 7 - Were there ACRS/ACNW reports that were particularly helpful in your deliberations?***

**ACRS Responses**

*Robert Pierson, Director/FCSS, NMSS*
ACRS review of NMSS review of MOX Construction Authorization Request was particularly useful.

*Stephen N. Salomon, State Programs Technical Analyst, ILB,DILR,FSME*
There are a limited number of particular interest to the States.

*Meena Khanna, Technical Assistant, NRO/DNRL*
By ACRS letter dated Dec 23, 2005, the Committee provided valuable insight to the NRC staff concerning the safety sections for the Grand Gulf early site permit. Specifically, the ACRS communicated its concern to the staff regarding the staff's analyses on hazards posed to the proposed site by transportation accidents on the Mississippi River. In turn, the staff addressed this issue and noted, to the ACRS Committee, that they made a valuable contribution to the staff's review and development of the FSER.

**ACNW Responses**

*Rateb (Boby) Abu-Eid, Senior Advisor, DWMEP/FSME/USNRC*
Yes, there were reports helpful for DWMEP deliberations.

*Stephen N. Salomon, State Programs Technical Analyst, ILB,DILR,FSME*
ACNW White Paper, History and Framework of Commercial LLW Management in the US, NUREG-1853.

*Bernard White, Technical Assistant, NMSS/SFST*
The report and interactions on Moderator Exclusion were very helpful to us for writing our Commission Paper.

*Tim McCartin, SLS for Performance Assessment, NMSS*
The soon to be released White Paper on Igneous Activity is expected to be very useful (comment based on draft that has been circulated in public and participation at ACNW workshop on this subject.

*Anonymous*
Only provided an informational brief to the ACNW members on a specific rulemaking activity. No ACNW reports associated with the scope of the rulemaking.

***Question 8 - Were there particular ACRS/ACNW work products that did not meet your expectations and, if so, in what ways?***

**ACRS Responses**

*Stephen N. Salomon, State Programs Technical Analyst, ILB,DILR,FSME*
I am not aware of any.

**ACNW Responses**

*Rateb (Boby) Abu-Eid, Senior Advisor, DWMEP/FSME/USNRC*
As far as I know, there were no reports that did not meet our expectations.

*Stephen N. Salomon, State Programs Technical Analyst, ILB,DILR,FSME*
I am not aware of any.

*Tim McCartin, SLS for Performance Assessment, NMSS*
Nothing comes to mind.

*Robert Pierson, Director/FCSS, NMSS*
No.

***Question 9 - Are there improvements that can be made to the ACRS/ACNW reviews/reports that would enhance their value to the OEDO?***

**ACRS Responses**

*Robert Pierson, Director/FCSS, NMSS*
No.

*Stephen N. Salomon, State Programs Technical Analyst, ILB,DILR,FSME*
I am unable to respond to this question.

**ACNW Responses**

*Robert Pierson, Director/FCSS, NMSS*
No.

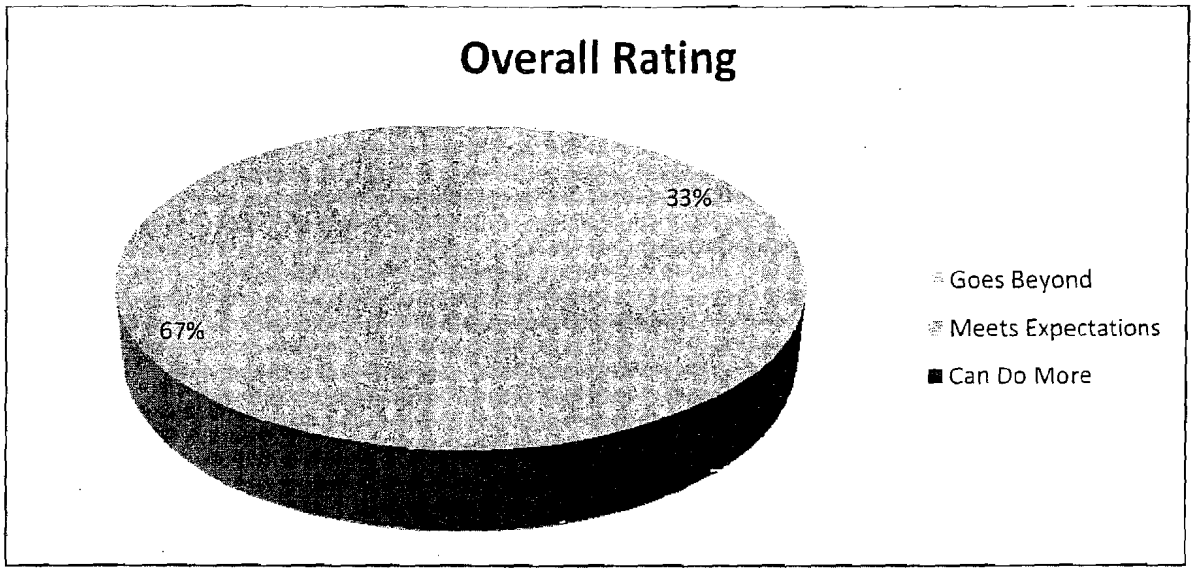
*Rateb (Boby) Abu-Eid, Senior Advisor, DWMEP/FSME/USNRC*
Yes, I would recommend including a discussion of the applicability of ACNW recommendations in the ACNW reviews/reports considering availability of resources and costs at the concerned EDO unit. (e.g., Division)

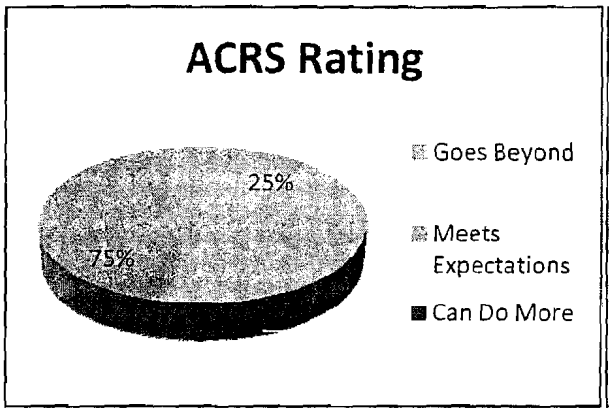
*Stephen N. Salomon, State Programs Technical Analyst, ILB,DILR,FSME*
I am not aware of any.

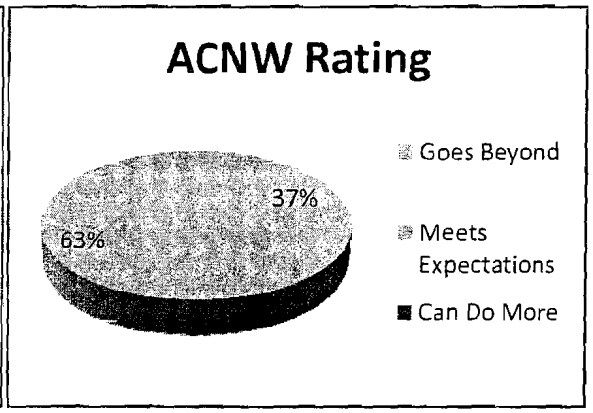
*Tim McCartin, SLS for Performance Assessment, NMSS*
Recent letters (i.e., the past few years or so) have had crisp recommendations followed by a brief discussion of the basis - this is a very useful format and should be continued.

*Anonymous*
Reviews should be focus more on waste issues. For non-waste issues, should request for informational brief only.

***Question 10 – Please provide an overall review for ACRS/ACNW.***

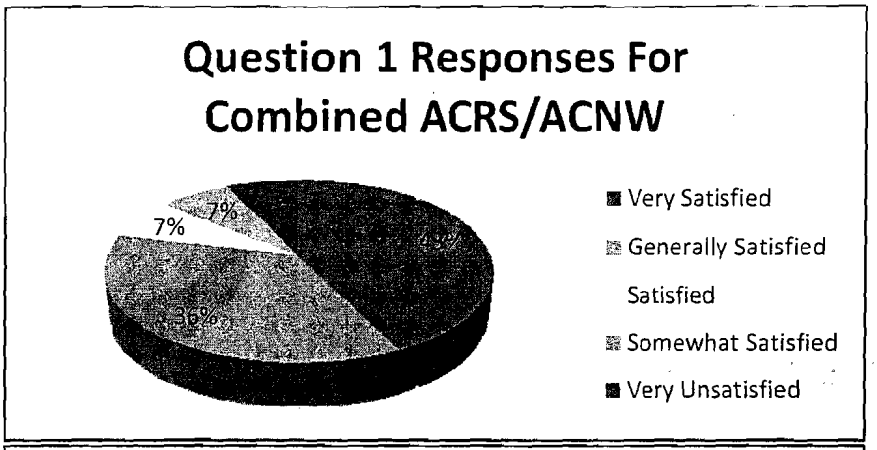


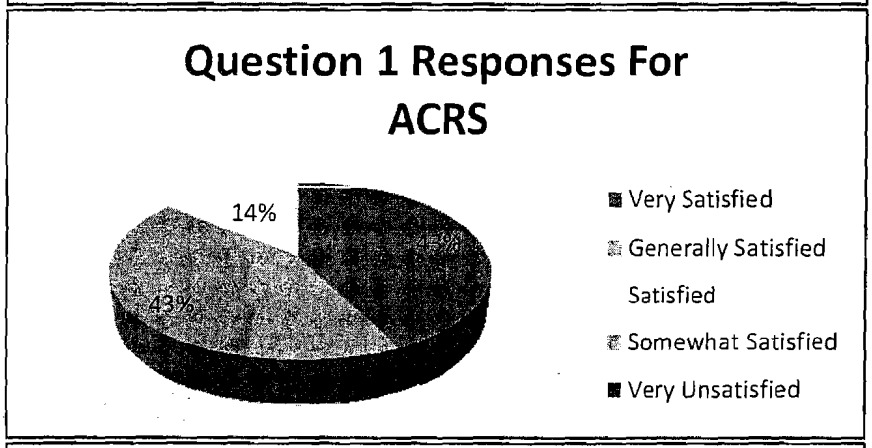



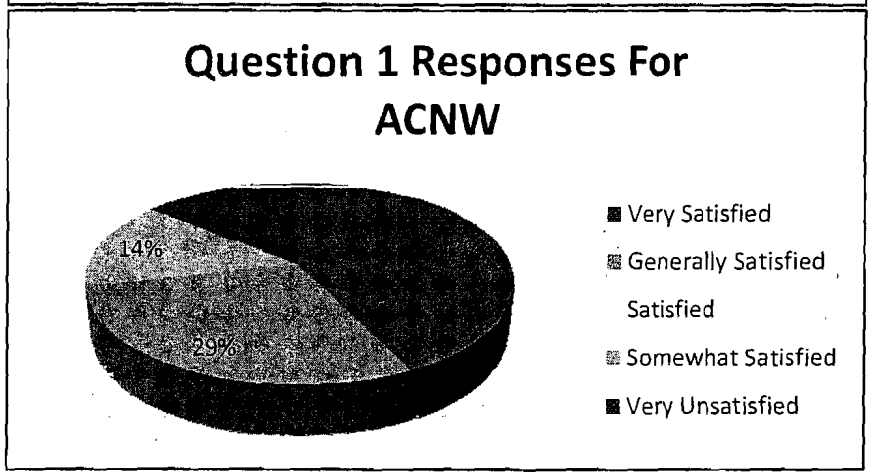



## 2007 ACRS/ACNW Survey Results

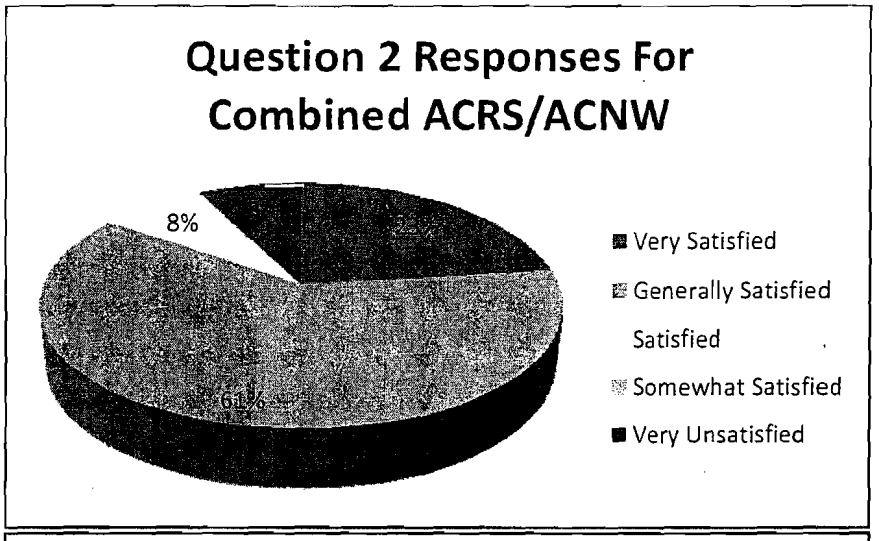
***Question 1** - Does the ACRS/ACNW adequately consider all relevant aspects of technical and regulatory issues in its review process?*

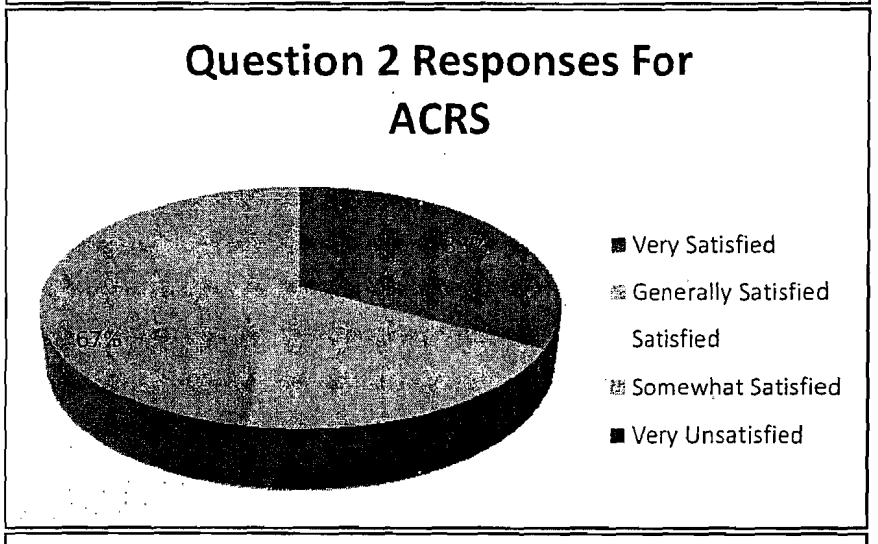


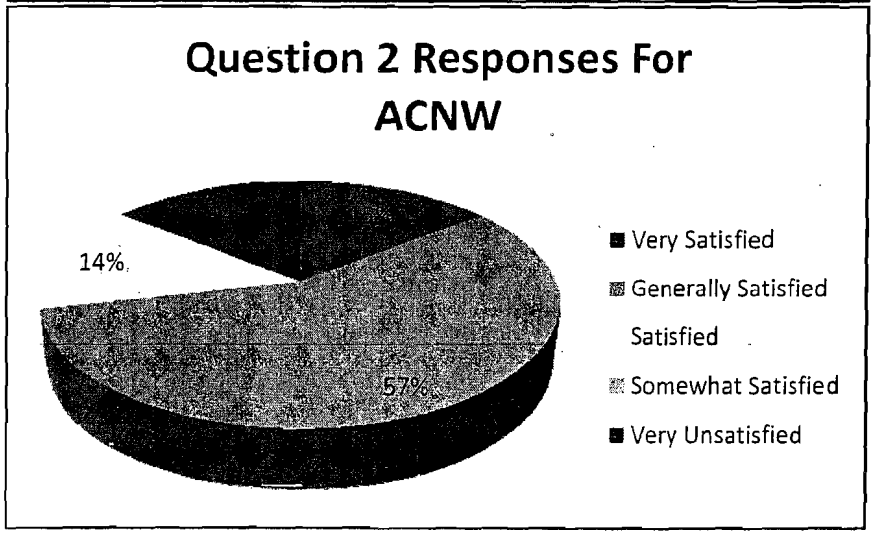



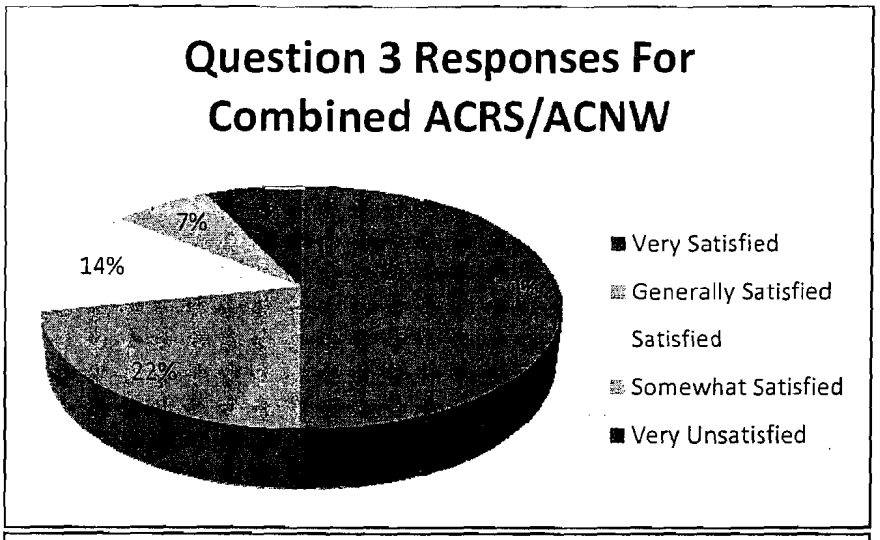
***Question 2 - Does the ACRS/ACNW address current issues in a timely manner?***

