

**ACRS MEETING WITH  
THE U.S. NUCLEAR  
REGULATORY  
COMMISSION**

**JUNE 2, 2004**

# **OVERVIEW**

**Mario V. Bonaca**  
**ACRS Chairman**

# **LICENSE RENEWAL**

- **Streamlined ACRS review of license renewal applications**
- **Reviewed three applications since October 2003 and plan to review another three during the remainder of CY 2004**

# **LICENSE RENEWAL (Cont'd)**

- **Will review six applications in CY 2005**
- **Will review updates to Generic License Renewal Guidance documents (SRP, GALL, and Reg. Guide)**

# **10 CFR 50.69**

- **Held a Subcommittee meeting in February 2004 to discuss:**
  - **Resolution of public and ACRS comments on the proposed 10 CFR 50.69**
  - **NEI implementation guidance document, Revision D**
- **Plan to review the draft final 10 CFR 50.69 in June 2004**

# **ACR-700 DESIGN**

- **Held a Subcommittee meeting with AECL representatives and staff in January 2004 to discuss the ACR-700 design**
- **Plan to review the staff's Safety Assessment Report**
- **Plan to tour the Chalk River facility**

# **EARLY SITE PERMIT APPLICATIONS**

- **Plan to review staff's SERs on ESP applications**
- **Anticipate review of one SER in late CY 2004**

# **FUTURE ACTIVITIES**

- **Risk-Informed and Performance-Based Regulation**
- **Materials and Metallurgy**
- **Advanced Reactor Designs**
- **Resolution of GSIs**
- **Revisions to SRP**
- **High-Burnup Fuel Issues**



# **FUTURE ACTIVITIES (Cont'd)**

- **Use of MOX Fuel in Commercial Reactors**
- **Safeguards and Security Matters**
- **Assessment of Research Quality**
- **Core Power Upgrades**
- **License Renewal Applications**

# **FUTURE ACTIVITIES (Cont'd)**

- **Fire Protection**
- **Human Factors and Human Reliability Assessment**
- **Operating Plant Issues**

# **PWR SUMP PERFORMANCE**

**John D. Sieber**

# **PRECURSOR EVENTS**

- **TMI-2**
- **Perry-1 (two events)**
- **Limerick (two events)**
- **Barsebäck Event**

# **TECHNICAL ISSUES**

- **Debris Generation**
  - **Break size**
  - **Zone of influence**
  - **Materials**
- **Debris Transport**
  - **Analytical methods**
  - **Debris interception