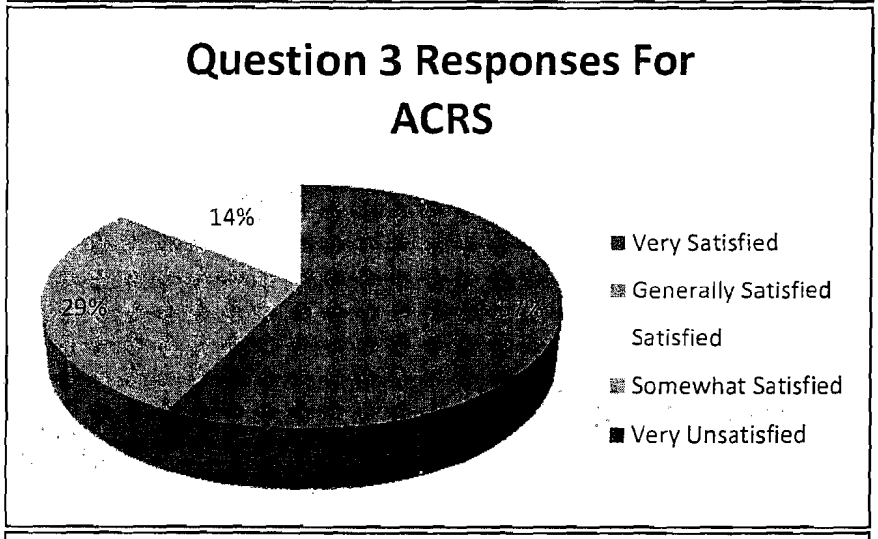


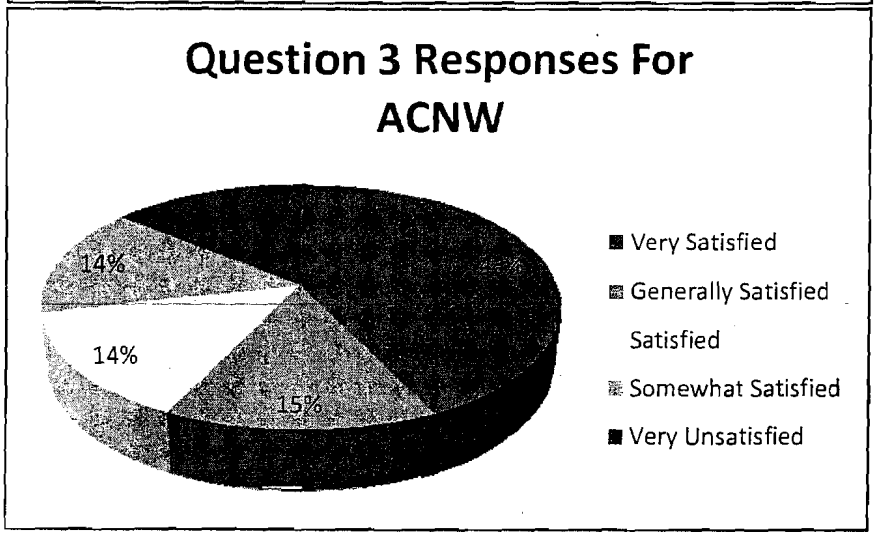



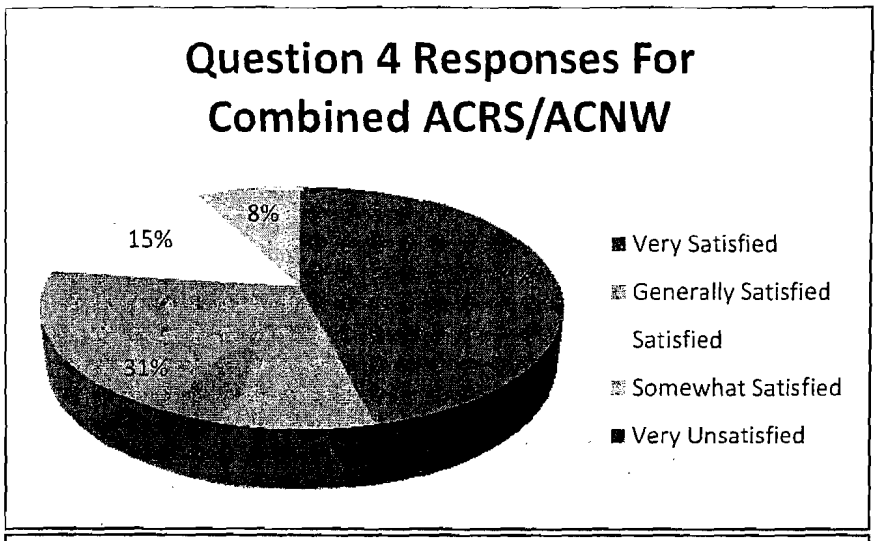
***Question 3** - Does the ACRS/ACNW address the issues in an objective manner and appropriately consider all available information and opinions?*

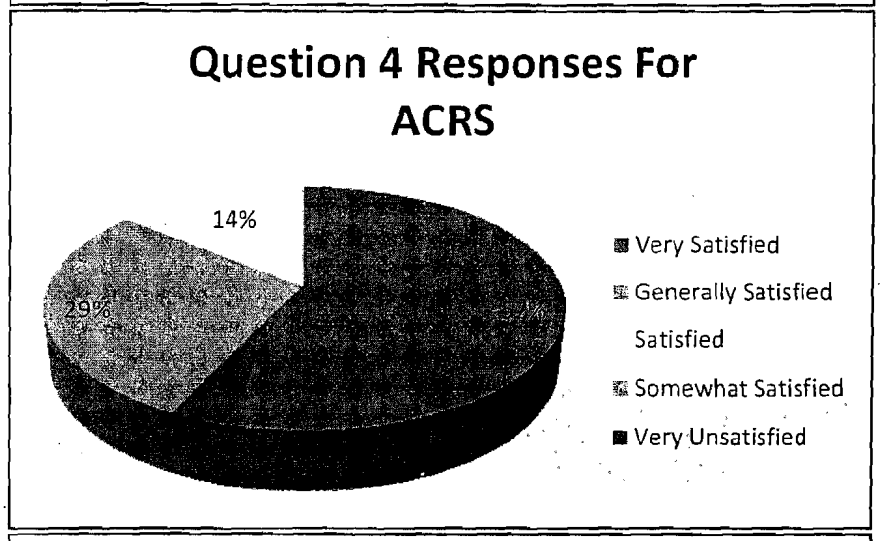


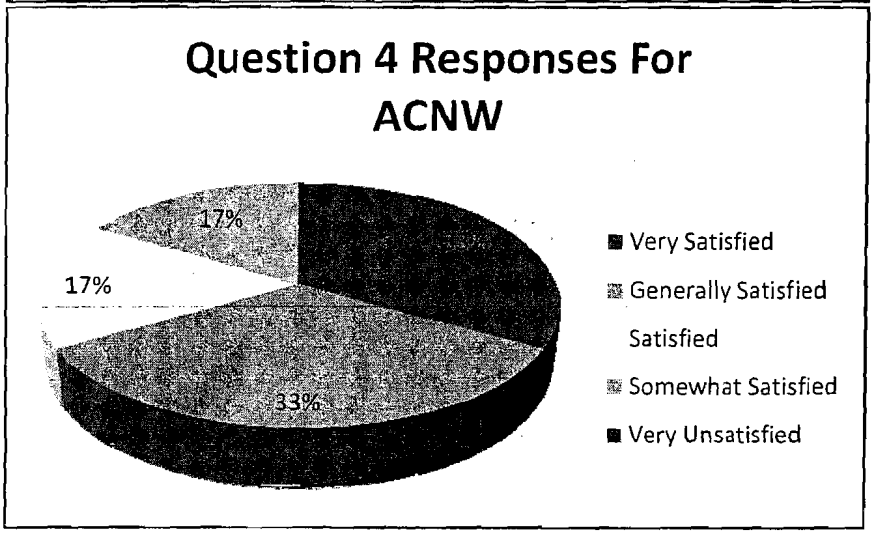



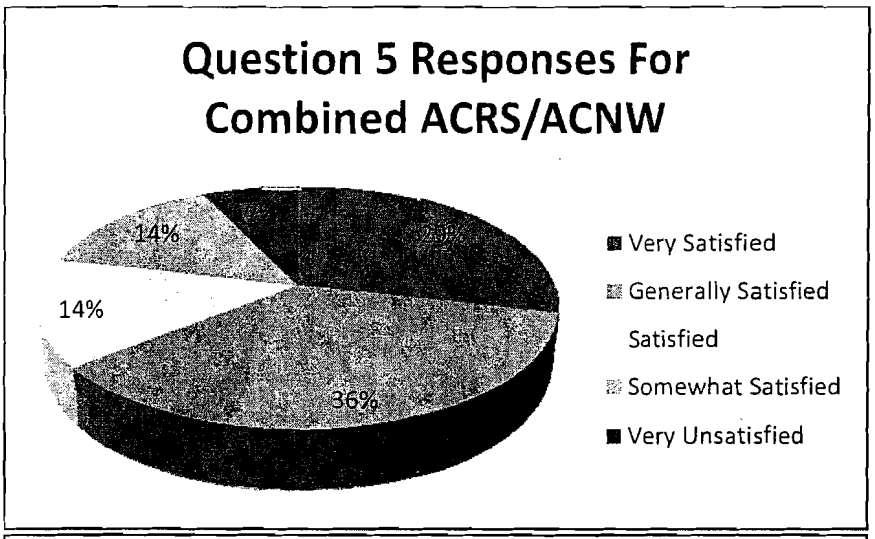
***Question 4** - Do the ACRS/ACNW products (reports, letters, transcripts, etc.) effectively communicate the basis for Committees' recommendations?*

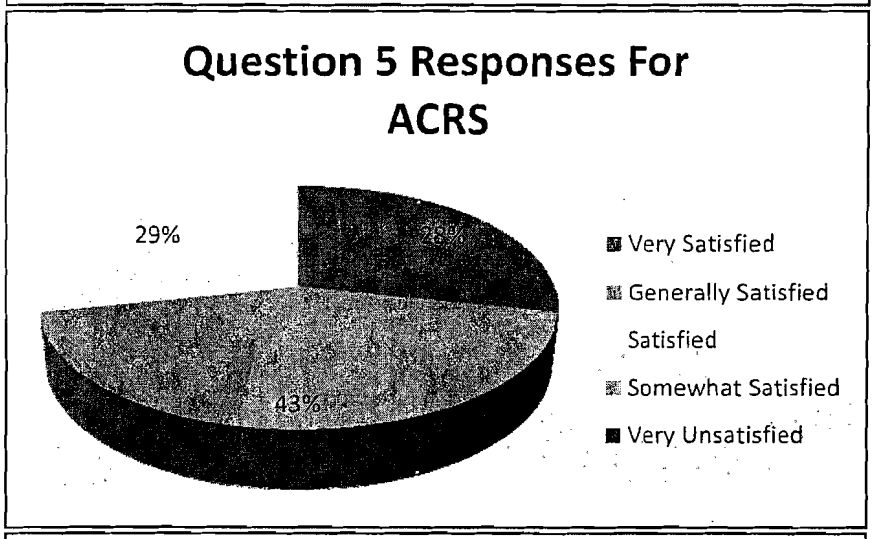


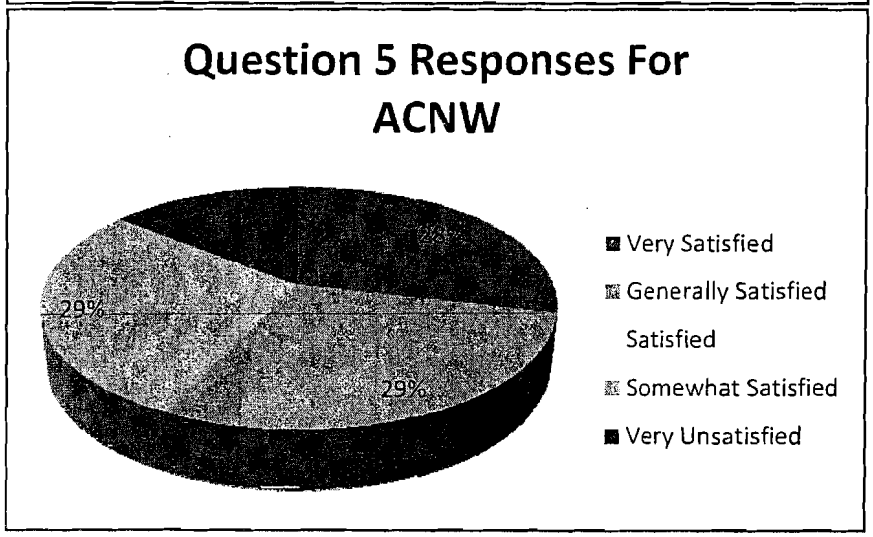



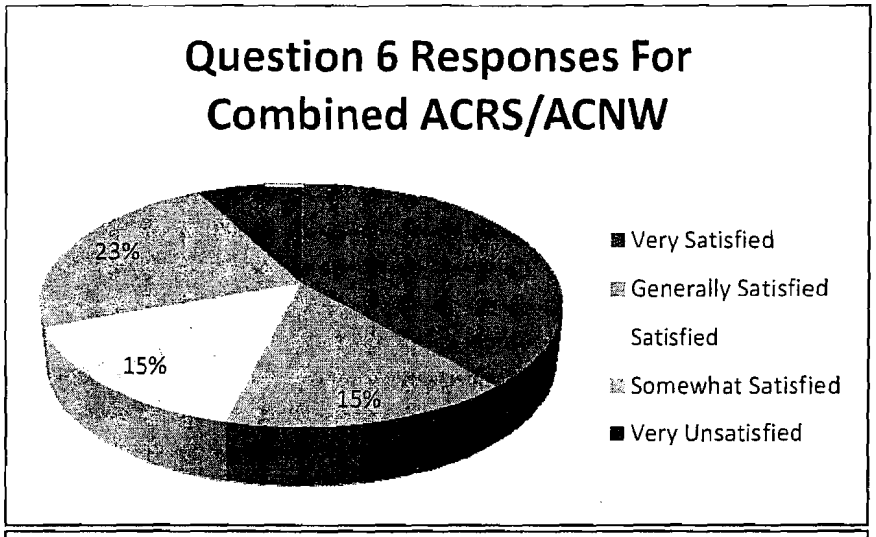
***Question 5** - Are the ACRS/ACNW interactions with the stakeholders effective in identifying and addressing key safety and regulatory issues?*

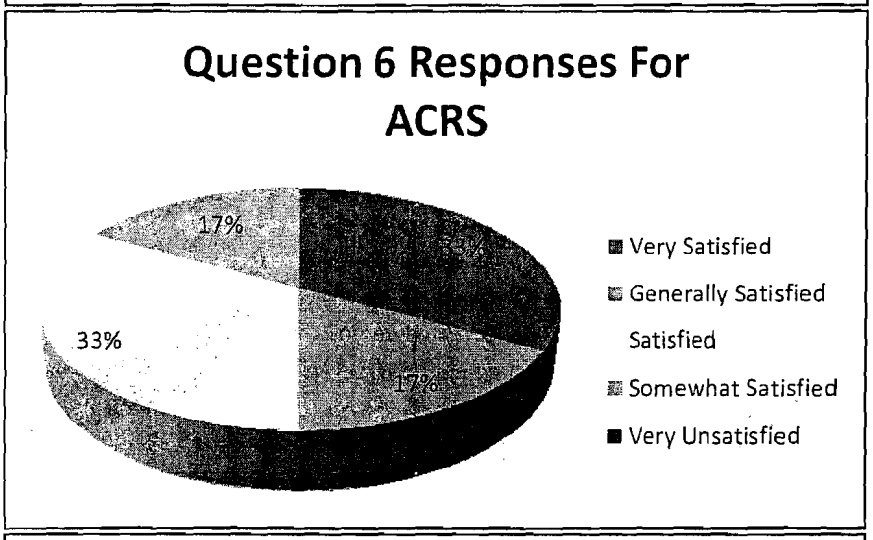


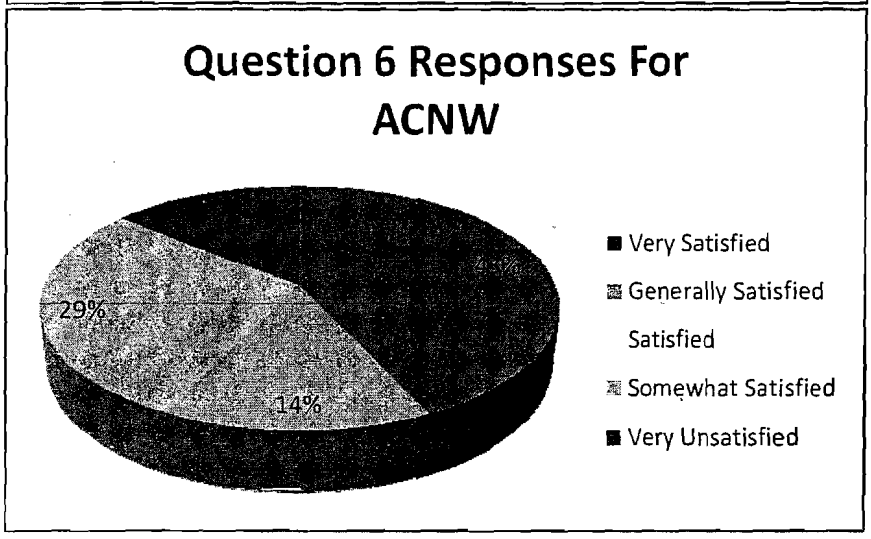



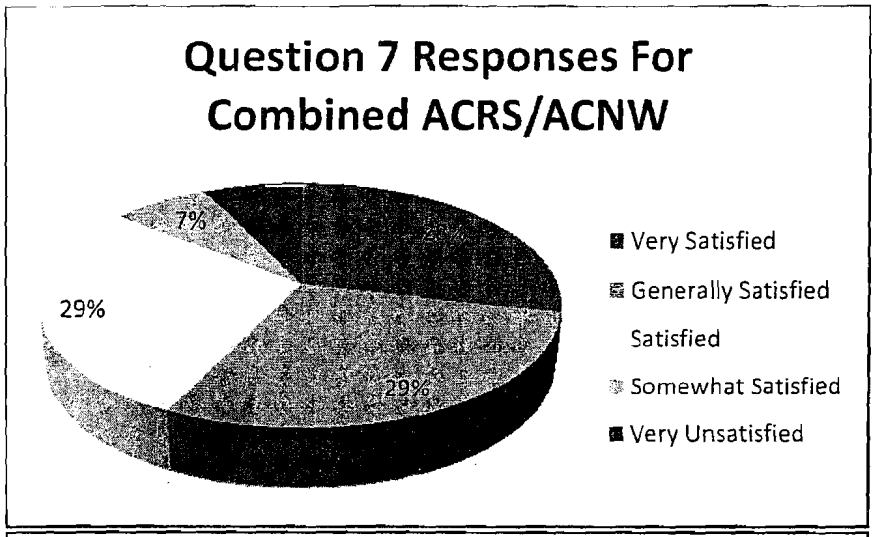
***Question 6** - Does the ACRS/ACNW review process enable you to become more informed about matters under review by the NRC?*

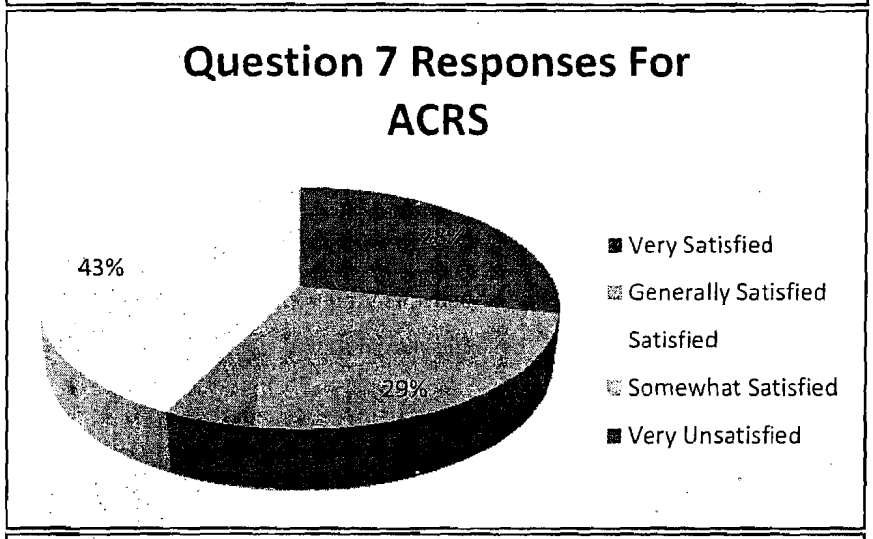


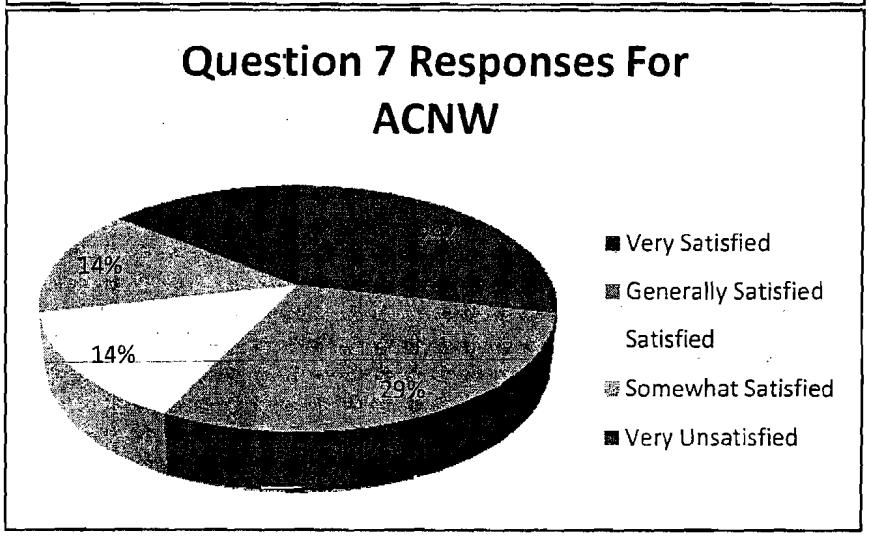



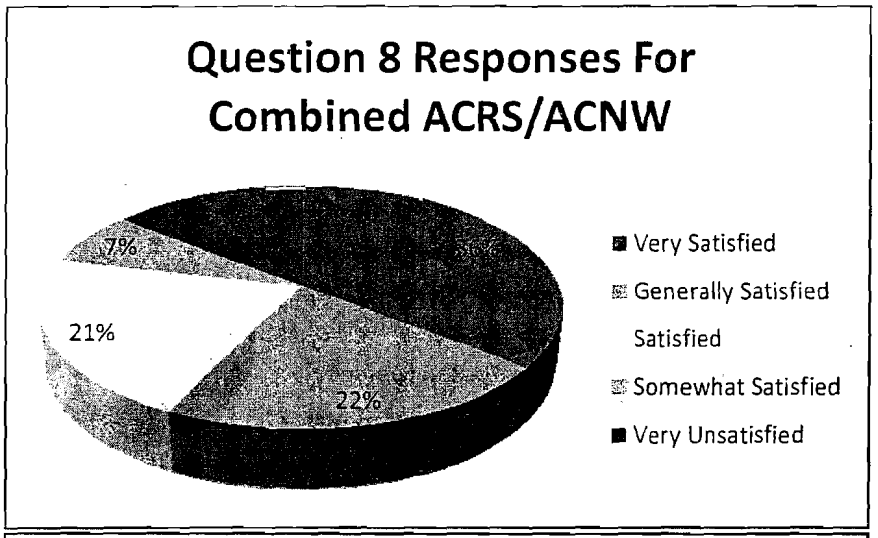
***Question 7** - Does the ACRS/ACNW facilitate the implementation of the NRC's policy of openness?*

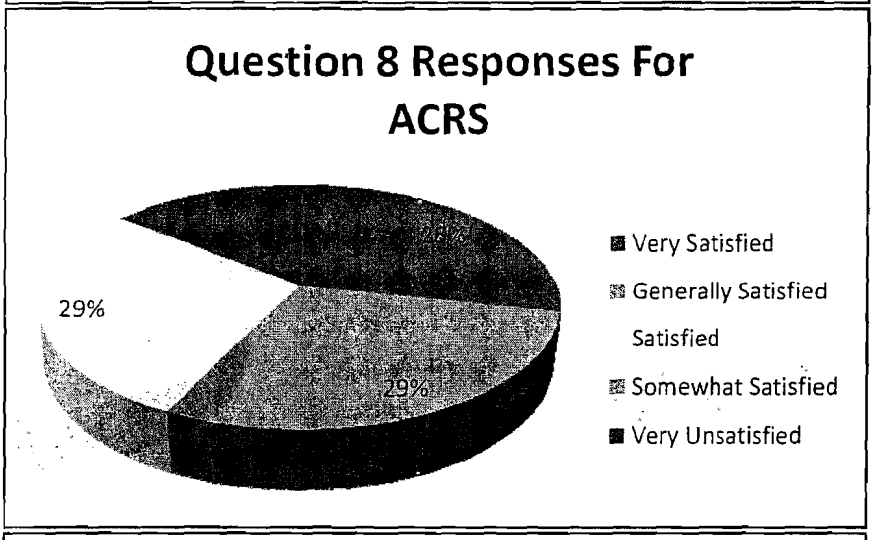


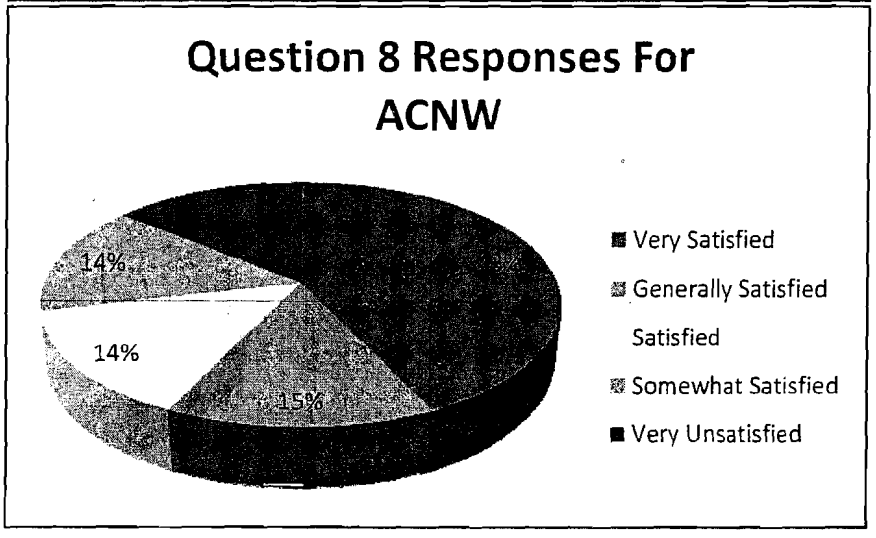



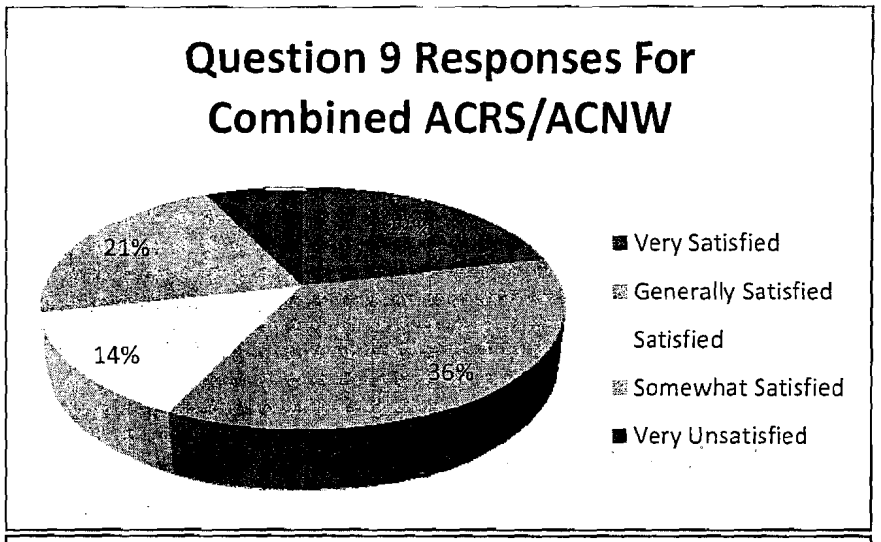
***Question 8** - Does the ACRS/ACNW review process provide adequate opportunities for stakeholder involvement?*

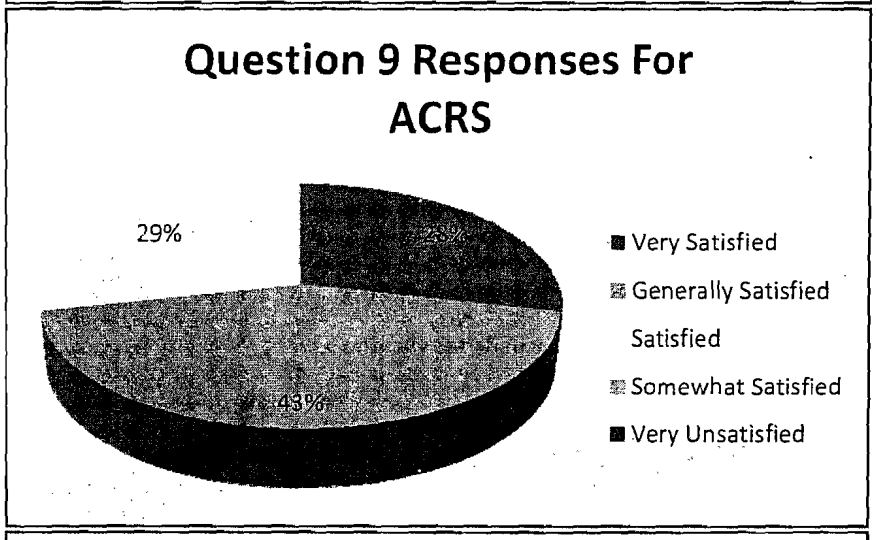


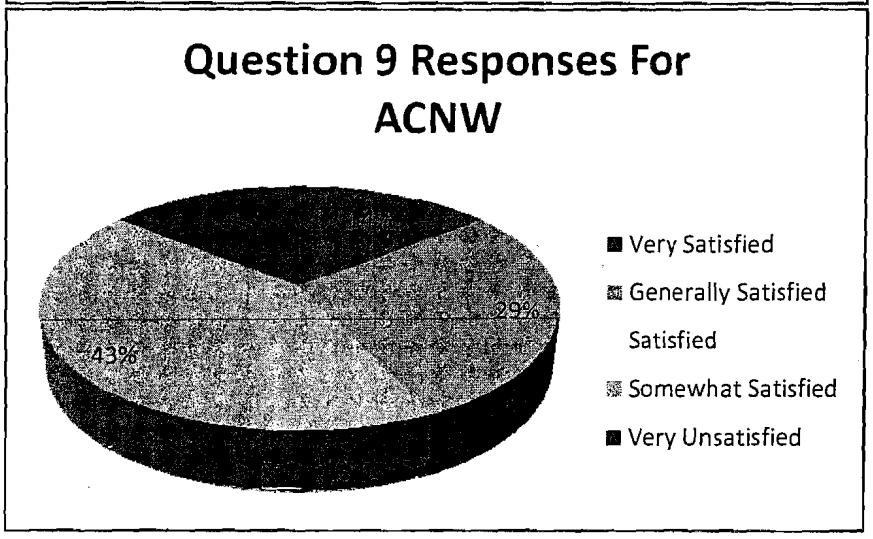



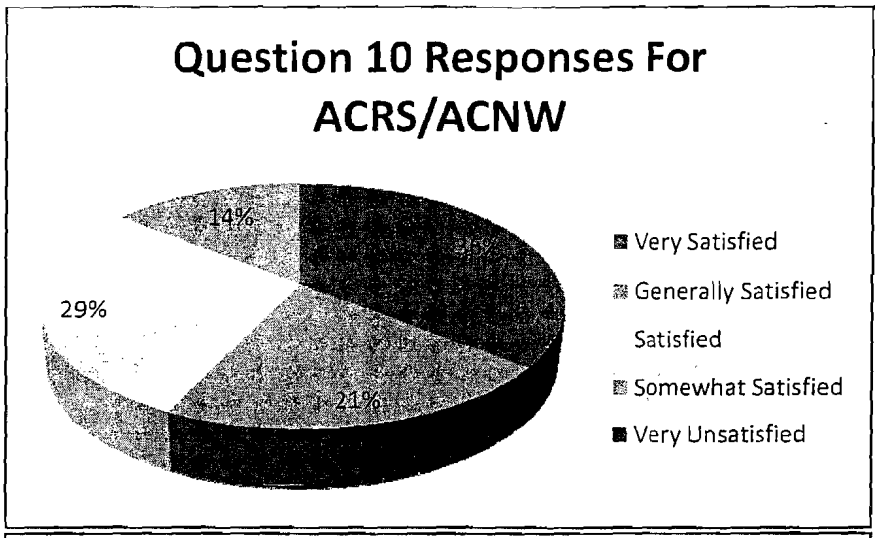
***Question 9 - Does the ACRS/ACNW review process facilitate the resolution of complex technical / regulatory issues?***

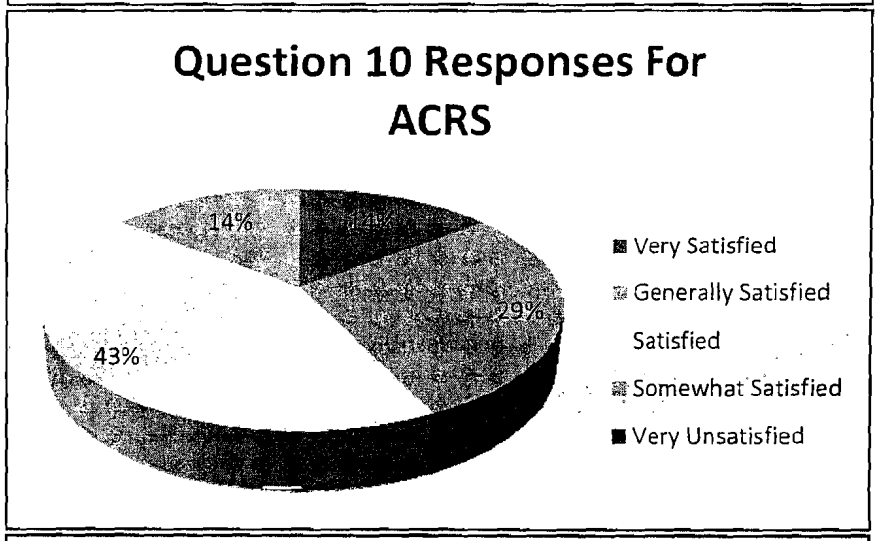


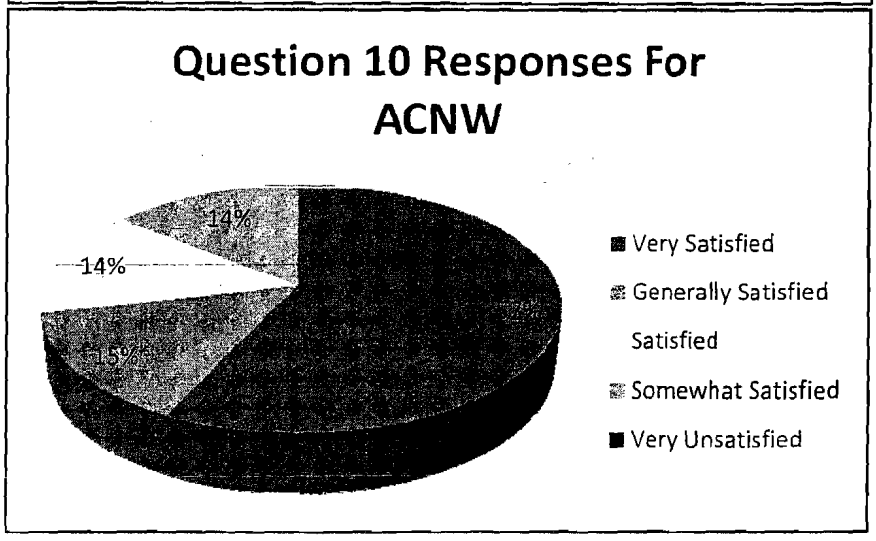



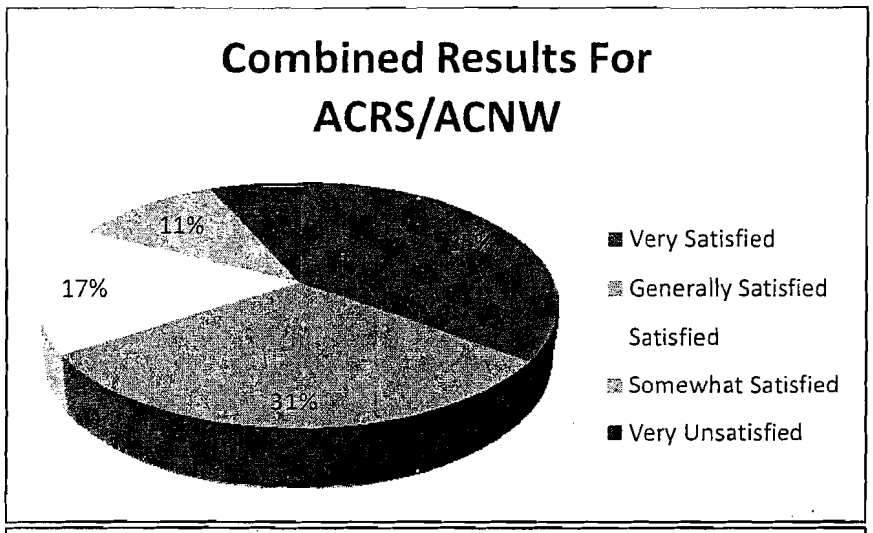
***Question 10 - Does the ACRS/ACNW publication of Federal Register Notices and Press Releases and the ACRS/ACNW website provide the information you need to keep you informed of ACRS/ACNW activities?***

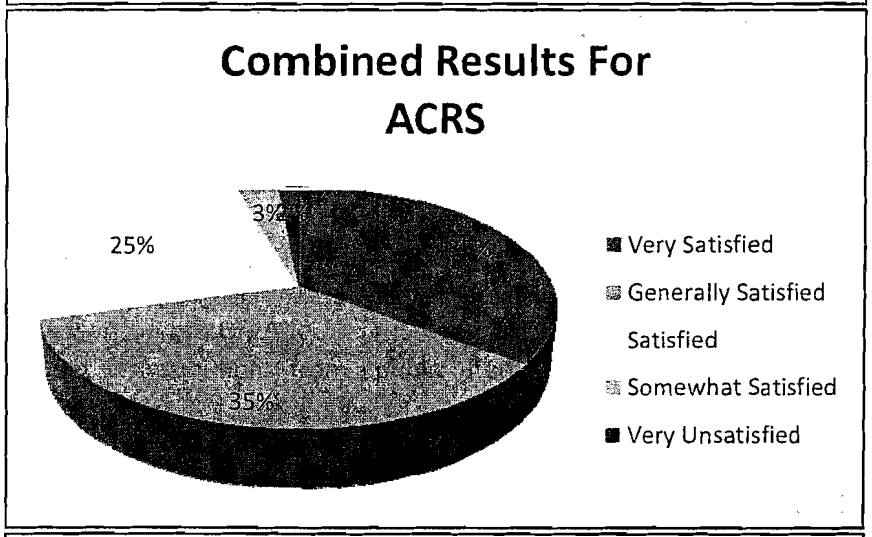


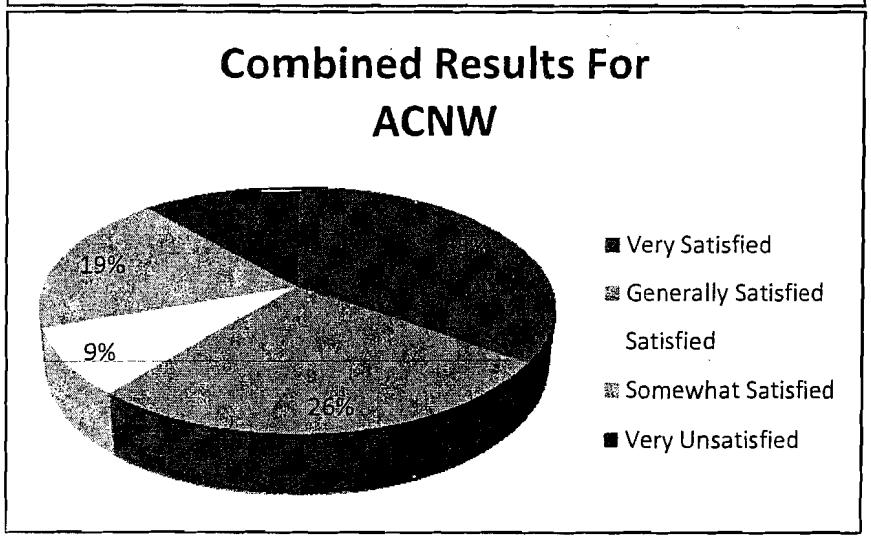



***Combined Results for All Question 1 – 10***



## *Written Comments Section for External Stakeholders (Optional)*

***Question 11 - Were there ACRS/ACNW reports that you found particularly helpful in the resolution of technical and regulatory issues?***

**ACRS Responses**

*Anonymous*
NRC website.

*David Lochbaum, Director, Nuclear Safety Project, Union of Concerned Scientists*
Not this period.

*Bill Stillwell, PRAC Supervisor, STP Nuclear Operating Company*
Yes They Were.

**ACNW Responses**

*Julie Clements, CHP, USACE*
NUREG-1853 is very thorough and has been useful to me on numerous occasions.

*Joe Cook, Senior Analyst, GAO*
No, have not found any of those reports.

*Dr Johnsrud, Sr. Advisor, Sierra Club*
Depends on how one defines resolutions, from a public interest and environmental, not sufficiently so.

*Rod McCullum, NEI*
Volcanism White Paper.

*Budhi Sagar, President, Center for Nuclear Waste Regulatory Analyses*
Their reports and letters on "realistic" versus "conservative" calculations were particularly helpful.

**Question 12 - Were there particular ACRS/ACNW letter reports that did not meet your expectations and, if so, in what ways?**

**ACRS Responses**

*David Lochbaum, Director, Nuclear Safety Project, Union of Concerned Scientists*
Not this period.

*Bill Stillwell, PRAC Supervisor, STP Nuclear Operating Company*
None. Very Satisfied

**ACNW Responses**

*Joe Cook, Senior Analyst, GAO*
No, have not seen any letter reports but, will be looking at one that is in the production process soon.

*Budhi Sagar, President, Center for Nuclear Waste Regulatory Analyses*
Letter reports related to igneous activity did not effectively and consistently use current staff information.

**Question 13 - What improvements can be made to the ACRS/ACNW reviews/reports that would enhance their value to the public?**

**ACRS Responses**

*James C Higgins, Group Leader, BNL*
Add some of them to the electronic distribution process that is done by NRC for generic communications (e. g., IN, RIS, etc.)

*David Lochbaum, Director, Nuclear Safety Project, Union of Concerned Scientists*
The ACRS to NRC Chairman letters are very fine, concise statements of ACRS viewpoints, with key justification and/or bases mentioned. It would help me if these concise letters contained a brief listing of pertinent publicly available documents that preceded the letter, such as the ADAMS ML numbers for transcripts of ACRS meetings in which the topic of the letter were discussed and the ADAMS ML numbers for any publicly available communications between the ACRS and NRC staff on the topic.

*Fred Polaski, Manager License Renewal, Exelon Nuclear*
To improve interactions between licensees and the ACRS (applies to license renewal and similar proceedings), it would be very helpful if the ACRS reviewed the applications and provided questions, areas of concern, and areas of interest to the applicant before the meeting with sufficient time for the applicant to properly prepare and be ready to answer ACRS members questions. Raising unexpected questions during License Renewal Application review meetings results in questions not being answered or the need for additional meetings.

**ACNW Responses**

*Joe Cook, Senior Analyst, GAO*
Have not seen one, no comment.

*Dr Johnsrud, Sr Advisor, Sierra Club*
From a public perspective they fail to admit or explain many of the concerns that the public feels concern mid/high level waist.

*Budhi Sagar, President, Center for Nuclear Waste Regulatory Analyses*
Add a plain English summary at the beginning, much the way the GAO does.

## Question 14 - In what ways does the ACRS/ACNW contribute to the safety culture of the NRC?

**ACRS Responses**

*Jan Fridrichsen, Mechanical/Civil Supervisor, Southern Nuclear Operating Company*
ACRS brings a level of reasonableness to activities being studied by Staff. Staff tends to take nuclear industry issues and inflate them to catastrophic levels and ACRS has a way of toning down the issue to a level that makes it manageable.

*Anonymous*
Independent oversight by a group of knowledgeable individuals

*David Lochbaum, Director, Nuclear Safety Project, Union of Concerned Scientists*
The questioning attitude demonstrated by the ACRS in its public discussions is a good model for the NRC. The ACRS could supplement this function by also periodically (say, every two years) reviewing the DPO and non-concurrence files for items raised within NRR. Having the ACRS review closed DPOs and non-concurrences and comment on the technical adequacy and timeliness would (a) reinforce among the NRC staff the viability of these programs and (b) allow problems with individual items and programmatic weaknesses to be identified and fixed.

*Bill Stillwell, PRAC Supervisor, STP Nuclear Operating Company*
By asking probing questions. by asking the staff to information to present to the ACRS.

*Fred Polaski, Manager License Renewal, Exelon Nuclear*
ACRS provides a different view on technical issues that challenges the NRC Staff to be more realistic and reasonable in some of their positions.

**ACNW Responses**

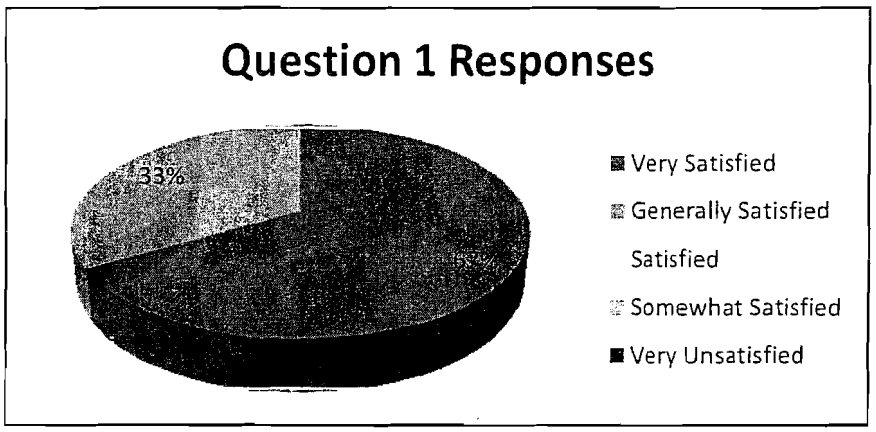
*Eugene S. Grecheck, Vice President Nuclear Support Services, Dominion*
Independent technical review of work products.

*Dr Johnsrud, Sr Advisor, Sierra Club*
Insufficiently.

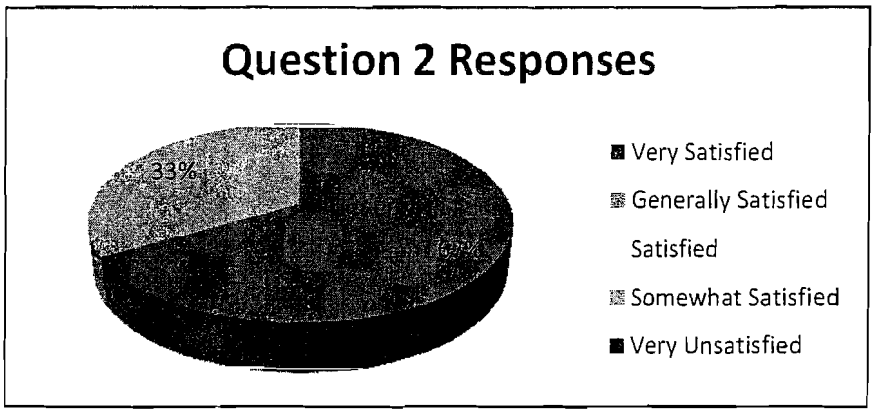
*Rod McCullum, NEI*
Encourages questioning attitude/critical self assessment.

*Budhi Sagar, President, Center for Nuclear Waste Regulatory Analyses*
The openness fostered by ACNW generally supports the safety culture of NRC. The ACNW plays more of a "restraining" role in the context of another NRC objective of avoiding undue regulatory burden. The ACNW activity noted in Item 11, above, is a good example of this.

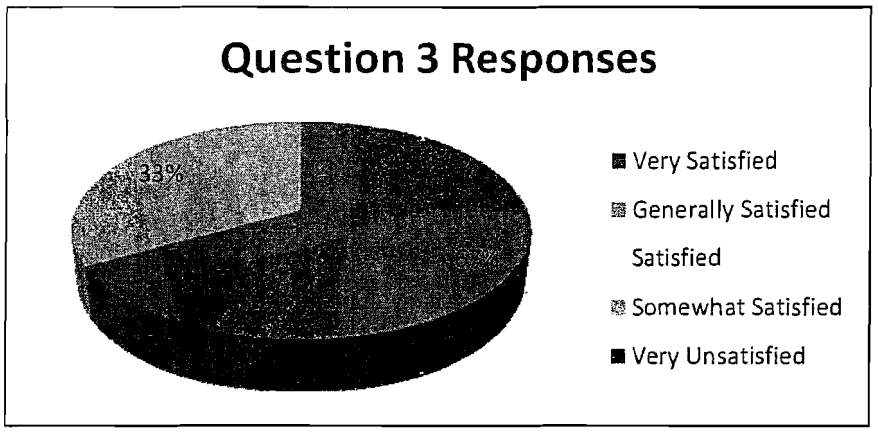
***Question 1 - Do ACRS/ACNW reports provide adequate background and basis for the Committees' advice?***



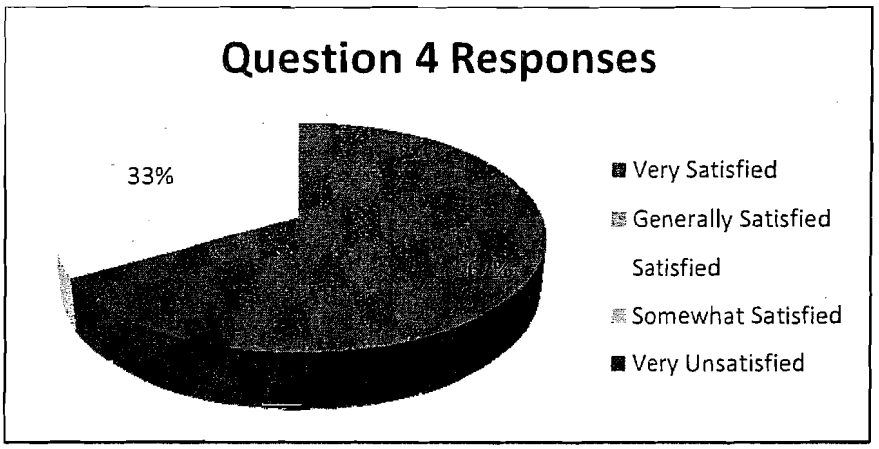
***Question 2 - Does the ACRS/ACNW provide clear and adequately supported advice in a timely manner?***



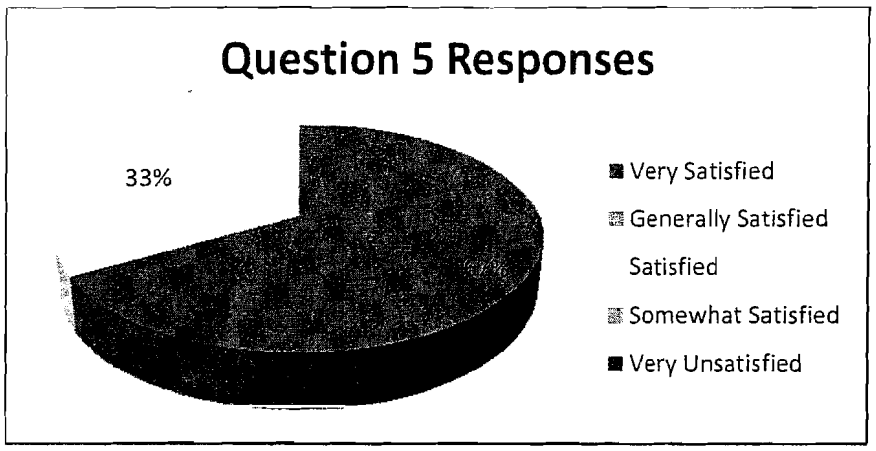
***Question 3 - Does the ACRS/ACNW adequately focus on areas/issues that are of importance to the Commission?***



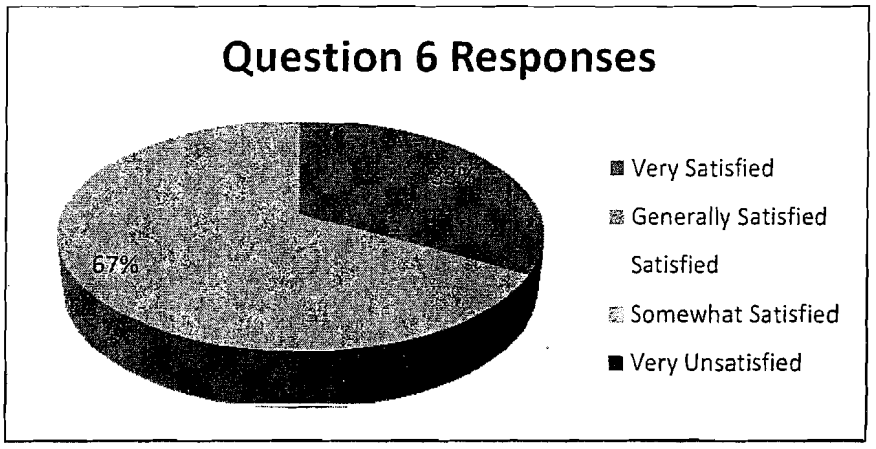
***Question 4 - Are the communications between the Committees and the Commission effective?***



***Question 5 - Do ACRS/ACNW letters and reports facilitate the Commission's decision making process?***



**Question 6 - Is the present mix of the experience and expertise of the ACRS/ACNW members appropriate for the Commission's current and planned regulatory priorities?**



***Question 7 - What ACRS/ACNW work products are of most value to your work as a Commissioner?***

*Steven Baggett, Technical Assistant for Materials, Office of Commissioner Lyons*
Letter reports very useful and timely.

*Anonymous*
Reviews of presentation topics.

***Question 8 - Were there ACRS/ACNW reports that were particularly helpful in your deliberations?***

*Steven Baggett, Technical Assistant for Materials, Office of Commissioner Lyons*
Human Reliability Analysis Model, Technology Neutral Framework for Future Plant Licensing, Staff approach to Dissimilar Weld Issues, Review of NRC Research, and 10 CFR 60.46a.

Comments on Draft Recommendations of the ICRP on Radiological Protection, Report of the French Academy of Sciences, and DOE Low Dose Radiation Research Workshop

*Anonymous*
Yes

***Question 9 - Were there particular ACRS/ACNW work products that did not meet your expectations and, if so, in what ways?***

*Steven Baggett, Technical Assistant for Materials, Office of Commissioner Lyons*
No

*Anonymous*
Some suggestions made by ACRS would not be cost effective (little value for the effort expended) to the project in question.

**Question 10 - What improvements can be made to ACRS/ACNW reports that would enhance their value to the Commission?**

*Steven Baggett, Technical Assistant for Materials, Office of Commissioner Lyons*
None

*Anonymous*
No suggestions

## Question 11 - Does the Commission find the ACNW Action Plan useful?

*Steven Baggett, Technical Assistant for Materials, Office of Commissioner Lyons*
Yes, available on the ACRS website

*Anonymous*
No opinion.

***Question 12*** **- Does the Commission find the ACRS/ACNW Operating Plan and Letter Matrix useful?**

*Steven Baggett, Technical Assistant for Materials, Office of Commissioner Lyons*
Yes, making the documents available on the ACRS website would improve utility.

*Anonymous*
No opinion

2007 Commissioner

| Name | Title | Organization |
| --- | --- | --- |
| Steven Baggett | Technical Assistant for Materials | Office of Commissioner Lyons |
| Steven Baggett | Technical Assistant for Materials | Office of Commissioner Lyons |
| No Name Given | None Given | None |

2007 Commissioner

| Phone | Email | Category | Survey | Date Taken | Time Taken |
|---|---|---|---|---|---|
| 301-415-8431 | slb@nrc.gov | Commissioner | ACRS | 5/8/2007 | 8:51:22 AM |
| 301-415-8431 | slb@nrc.gov | Commissioner | ACNW | 5/8/2007 | 8:57:31 AM |
| None Given | No E-Mail Given | Commissioner | ACRS | 5/15/2007 | 3:51:32 PM |

2007 Commissioner

| Question 1 | Question 2 | Question 3 | Question 4 | Question 5 |
|---|---|---|---|---|
| Very Satisfied | Very Satisfied | Very Satisfied | Very Satisfied | Very Satisfied |
| Very Satisfied | Very Satisfied | Very Satisfied | Very Satisfied | Very Satisfied |
| Generally Satisfied | Generally Satisfied | Generally Satisfied | Satisfied | Satisfied |

| Question 6 | Question 7 | Question 8 | Question 9 | Question 10 | Question 11 | Question 12 |
|---|---|---|---|---|---|---|
| Generally Satisfied | Letter Reports | Human Relia | No | None. | Yes, available | Yes, making the |
| Very Satisfied | Letter reports | Comments o | No | None | Yes | Yes, but utility co |
| Generally Satisfied | Reviews of pre | Yes | Some sugges | No suggestion | No opinion | No opinion |

documents available on the ACRS website would improve utility.
ould be improved by placing on the ACNW website

**rom:** "Sam Armijo" <jsarmijo@msn.com>
**o:** "'Mugeh Afshar-Tous'" <MXA5@nrc.gov>
**ate:** 07/05/2007 2:20 PM
**u** RE: 2007 International LWR Fuel Performance Meeting
**C** "'Charles Hammer'" <CGH@nrc.gov>, "'Cayetano Santos'" <CXS3@nrc.gov>

nny,
Please put this on the P&P agenda for the July mtg.
m

--Original Message-----
om: Mugeh Afshar-Tous [mailto:MXA5@nrc.gov]
nt: Thursday, July 05, 2007 10:35 AM
: jsarmijo@msn.com
: Charles Hammer; Cayetano Santos
bject: 2007 International LWR Fuel Performance Meeting

m - If you want ACRS to pay for you attending the meeting, please ask
nny to put the request on the July P&P. The Committee will vote on
ıext week.

ce approved, Carol will prepare a travel authorization for you.
ıce the dates are Fiscal year 2007 (for Sept 30) and Fiscal year 2008
r Oct 1-3), you'll probably have two travel authorizations.

me know if you have any other questions.

m regards,
geh
1) 415-6899

-Original Message-----

geh, Can you help Sam with this question? Thanks, Gary

> "Sam Armijo" <jsarmijo@msn.com> 07/05/2007 12:14 PM >>>
y,
want to attend the ANS topical meeting on fuel performance in
t.
v do I go about getting ACRS/NRC approval?
ı

Original Message-----
n: ANS Broadcasts [mailto:broadcasts@ans.org]
: Thursday, July 05, 2007 12:42 AM
Dr. Joseph S. Armijo
2007 International LWR Fuel Performance Meeting

IEW THE PROGRAM AND PLAN TO ATTEND:

7 International LWR Fuel Performance Meeting
o by 2010"

rand Hyatt San Francisco
an Francisco, California

ave money - register by September 3, 2007!

tp[illegible]v.ans.org/meetings/fuel

---

OTE: To unsubscribe from all future ANS e-mail broadcasts, please
nd
mail to < broadcasts@ans.org > and type "unsubscribe" in the subject
eld.

Armijo

ACRS/ACNW SPECIAL TRAVEL ENDORSEMENT FORM

This form is to be used to request ACRS/ACNW endorsement of special travel requests by members when NRC support for partial or full reimbursement of expenses and/or time is desired. This procedure in no way limits the freedom of a member to participate in a meeting as an individual at personal expense. Please submit this form to the Planning and Procedures Subcommittee at least 60 days prior to the meeting, if possible. Supplemental information may be added as details develop.

Member name: J. Sam Armijo Date submitted: 7-10-07

Dates of trip: Sept 30, 2007 to Oct 3, 2007

Destination: San Francisco, CA

Meeting or facility to be visited: 2007 LWR Fuel Performance Meeting/ TOP Fuel

Purpose/relevance to ACRS/ACNW business: LWR Fuel Performance is an important review area for ACRS

Participation (invited speaker, paper presented, etc.): N/A

Justification (for foreign travel only): _____

**NRC Support Requested:**

Air Fare: yes ___ no ✓

Per Diem: yes ✓ no ___

Compensation: yes ✓ no ___

Registration: $ 725.00

**Please return to ~~Sherry~~ Carol** (by fax 301-415-5589)

G:\SAM\Member Information\OtherTravelForm.wpd

Mark your calendars!

# 007 LWR FUEL PERFORMANCE MEETING/TOP FUEL

"Zero by 2010"

September 30 - October 2, 2007

San Francisco, CA • Grand Hyatt Hotel

*Golden Gate Bridge—A San Francisco Landmark!*

**Cosponsored by: ANS, ENS, AESJ and KNS**

Save money - register early

Register NOW at www.ans.org

PRELIMINARY PROGRAM AND REGISTRATION MATERIALS

For more information, please visit:
http://www.ans.org/goto/fuel07

# September 30–October 3, 2007
# San Francisco, CA
# Grand Hyatt Hotel

**NOTE:**

**This is a preliminary listing. Times and locations are subject to change. The Official Program, distributed at the meeting, will contain the final meeting schedule.**

## Meeting Overview
Get an overview of the meeting along with information on meeting officials, steering committee, technical program committee and the meeting highlights.

## Meeting Information
Find additional information regarding:
accommodations and hotel information, local attractions and activities, meeting registration, and the meeting proceedings.

## Technical Sessions – Monday
Find Monday's meeting highlights and a comprehensive listing of Monday's technical sessions.

## Technical Sessions – Tuesday
Find Tuesday's meeting highlights and a comprehensive listing of Tuesday's technical sessions.

## Technical Sessions – Wednesday
Find Wednesday's meeting highlights and a comprehensive listing of Wednesday's technical sessions.

## Advance Meeting Registration Form
Register early and save money!

## Hotel Reservation Form
Reserve your room today to take advantage of the special room rate.

**UPDATED:**

# Welcome

# to the

# 2007 LWR Fuel Performance

## September 30–October 3, 2007

## San Francisco, CA

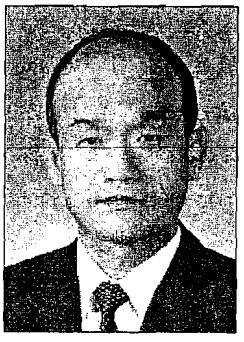
## Grand Hyatt Hotel

MEETING OFFICIALS

GENERAL CO-CHAIR:
Amir Shahkarami,
*Exelon Generation Company, LLC-USA*

GENERAL CO-CHAIR:
Si-Hwan Kim,
*KAERI-Korea*

TECHNICAL PROGRAM CO-CHAIR:
Roger Reynolds,
*AREVA-USA*



TECHNICAL PROGRAM CO-CHAIR:
Myung Seung Yang,
*KAERI-Korea*

The technical scope of the meeting includes all aspects of nuclear fuel from fuel rod to core design as well as performance experience in commercial and test reactors. The meeting excludes front end and back end fuel issues, however, it covers all front and/or back issues that impact fuel designs and performance.

2007 LWR Fuel Performance/Top Fuel

**Steering Committee**

Samim Anghaie (Univ of Florida-USA)
James Malone (Exelon-USA)
James Tulenko (Univ of Florida-USA)

**Technical Program Committee**

Samim Anghaie (Univ of Florida-USA)
Carl E. Beyer (PNNL-USA)
Dirk Blavius (AREVA NP-USA)
Robert Brown (GNF-USA)
Michel Debes (EDF-France)
Scott Ferguson (WCNOC-USA)
Robert Freeman (AREVA NP-USA)
Toyoshi Fuketa (JAEA-Japan)
Garry Garner (AREVA NP-USA)
Jose E. Gutierrez (ENUSA-Spain)
Didier Haas (ITU, Karlsruhe-Germany)
Lars Hallstadius (Westinghouse Atom AB-Sweden)
Hiroshi Hayashi (NUPEC-Japan)
Nadine Hoilasky (AVN-Belgium)
Kenichi Ito (Global Nuclear Fuel-Japan)
Yong Hwan Jeong (KAERI-Korea)
Zeses E. Karoutas (Westinghouse-USA)
Mujid Kazimi (MIT-USA)
Motoyashu Kinoshita (CRIEPI-Japan)
Hideya Kitamura (TEPCO-Japan)
Phil MacDonald (Consultant-USA)
James Malone (Exelon-USA)
Ralph Meyer (NRC-USA)
David Mitchel (Westinghouse-USA)
Pierre Mollard (AREVA NP-France)
Kari Ranta-Puska (TVO-Finland)
Javier G. Riverola (ENUSA-Spain)
Dong Seong Sohn (KAERI-Korea)
James Tulenko (Univ of Florida-USA)
Peter Urban (AREVA-Germany)
Nicolas Waeckel (EDF-France)
John Willse (AREVA-USA)
Jinzhao Zhang (Tractebel Engineering-Belgium)

# [illegible] Meeting/Top Fuel

## MEETING SCHEDULE

[illegible] September 30, 2007

| | |
|---|---|
| 6:00 p.m. – 8:00 p.m. | Opening Reception |

[illegible] October 1, 2007

| | |
|---|---|
| 8:00 a.m. – 10:15 a.m. | Opening Plenary: "Zero by 2010" |
| 10:15 a.m. – 10:30 a.m. | Coffee Break |
| 10:30 a.m. – 12:00 p.m. | Operating Experience, Fuel Reliability: BWR Fuel Performance |
| 12:00 p.m. – 1:15 p.m. | Meeting Luncheon |
| 1:15 p.m. – 2:30 p.m. | Operating Experience, Fuel Reliability: PWR Fuel Performance |
| [illegible]30 p.m. – 3:45 p.m. | Fuel Failure Mechanism and Analysis |
| [illegible]45 p.m. – 4:45 p.m. | Poster Session / Coffee Break |
| 4:45 p.m. – 6:00 p.m. | Influence of Water Chemistry on Fuel |

[illegible] October 2, 2007

| | |
|---|---|
| 8:00 a.m. – 10:00 a.m. | Fuel Assembly Design and Cladding |
| 10:00 a.m. – 10:15 a.m. | Coffee Break |
| 10:15 a.m. – 12:15 p.m. | Fuel Fabrication, Methods and Models |
| 12:15 p.m. – 1:30 p.m. | Meeting Luncheon |
| 1:30 p.m. – 3:00 p.m. | Fuel Rods and Structural Components |
| 3:00 p.m. – 4:00 p.m. | Poster Session / Coffee Break |
| 4:00 p.m. – 5:30 p.m. | High Burn-up Fuel |

[illegible] October 3, 2007

| | |
|---|---|
| 8:00 a.m. – 10:00 a.m. | Fuel Behavior during Design Basis Accidents (RIA and LOCA) |
| 10:00 a.m. –11:00 a.m. | Poster Session / Coffee Break |
| 11:00 a.m. – 12:30 p.m. | Fuel Behavior during Off-normal Transient |
| 12:30 p.m. – 1:45 p.m. | Meeting Luncheon |
| [illegible]45 p.m. – 3:15 p.m. | Neutronics, Thermal and Mechanical Methodologies |
| 3:15 p.m. – 5:00 p.m. | Fuel Cycle, Spent Fuel Storage and Transportation |

The Grand Hyatt San Francisco will be the location for the 2007 LWR Fuel Performance Meeting/Top Fuel, where all meeting activities and technical sessions will take place. Treat yourself to the premier choice among Union Square hotels - Grand Hyatt San Francisco. Pampering amenities and welcoming staff await you at this gracious hotel, while all the city's delights beckon from just outside the doors. Enjoy unequalled access to world-class shopping, Chinatown, museums, the theater and the many famous sights of this vibrant metropolis, all just minutes away.

The hilly streets of San Francisco provide some gorgeous glimpses of the sparkling bay and its famous bridges. The city's steepness makes for some beautiful panoramic views. You can observe a diverse mix of neighborhoods, bohemian history, provocative art, innovative architecture and restorative parks.

Some popular attractions include:

- Alcatraz Island
- Aquarium of the Bay
- Asian Art Museum
- Cable Car Museum
- California Palace of the Legion of Honor
- Coit Tower
- The Exploratorium
- Fisherman's Wharf
- Ghiradelli Square
- Golden Gate Bridge
- Haas-Lilienthal House
- Lombard Street
- Mission Dolores
- Octagon House
- Pier 39
- San Francisco Maritime National Historical Park
- San Francisco Museum of Modern Art (MOMA)
- Yerba Buena Center for the Arts/ Yerba Buena Gardens

**Save money by registering by September 3, 2007.** Registration is required for all attendees and presenters. Badges are required for admission to all events. The Full Meeting Registration fee includes one (1) copy of the CD of the Meeting Proceedings and one (1) ticket each to the Opening Reception and the Monday, Tuesday and Wednesday Luncheons.

NOTE:
Additional tickets can be purchased in advance or at the ANS Registration Desk for the Sunday Opening Reception and the Monday, Tuesday, and Wednesday meeting luncheons.

The Meeting Registration Desk and Message Center will be located in the Ballroom Foyer East of the Grand Hyatt San Francisco Hotel. You may register, purchase tickets for events, or pick up your registration packet during the following hours:

SUNDAY, SEPTEMBER 30, 2007
3:00 P.M. – 7:00 P.M.

MONDAY, OCTOBER 1, 2007
7:00 A.M. – 5:00 P.M.

TUESDAY, OCTOBER 2, 2007
7:00 A.M. – 5:00 P.M.

WEDNESDAY, OCTOBER 3, 2007
7:00 A.M. – 2:00 P.M.

Registrations canceled prior to **September 3, 2007,** will be refunded minus a $75 processing fee. Cancellations received after September 3, 2007, will NOT be refunded. However, you may send a substitute.

A Speakers' Preview Room, Merced A of the Grand Hyatt San Francisco Hotel, will be available during the following hours:

SUNDAY, SEPTEMBER 30, 2007
3:00 P.M. – 7:00 P.M.

MONDAY, OCTOBER 1, 2007
7:00 A.M. – 4:00 P.M.

TUESDAY, OCTOBER 2, 2007
7:00 A.M. – 4:00 P.M.

WEDNESDAY, OCTOBER 3, 2007
7:00 A.M. – 12:00 P.M.

Audio/visual equipment will be set up; so, that speakers may preview their presentation material.

The meeting proceedings is available on CD-ROM. Copies of the Meeting Proceedings will be available on-site. Each full meeting registrant will receive a copy of the proceedings as part of the full meeting registration fee. Additional copies may be purchased at the meeting registration desk for $50.00. (This special rate is available at the meeting only.) To purchase copies following the meeting, you may contact the ANS Accounting Department at 708-579-8210 (telephone); 708-579-8314 (fax); accounting@ans.org (email); or submit your request in writing to: American Nuclear Society, 97781 Eagle Way, Chicago, IL 60678-9770. Copies of the proceedings are available for $75.00 after the meeting. Payment information must accompany all orders.

**Opening Reception**
SUNDAY, SEPTEMBER 30, 2007
6:00 p.m. – 8:00 p.m.

The meeting will start with a welcome reception. One ticket to the Opening Reception is included with the full meeting registration.

*Additional tickets can be purchased in advance or at the ANS Registration Desk for $65.00 each.*

**Monday Luncheon**
MONDAY, OCTOBER 1, 2007
12:00 p.m. – 1:15 p.m.

One ticket to the Monday Luncheon is included with the full meeting registration.

*Additional tickets can be purchased in advance or at the ANS Registration Desk for $50.00 each.*

**Tuesday Luncheon**
TUESDAY, OCTOBER 2, 2007
12:15 p.m. – 1:30 p.m.

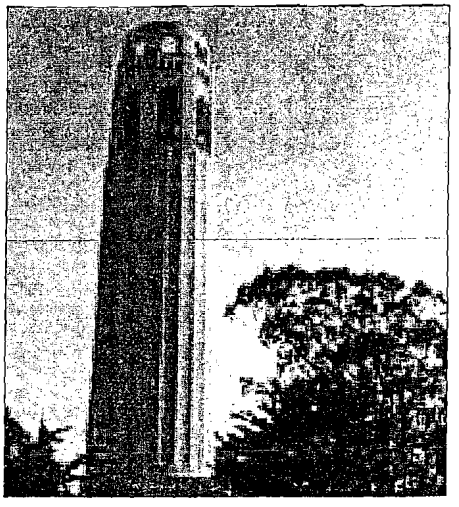
One ticket to the Tuesday Luncheon is included with the full meeting registration.

*Additional tickets can be purchased in advance or at the ANS Registration Desk for $50.00 each.*

**Wednesday Luncheon**
WEDNESDAY, OCTOBER 3, 2007
12:30 p.m. – 1:45 p.m.

One ticket to the Wednesday Luncheon is included with the full meeting registration.

*Additional tickets can be purchased in advance or at the ANS Registration Desk for $50.00 each.*



*Coit Tower*

**NDAY, OCTOBER 1, 2007 • 8:00 A.M. - 10:15 A.M.**

*Session Chairs:* Roger Reynolds *(AREVA-USA)*, Myung Seung Yang *(KAERI-Korea)*

SPEAKERS:

- Amir Shahkarami *(Exelon-USA)*
- Si-Hwan Kim *(KAERI-Korea)*
- Kevin Donovan *(INPO-USA)*
- Representative – To Be Announced *(EDF-France)*, invited
- Kurt Edsinger *(EPRI-USA)*
- Representative – To Be Announced *(TEPCO-Japan)*, invited

**MONDAY, OCTOBER 1, 2007 • 10:30 A.M. - 12:00 P.M.**

*Session Chair:* James Malone *(Exelon-USA)*

GNF2 Operating Experience, J. Schardt *(GE Energy, Nuclear-USA)*

Westinghouse BWR Fuel Reliability – Recent Experience and Analyses, K. Ryttersson, S. Helmersson, J. Wright, L. Hallstadius *(Westinghouse-Sweden AB)*

Dimensional Behavior of Fuel Channels - Recent Experience and Consequences, D. Blavius, C.-J. Muench, N.L. Garner *(AREVA NP-USA)*

Channel Bow in Boiling Water Reactors - Hot Cell Examination Results and Correlation to Measured Bow, S.T. Mahmood, Y.-P. Lin, M.A. Dubecky *(GNF-USA)*, K. Edsinger, E.V. Mader *(EPRI-USA)*

**MONDAY, OCTOBER 1, 2007 • 1:15 P.M. - 2:30 P.M.**

*Session Chairs:* Scott Ferguson *(WCNOC-USA)*, David Mitchel *(Westinghouse-USA)* invited

Modern Fuel Cladding in Demanding Operation - ZIRLO in Full Life High Lithium PWR Coolant, K. Kargol *(Pacific Gas & Electric Company-USA)*, J. Stevens *(KU Power-USA)*, J. Bosma, J. Iyer, G. Wikmark *(Westinghouse-USA)*

Performance of Alloy M5™ Cladding and Structure, G. Garner *(AREVA-NP-USA)*, B. Hilton *(INL-USA)*, E. Mader *(EPRI-USA)*

In-reactor Verification of Advanced Nuclear Fuel, PLUS7TM, for KSNPs, Y.K. Jang, H.K. Kim, J.I. Kim, K.T. Kim, C.C. Lee, C.O. Park *(KNFC-Korea)*

**MONDAY, OCTOBER 1, 2007 • 2:30 P.M. - 3:45 P.M.**

*Session Chair:* Nicolas Waeckel *(EDF-France)*

Studies of Hydrogen Assisted Failures Initiating at the Cladding Outer Surface of High Burnup Fuel Using a Modified Ring Tensile Technique, A.-M. Alvarez-Holston, G. Lysell, V. Grigoriev *(Studsvik Nuclear-Sweden)*

Experimental Study on the Influence of the Supporting Condition and Rod Motion on the Fuel Fretting Damage, H.-K. Kim, Y.-H. Lee *(KAERI-Korea)*

A Model for Predicting Coolant Activity Behaviour for Fuel-Failure Monitoring Analysis, B.J. Lewis, A. El-Jaby, J. Higgs, W.T. Thompson *(RMC-Canada)*, F.C. Iglesias, R. Laidler, J. Armstrong, R. Stone, R. Oduntan *(Bruce Power-Canada)*

**MONDAY, OCTOBER 1, 2007 • 3:45 P.M. - 4:45 P.M.**

***Operating Experience, Fuel Reliability: BWR Fuel Performance-Poster Session***

Fuel Performance Experience, Analysis and Modeling: Deformations, Fission Gas Release and Pellet-Clad Interaction, G. Zhou *(Westinghouse-Sweden)*, A.R. Massih *(Quantum Technologies-Sweden)*, L. Hallstadius *(Westinghouse-Sweden)*, D. Schrire *(Vattenfall Bränsle-Sweden)*, S. Helmersson *(Westinghouse-Sweden)*, R. Källströmd *(Studsvik Nuclear-Sweden)*, G. Wikmark *(Westinghouse-USA)*, C. Hellwig *(PSI-Switzerland)*, M. Limbäck *(Westinghouse-Sweden)*

XEDOR - Reduced Order Stress Model for Interactive Maneuvering of Boiling Water Reactors, Y.M. Farawila *(Consultant-USA)*, M.R. Billaux *(AREVA NP-USA)*

Burn-up Increase and Power Up-rate – Operation History of KKL, G. Ledergerber, W. Kaufmann, A. Ritter, D. Greiner, Y. Parmar, R. Jacot, J. Krouthén *(KKL AG-Switzerland)*

***Operating Experience, Fuel Reliability: PWR Fuel Performance-Poster Session***

CHF Performance of Hybrid Mixing Vane Grid for Nuclear Fuel Bundle, C.-H. Shin, Y.-J. Choo, S.-K. Moon, S.-Y. Chun, T.-H. Chun *(KAERI-Korea)*

Irradiation Test of Advanced PWR Fuel in Fuel Test Loop at HANARO, Y.S. Yang, J.G. Bang, K.W. Song, S.K. Park, J.M. Lee, C.G. Seo *(KAERI-Korea)*

Meeting Industry's Fuel Performance Goals Through Reliable PCI-Failure Prediction, W. F. Lyon *(Anatech Corporation)*, S. Yagnik *(EPRI)*, R. O. Montgomery, Y. R. Rashid *(Anatech Corporation)*

***Fuel Failure Mechanism and Analysis-Poster Session***

The Necessity of a New Type Test Rig for the Development of an Evaluation Method in Grid Fretting Problems, Y.-H. Lee, H.-K. Kim *(KAERI-Korea)*

WWER Expert System for Fuel Failure Analysis Using Data on Primary Coolant Activity, V.V. Likhanskii, I.A. Evdokimov, A.A. Sorokin, A.G. Khromov, V.D. Kanukova, O.V. Apollonova *(SRC RF TRINITI-Russia)*, A.V. Ugryumov *(JSC TVEL-Russia)*

Progress in the Research Programs to Elucidate Axial Cracking Fuel Failure at High Burn-up, K. Ogata, M. Aomi, T. Baba, K. Kamimura *(JNES-Japan)*, Y. Etoh *(NFD-Japan)*, K. Ito *(GNF-Japan)*, T. Kido *(NDC-Japan)*, H. Teshima *(MHI-Japan)*

***Fuel Rods and Structural Components-Poster Session***

Corrosion and Hydrogen Pick-up Behaviors of Cladding and Structural Components in BWR High Burnup 9X9 Lead Use Assemblies, T. Miyashita, N. Nakae, K. Ogata, T. Baba, K. Kamimura *(JNES-Japan)*, T. Matsumoto *(GNF-Japan)*, K. Kakiuchi *(NFI-Japan)*

Investigation of Increased Hydriding of Guide Tubes in Ringhals 2 During Cycle Start-up, H. Pettersson, B. Bengtson, T. Andersson *(Vattenfall-Sweden)*, H.-J. Sell, P.-B. Hoffmann *(AREVA NP GmbH-Germany)*, F. Garzarolli *(Consultant-Germany)*

Microstructure Study on the Deteriorating Role of Hydrogen in the Zirconium Alloys Oxidation, S.B. Sohn *(KNFC-Korea)*, Y.S. Kim *(Hanyang Univ.-Korea)*, J.H. Baek, Y.H. Jeong *(KAERI-Korea)*

***Influence of Water Chemistry on Fuel-Poster Session***

Integrated Electronic Microscopy Method to Characterize BWR Crud Deposits, M.G. Pop, B. Lockamon *(AREVA NP-USA)*, J.M. Howe, V.P. Oleshko *(Univ of Virginia-USA)*

Phase Identifications in Crud from Commercial Boiling Water Reactors at the Idaho National Laboratory by Transmission Electron Microscopy, D.E. Janney, D.L. Porter *(INL-USA)*, J.L. Peterson *(Univ of Texas, Austin-USA)*

**MONDAY, OCTOBER 1, 2007 • 4:45 P.M. - 6:00 P.M.**

*Session Chairs:* John Willse *(AREVA-USA)*, invited, Motoyashu Kinoshita *(CRIEPI-Japan)*, invited

Electrochemical Potential (ECP) of Clean Heated Fuel Cladding Material and Structural SS under BWR Operating Conditions, M.G. Pop, M. Bell *(AREVA NP-USA)*, R. Kilian, T. Dorsch, M. Christian *(AREVA NP GmbH-Germany)*

Water Chemistry Influence on AOA Phase 3 of the Spanish Experiment at Studsvik, N. Doncel *(ENUSA Industrias Avanzadas-Spain)*, J. Chen *(Studsvik Nuclear AB-Sweden)*, J. Deshon *(EPRI-USA)*

AREVA NP Fuel Condition Index for Boiling Water Reactors, M.G. Pop, M. Bell, B. Lockamon *(AREVA NP-USA)*

**TUESDAY, OCTOBER 2, 2007 • 8:00 A.M. - 10:00 A.M.**

*Session Chairs:* Lars Hallstadius *(Westinghouse Atom AB-Sweden)*, John Schardt *(GE Energy, Nuclear-USA)*

Safety and Economic of High Power Density PWR with Annular Fuel, J. Beccherle, P. Hejzlar, M.S. Kazimi *(MIT-USA)*

High Mechanical Performance of AREVA Upgraded Fuel Assemblies for PWR in USA, D. Gottuso *(AREVA NP-USA)*, J.-N. Canat, P. Mollard *(AREVA NP-France)*

Upgraded Fuel Assemblies for BWR, N.L. Garner *(AREVA NP-USA)*, T. Rentmeister, H.-J. Lippert *(AREVA NP GmbH-Germany)*, P. Mollard *(AREVA NP-France)*

AREVA Cr2O3-Doped Fuel Development for BWRs, C. Delafoy *(AREVA NP-France)*, P. Dewes *(AREVA NP GmbH-Germany)*, T. Miles *(AREVA NP-USA)*

Overview on the Thermal and Mechanical Properties of HANA Claddings, J.H. Baek, B.K. Choi *(KAERI-Korea)*, Y.J. Oh *(Hanbat Univ-Korea)*, Y.H. Jeong *(KAERI-Korea)*

**TUESDAY, OCTOBER 2, 2007 • 10:15 A.M. - 12:15 P.M.**

*Session Chairs:* Peter Urban *(AREVA NP-Germany)*, Zeses E. Karoutas *(Westinghouse-USA)*, invited

Design, Feasibility, and Testing of Instrumented Rod Bundle to Improve Heat Transfer Knowledge in PWR Fuel Assemblies, A. Bergeron *(CEA, Saclay-France)*, T. Chataing *(CEA, Grenoble-France)*, E. Décossin *(EDF-DRD-France)*, J. Garnier *(CEA, Grenoble-France)*, P. Péturaud *(EDF-DRD-France)*, S.K. Yagnik *(EPRI-USA)*

CFD Simulations of a Flow Mixing and Heat Transfer Enhancement in an Advanced LWR Nuclear Fuel Assembly, W.K. In, T.H. Chun, C.H. Shin, D.S. Oh *(KAERI-Korea)*

Controlled Beta-quench Treatment of Fuel Channels, A. Moeckel, A. [illegible]er, D. Walter, I. Cremer *(AREVA NP GmbH)*

[illegible]Manufacture and Performance of Homogeneous-Microstructure SBR MOX Fuel, M.A. Barker, K. Stephenson, R. Weston *(Nexia Solutions-UK)*

Successful Deployment of 6 Sigma Methodology within AREVA Zirconium Activities, J. Hautdidier, R. Doublet *(AREVA CEZUS-France)*

**TUESDAY, OCTOBER 2, 2007 • 1:30 P.M. - 3:00 P.M.**

*Session Chairs:* Pierre Mollard *(AREVA NP-France)*, invited, Yong Hwan Jeong *(KAERI-Korea)*, invited

In-Reactor Creep Behavior of Zircaloy-2, J.P. Foster *(Westinghouse-USA)*, M.A. McGrath *(Halden Reactor Project-Norway)*

Development of Modified MDA (M-MDA), PWR Fuel Cladding Tube for High Duty Operation in Future, S. Watanabe *(MHI-Japan)*, T. Kido *(NDC-Japan)*, T. Sendo *(Kansai-Japan)*

The Effects of Cladding Chemical Composition on Corrosion Behavior of High Burn-up BWR Fuel, Y. Otsuka, M. Abe *(TEPCO-Japan)*, K. Kakiuchi, T. Fukuda, K. Ohira, N. Itagaki *(NFI-Japan)*

Failure of Hydrided Zircaloy-4 Under Through Thickness Crack Growth Conditions, P.A. Raynaud, D.A.Koss, M. Meholic *(Penn State Univ-USA)*, K.S. Chan *(Southwest Research Institute-USA)*

**TUESDAY, OCTOBER 2, 2007 • 3:00 P.M. - 4:00 P.M.**

***Fuel Assembly Design and Cladding-Poster Session***

Bi-content Gadolinia as Burnable Absorber in PWR to Improve the Reactor Core Behaviour, S. Zheng *(AREVA-France)*

[illegible]al Behaviour of Advanced UO2 Fuel at High Burn-up, E. Muller, [illegible]bert, N. L'Hullier, K. Silberstein *(CEA-France)*, C. Delafoy *(AREVA NP-France)*, [illegible]erache *(EDF-France)*

***Fuel Fabrication, Methods and Models-Poster Session***

3D Hydraulic Lift Force Models for AREVA Fuel Assembly in EDF PWRs, S. Ekomie *(EDF-SEPTEN-France)*, J. Bigot, Ph. Dolleans *(AREVA NP-France)*, J. Vallory *(CEA Cadarache-France)*

First Principles CANDU Fuel Model and Validation Experimentation, E.C. Corcoran, M.H. Kaye, F. Akbari, J.D. Higgs, B.J. Lewis, W.T. Thompson *(Royal Military College-Canada)*, R.A. Verrall, Z. He, J.F. Mouris *(AECL-Canada)*

Heat Transfer Coefficient Variations in Nuclear Fuel Rod Bundles, M.E. Conner *(Westinghouse-USA)*, M.V. Holloway *(USNA-USA)*

A Study On The Influences Of U3O8 Powder On Microstructure and Thermal Stability Of UO2 Pellet, P. Jiaye, F. Shaohua, Q. Zhiping *(CJNF-China)*

Experience and Outlook for Development of Vibropack Oxide Fuel Pins for Light Water Reactors, Yu.M. Golovtchenko, A.A. Mayorshin, O.V. Shishalov, S.P. Prokop'eva *(Research Institute of Atomic Reactors-Russia)*

***High Burn-up Fuel-Poster Session***

Clarification of Rim Structure Effects on Properties and Behaviour of LWR UO2 Fuels and Gadolinia Doped Fuels, T. Sonoda, T. Kameyama, A. Sasahara, S. Kitajima, Y. Nauchi, M. Kinoshita *(CRIEPI-Japan)*, V.V. Rondinella, T. Wiss, J.P. Hiernaut, D. Papaioannou, M. Sheindlin, D. Staicu *(ITU-Germany)*

Irradiation Behaviour of the Large Grained UO2 Fuel Pellet in the Transient Conditions, Y. Kosaka *(Nuclear Development Corporation-Japan)*, S. Watanabe *(Mitsubishi Heavy Industries-Japan)*

The Width of High Burnup Structure in LWR UO2 Fuel, Y.-H. Koo, B.-H. Lee, J.-Y. Oh, D.-S. Sohn *(KAERI-Korea)*

A New Fission Gas Release Model for Predicting Gas Release during Steady State and Slow Power Ramps and for Initializing Fast Transients, K.J. Geelhood, C.E. Beyer *(PNNL-USA)*

Early Fission-gas Behavior in Oxide Fuel: Escape vs Trapping, V. Cordoliani, D. Olander *(Univ. of California-USA)*

Estimation of the Influence of Plutonium Agglomerates in MOX Fuel on the Pellet Temperature, G. Sauer, W. Besenböck *(TÜV SÜD Industrie Service GmbH-Germany)*

Study of Irradiation Induced Restructuring of High Burnup Fuel- (2) Use of Computer and Accelerator for Fuel Science and Development, M. Kinoshita *(JAEA, CRIEPI, The Univ of Tokyo-Japan)*, H. Y. Geng, Y. Chen, Y. Kaneta *(The Univ of Tokyo-Japan)*, M. Iwasawa, T. Ohnuma *(CRIEPI-Japan)*, K. Yasunaga, S. Matsumura, K. Yasuda *(Kyushu Univ-Japan)*, M. Sataka, N. Ishikawa, Y. Chimi *(JAEA-Japan)*, Iwase *(Osaka Prefecture Univ-Japan)*, J. Nakamura, M. Amaya *(JAEA-Japan)*

**TUESDAY, OCTOBER 2, 2007 • 4:00 P.M. - 5:30 P.M.**

*Session Chairs:* Carl E. Beyer *(PNNL-USA)*, Kari Ranta-Puska *(TVO-Finland)*

Thermal Diffusivity of Homogeneous SBR MOX Fuel with a Burn-up of 35 MWd/kgHM, D. Staicu, G. Pagliosa, D. Papaioannou, V.V. Rondinella, C. Cozzo, R. Konings, C.T. Walker *(Institute for Transuranium Elements, JRC-Germany)*, M. Barker *(Nexia Solutions-UK)*, R. Weston *(BNFL-UK)*

Final Assessment of MOX Fuel Performance Experiment with Japanese PWR Specification Fuel in the HBWR, H. Fujii, H. Teshima, K. Kanasugi *(MHI-Japan)*, Y. Kosaka *(Nuclear Development Corporation-Japan)*, T. Sendo *(Kansai Electric Power Co-Japan)*

Fission Gas Distribution and Behavior in the High Burn-up Structure, Ch. Hellwig, M.I. Horvath *(PSI-Switzerland)*, P.R. Blair, R. Chawla *(PSI and EPFL-Switzerland)*, D. Günther *(ETH Zurich-Switzerland)*

Fuel Modelling at Extended Burnup: IAEA Coordinated Research Project FUMEX-II, J.C. Killeen *(IAEA)*, J.A. Turnbull *(Consultant-UK)*, E. Sartori *(OECD/NEA-France)*

**WEDNESDAY, OCTOBER 3, 2007 • 8:00 A.M. – 10:00 A.M.**

*Session Chairs:* Javier Riverola *(ENUSA-Spain)*, Phil MacDonald *(Consultant-USA)* invited

The U. S. Nuclear Regulatory Commission's Strategy for Revising the RIA Acceptance Criteria, P.M. Clifford *(USNRC-USA)*

High Temperature Expansion Due to Compression Test for the Determination of a Cladding Material Failure Criterion under RIA Loading Conditions, M. Le Saux, C. Poussard, X. Averty, C. Sainte Catherine, S. Carassou *(CEA Saclay-France)*, J. Besson *(Centre des Matériaux, Mines Paris-France)*

JAEA Studies on High Burnup Fuel Behaviors during Reactivity-Initiated Accident and Loss-of-Coolant Accident, T. Fuketa, F. Nagase, M. Suzuki, T. Sugiyama *(Japan Atomic Energy Agency)*

Behavior of Zr1%Nb Fuel Cladding under Accident Conditions, E. Perez-Feró, Z. Hózer, P. Windberg, I. Nagy, A. Vimi, N. Vér, L. Matus, M. Kunstár, T. Novotny, M. Horváth *(AEKI-Hungary)*, Cs. Györi *(JRC ITU-Germany)*

Overview of the M5™ Alloy Behavior under RIA and LOCA Conditions, J.P. Mardon *(AREVA NP-France)*, B. Dunn *(AREVA NP-USA)*

**WEDNESDAY, OCTOBER 3, 2007 • 10:00 A.M. – 11:00 A.M.**

***Fuel Cycle, Spent Fuel Storage and Transportation-Poster Session***

Trans-Atlantic Fuel Fabrication: Security of Supply Program, E. Bobo *(ENUSA-Spain)*, M. Novo *(CNAT-Spain)*, S. Ferguson *(WCNOC-USA)*, B. Feagin, J. Dwight *(Westinghouse-USA)*, R. González *(ENUSA-Spain)*

AREVA NP Next Generation Fresh UO2 Fuel Assembly Shipping Cask: SCALE - CRISTAL Comparisons Lead to Safety Criticality Confidence, M. Doucet *(AREVA NP-France)*, R. Montgomery, B. O'Donnel *(AREVA NP-USA)*, M. Landrieu *(AREVA NP-France)*

Requirements of Cask-Storage and Cask-Transport Licensing According to KTA 1996 Rules for On-Site Storage of Spent Fuel in Germany – From a Utility's Point of View, P. Schmidt *(Kernkraftwerk Philippsburg-Germany)*

ORNL Capability to Conduct Post Irradiation Examination of Full-Length Commercial Nuclear Fuel Rods, D.J. Spellman *(ORNL-USA)*

Feasibility Study of the Plant for LWR Spent Fuel Reprocessing by Pyrochemical Methods, A.V. Bychkov, M.V. Kormilitsyn, Yu.P. Savotchkin, Yu.S. Sokolovsky *(Research Institute of Atomic Reactors-Russia)*, _. Baganz, S. Lopoukhine *(AREVA NC-France)*, G. Mauvin, M. Medzadourian *(SGN-France)*

***Fuel Behavior during Design Basis Accidents (RIA and LOCA) - Poster Session***

A Model for Assessment of Failure of LWR Fuel during an RIA, W. Liu, M.S. Kazimi *(MIT-USA)*

FRAPTRAN Predictability of High Burnup Advanced Fuel Performance: Analysis of the CABRI CIP0-1 and CIP0-2 Experiments, M.T. del Barrio, L.E. Herranz *(CIEMAT-Spain)*

Multi-pin Studies of the Effect of Changes in PWR Fuel Design on Clad Ballooning and Flow Blockage in a Large-break Loss-of Coolant Accident, J.R. Jones *(British Energy-UK)*, M. Trowe *(AMEC NNC-UK)*

***Neutronics, Thermal and Mechanical Methodologies-Poster Session***

ARCADIA(TM) - A New Generation of Coupled Neutronics / Core Thermal-Hydraulics Code System at AREVA NP, F. Curca-Tivig, S. Thareau, A. Pautz, S. Thareau *(AREVA NP GmbH)*

Helium Production and Behavior in Nuclear Oxide Fuels during Irradiation in LWR, E. Federici, A. Courcelle *(CEA Cadarache-France)*, P. Blanpain *(AREVA-NP-France)*, H. Cognon *(EDF/SEPTEN-France)*

An Experimental Evaluation of the Grain Boundaries Gas Content in Fuels: New Insight and Perspective of the ADAGIO Technique, Y. Pontillon, J. Noirot, L. Caillot, E. Muller *(Commissariat à l'Energie Atomique-France)*

Prediction of Regions of Reduced Heat Transfer Downstream of Nuclear Fuel Spacer Grids, B. Liu, Z. Karoutas *(Westinghouse-USA)*

High Burnup Fuel Behavior Modeling and Licensing, M. Jahingir, R. Rand, R. Stachowski, B. Miles *(GNF-USA)*, K. Kusagaya *(GNF-Japan)*

A 3D Behavior Modelling for Design and Performance Analysis of LWR Fuels, A.C. Marino, G.L. Demarco, D.O. Brasnarof, P.C. Florido *(CNEA-Argentina)*

HIDUTYDRV Code, A Fuel Product Margin Tool, M. A. Krammen, Z. E. Karoutas, S. F. Grill, B. Sutharshan *(Westinghouse)*

**WEDNESDAY, OCTOBER 3, 2007 • 11:00 A.M. – 12:30 P.M.**

*Session Chairs:* Marius Stan *(LANL-USA)* invited, Jinzhao Zhang *(Tractebel Engineering-Belgium)*

Multidimensional Modelings of a Ramp Test with the PWR Fuel Performance Code ALCYONE, G. Thouvenin, B. Michel, J. Sercombe, D. Plancq *(CEA-France)*, P. Thevenin *(EDF-France)*

The Mechanical Behavior of Pellet-Cladding with the Missing Chip under PCMI Loadings during Power Ramp, J.-S. Lee, J.S. Yoo, H.K. Kim *(KNFC-Korea)*, D. Mitchell, Y. Aleshin *(Westinghouse-USA)*

Computer Simulation of Non-congruent Melting of Non-stoichiometric Uranium Dioxide Fuel, M.J. Welland, W.T. Thompson, B.J. Lewis *(Royal Military College of Canada)*

ATWS Analysis with an Advanced Rewetting Model within COBRA 3-CP, A. Gensler, A. Knoll, K. Kuehnel *(AREVA NP GmbH-Germany)*

**WEDNESDAY, OCTOBER 3, 2007 • 1:45 P.M. – 3:15 P.M.**

*Session Chairs:* Nadine Hollasky *(AVN-Belgium)*, Toyoshi Fuketa *(JAEA-Japan)*

Impact of Plant Noise on BWR Stability Analyses, J.G.M. Andersen, G. Pearson *(Global Nuclear Fuel-USA)*, A.K. Chung, C.L. Heck, J. Vedovi *(GE Nuclear-USA)*

Approach to Analyze Potentially Limiting Hot Low Power BWR Control Rod Drop Accident, S. Söderholtz *(Westinghouse-Sweden)*, B. Schröder *(Forsmarks Kraftgrupp AB-Sweden)*, E. Ramenblad *(Vattenfall Bränsle AB-Sweden)*

Non-Linear Dynamics Analysis of a PWR with up-to-date Fuel Design, J. Riverola *(ENUSA-Spain)*

The COPERNIC3 Project: How AREVA is Successfully Developing an Advanced Global Fuel Rod Performance Code, Ch. Garnier *(AREVA NP-France)*, F. Sontheimer *(AREVA NP GmbH-Germany)*, P. Mailhé *(AREVA NP-France)*, H. Landskron, D.Deuble *(AREVA NP GmbH-Germany)*, V. I. Arimescu, M. Billaux *(AREVA NP-USA)*

**WEDNESDAY, OCTOBER 3, 2007 • 3:15 P.M. – 5:00 P.M.**

*Session Chairs:* James Tulenko *(Univ of Florida-USA)* invited, Michel Debes *(EDF-France)* invited

Study on Hydride Reorientation in Zry-2 Fuel Claddings during Interim Dry Storage, K. Sakamoto, H. Matsuoka *(GNF-Japan)*, A. Takagi *(TEPCO-Japan)*, S. Kashibe *(NFD-Japan)*

Fabrication Characteristics of Large Grain DUPIC Pellet Using SIMFUEL, G.I. Park, J.W. Lee, J.W. Lee, M.S. Yang, K.C. Song *(KAERI-Korea)*

Threat of Hydride Re-orientation to Spent Fuel Integrity During Transportation Accidents: Myth or Reality?, J. Rashid *(ANATECH-USA)*, A. Machiels *(EPRI-USA)*

Evaluation of Hoop Creep Behaviors in Long-term Dry Storage Condition of Pre-hydrided and High Burn-up Nuclear Fuel Cladding, S. Kim, J. Bang, D. Kim, Y. Yang *(KAERI-Korea)*

**SEPTEMBER 30 – OCTOBER 3, 2007**
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| **Speaker/Session Chair Meeting Registration** *Includes one (1) ticket to the Opening Reception, Monday, Tuesday and Wednesday Luncheons, and a copy of the Meeting Proceedings on CD-Rom.* | **[01] ☐ $725** | **[02] ☐ $875** | **[03] ☐ $825** | **[04] ☐ $975** |
| **Meeting Attendee Registration** *Includes one (1) ticket to the Opening Reception, Monday, Tuesday and Wednesday Luncheons, and a copy of the Meeting Proceedings on CD-Rom.* | **[05] ☐ $725** | **[06] ☐ $875** | **[07] ☐ $825** | **[08] ☐ $975** |

**SUNDAY, SEPTEMBER 30, 2007**
Additional Ticket: Opening Reception [11] ___ x $65.00 $_____

**MONDAY, OCTOBER 1, 2007**
Additional Ticket: Monday Luncheon [12] ___ x $50.00 $_____

**TUESDAY, OCTOBER 2, 2007**
Additional Ticket: Tuesday Luncheon [13] ___ x $50.00 $_____

**WEDNESDAY, OCTOBER 3, 2007**
Additional Ticket: Wednesday Luncheon [14] ___ x $50.00 $_____

**GRAND TOTAL: $_____**

☐ Check ☐ Visa ☐ MosterCard ☐ American Express ☐ Diners Card

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*Make checks payable to ANS in U.S. funds and mail to ANS, 97781 Eagle Way, Chicago, IL 60678-9770. Credit card registrations may be faxed to 708/579-8314. Do not mail registrations which have been faxed. Bank transfer information available from ANS Registrar. Registration cancellations must be made in writing prior to September 3, 2007, in order to receive a refund minus a $75 processing fee. Additional tickets for events will be refunded in full if cancellation request is received by September 3, 2007. Meeting registrations and additional tickets for events canceled after September 3, 2007, will not be refunded; however, you may send a substitute. Contact the ANS Registrar at telephone number: 708/579-8316 or email: registrar@ans.org with any questions.*

GRAND HYATT SAN FRANCISCO • SAN FRANCISCO, CALIFORNIA

**2007 LWR FUEL PERFORMANCE MEETING/ FUEL**
SEPTEMBER 30 – OCTOBER 3, 2007

HOTEL TELEPHONE: 415-398-1234 (ASK FOR IN-HOUSE RESERVATIONS)
RESERVATIONS TELEPHONE: 800-233-1234 OR 888-591-1234

FOR RESERVATIONS, EITHER CALL OR SEND THIS FORM DIRECTLY TO THE HOTEL – DO NOT SEND THIS FORM TO THE AMERICAN NUCLEAR SOCIETY

## PLEASE PRINT

GUEST NAMES(S): _____

COMPANY: _____

MAILING ADDRESS: _____

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TELEPHONE: _____ FACSIMILE: _____

EMAIL: _____

ARRIVAL DATE: _____ DEPARTURE DATE: _____

## PREFERRED ACCOMMODATIONS

SPECIAL REQUEST: ☐ SMOKING ☐ NON-SMOKING ☐ HANDICAP ACCESSIBLE

ROOM RATES: ☐ SINGLE OCCUPANCY – $199 ☐ DOUBLE OCCUPANCY – $224 ☐ REGENCY CLUB – + $50

ADDITIONAL SPECIAL REQUESTS: _____

EXPECTED ARRIVAL TIME: _____

CHECK-IN TIME IS 3:00 P.M. • CHECK-OUT TIME IS 11:00 A.M.

## METHOD OF PAYMENT

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☐ AMERICAN EXPRESS ☐ VISA ☐ MASTER CARD ☐ DISCOVER

CREDIT CARD NUMBER: _____ EXPIRATION DATE: _____

CARDHOLDER'S NAME: _____ DEPOSIT AMOUNT: _____

CARDHOLDER'S SIGNATURE: _____

ROOMS ARE SUBJECT TO 14% STATE AND LOCAL TAXES OR APPLICABLE SERVICE, SUBJECT TO CHANGE WITHOUT NOTICE. CREDIT CARD INFORMATION MUST ACCOMPANY RESERVATION TO GUARANTEE ROOM. RESERVATIONS MUST BE MADE BY SEPTEMBER 3, 2007. AFTER THIS DATE, RESERVATIONS ARE SUBJECT TO AVAILABILITY. NOTE: RESERVE YOUR ROOM EARLY. IF YOU INCLUDE YOUR FAX OR EMAIL, YOU WILL RECEIVE WRITTEN CONFIRMATION OF YOUR RESERVATION FROM THE HOTEL.

[illegible] RESERVATIONS MUST BE MADE BY SEPTEMBER 3, 2007.

- RESERVATIONS RECEIVED AFTER THE DEADLINE DATE WILL BE SUBJECT TO AVAILABILITY AND WILL BE CHARGED AT THE HOTEL'S PREVAILING ROOM RATE.
- YOUR DEPOSIT GUARANTEES YOUR ROOM. PLEASE TELEPHONE CHANGES TO OUR RESERVATION DEPARTMENT AT 800-233-1234.
- CHECK-OUT TIME IS 11:00 A.M., CHECK-IN TIME IS 3:00 P.M.
- RATES ARE SUBJECT TO CURRENT OCCUPANCY TAX.

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*temurley@erols.com*

## TELECOMMUNICATIONS COVER SHEET

DATE: JULY 12, 2007

This transmission consists of 5 pages including this cover sheet.

PLEASE DELIVER THIS TRANSMISSION TO

NAME: MR. FRANK GILLESPIE, EXECUTIVE DIRECTOR, ACRS, NRC

FAX/TELECOPY NUMBER: 301-415-5589

THIS DOCUMENT IS FROM

NAME: Thomas E. Murley

FAX/TELECOPY NUMBER: (301) 469-5002

MESSAGE:

FRANK,
I WOULD BE GRATEFUL IF YOU WOULD GIVE TO THE ACRS MEMBERS MY ATTACHED COMMENTS AS AN ORDINARY MEMBER OF THE PUBLIC,

BEST REGARDS,
Tom Murley

Comments On Framework Safety Standard

Thomas E Murley

The Framework document notes that the Commission Policy Statement on "Regulation of Advanced Nuclear Power Plants" listed two safety expectations:

- that advanced reactors will provide enhanced margins of safety

- that advanced reactor designs will comply with the Commission's safety goal policy statement.

The framework report chose to use the safety goal Quantitative Health Objectives (QHOs) as the level of safety that advanced reactors are intended to meet. As will be discussed below, these two safety expectations are not consistent and they imply very different levels of safety for advanced reactors.

To supplement the QHOs the framework report developed a Frequency-Consequence (F-C) curve as a practical aid for the designer and regulator to select and evaluate Licensing Basis Events (LBEs). The F-C curve was developed from existing regulations, policy statements and other guidelines. As acknowledged in the report some of these existing criteria specify dose limits for cumulative yearly exposure and others specify dose limits per event. Likewise, some dose limits were meant to apply at the Exclusion Area Boundary (EAB) while others were meant to apply at one mile from the Exclusion Area Boundary. In spite of its mixed source origins the F-C curve seems reasonable to me, and as long as the F-C curve is applied consistently there is no inherent problem with its mixed source origins.

The real problem with the F-C curve and the QHOs is that they do not place a useful limit on core damage accident frequency. Therefore, the F-C curve and QHOs, by themselves, are almost certainly not acceptable regulatory standards for reasonable assurance of no undue risk to public health and safety, and they certainly do not meet the Commission's expectation of "enhanced margins of safety."

People living in the vicinity of a nuclear power plant have the reasonable expectation that they will not be subjected to frequent, potentially dangerous events (near misses) and certainly not actual core damage accidents, even if there are no significant radioactive releases from containment and no public health consequences. A contained core damage accident (even with no significant radioactive releases) would nonetheless automatically trigger a complex series of emergency response actions, such as school and population evacuations, that would be extremely disruptive to the local population and local governments. In the longer term a complex and costly cleanup operation would be required and any other operating reactors on the site would likely be shut down for an extended period of time, just to mention a few of the negative financial impacts.

NRC has for many years recognized the public expectation of freedom from unreasonable risk and that is the reason the subsidiary (or surrogate) safety goal of CDF < 10E-4 per R-Y has proven to be so useful over the years. The QHOs place no useful limit on core damage accident frequency for LWRs and they would not do so for advanced reactors. To give a specific example, assuming a population of 104 LWRs at 65 sites in the United States, the QHOs and the F-C curve, if they were the only safety standards, would permit a core damage accident identical to the TMI-2 accident (i.e., a largely contained core-damage accident) each year. Clearly, this would be unacceptable in the United States, and for this reason there must be a separate core damage frequency goal for advanced reactors just as there is for current LWRs.

After years of struggling for a consistent method to implement the Safety Goals in the 1980s, it became clear to me that the surrogate goals (CDF< 10E-4/RY and Large Release Frequency LRF < 10E-6/RY) were much more conservative in protecting public health than are the QHOs. As a result, the QHOs were to my knowledge never used as practical safety criteria in the day-to-day regulation of operating LWRs.

The original LRF surrogate goal (called a performance guideline) for LWRs was essentially a containment performance goal. It implied that the conditional probability of containment failure or containment bypass, given the onset of core damage, must be less than 0.01. This was not easy to demonstrate, but assuming a conditional vessel failure probability of 0.1 and a subsequent conditional containment failure probability of 0.1

it was reasonably in the ballpark as a goal. The LRF guideline separately set a limit on the sub-class of containment bypass core damage accidents (like Event V) of < 10E-6/RY, which proved to be a useful goal.

In recent years the Large Release guideline has been changed to Large Early Release and the allowed frequency has been changed to 10E-5 (LERF < 10E-5/RY). This has produced an inconsistency between the CDF and LERF surrogate safety goals. In effect this means that 10 per cent of core damage accidents can be early release sequences. It further means that core damage containment bypass accidents (like Event V) can have a frequency of 10E-5/RY. For these reasons the change to the LERF surrogate goal does not make sense to me.

A separate LRF goal (not LERF) would be useful (I think necessary) for a risk-informed, performance based alternative to Part 50 for new reactor designs. A new reactor technology that proposes a new or novel approach to the containment function (different from the standard LWR containment systems and structures) will present a special challenge for the regulator. One can imagine designs where the fuel form itself serves a containment function, as does the reactor vessel. In that case an LRF guideline may become more important than a CDF guideline as the relevant guideline protecting public health. If one adopts reasonable definitions of "core damage" and "large release" for advanced reactor designs, I see no reason why CDF <10E-5/RY and LRF < 10E-6/RY could not be chosen as surrogate safety goals for advanced reactors.

Throughout the framework report the impression is given that current LWR plants may not (or do not) meet the QHOs. I am quite confident that, on average, current LWR plants meet the QHOs with large margins and I am further confident that operating experience supports that contention. The reason for the large margins is that in practice the surrogate goal of CDF < 10E-4 was the goal used in guiding regulatory decision-making, not the QHOs. The deterministic requirements on pressure vessels and containments resulted in the LRF and LERF surrogate goals being met as well.

The report raises the question whether the safety goals are to apply to a single unit or to all of the units at a site. The intent of the Safety Goals is clear on this matter. The QHOs are intended to limit the risk to individuals living in the vicinity of nuclear power plants. It was never

intended that individuals living near a three unit site should bear three times the risk of individuals living near a single unit site. Thus, the QHOs set a limit on the total site risk. If there are N reactors at a site, the allowed site risk must be apportioned among the N reactors. This question would be moot, of course, if surrogate safety goals for CDF and LRF were adopted and applied to each advanced reactor on a site.

In summary, I believe the report should be revised to make clear that:

(a) current LWRs, on average, meet the QHOs with substantial margins,

(b) the QHOs and the F-C curve will not by themselves ensure "that advanced reactors will provide enhanced margins of safety," and

(c) new surrogate safety goals (analogs to CDF and LERF) will be needed for advanced reactors, in addition to the QHOs and F-C curve, to ensure that these reactors "provide enhanced margins of safety."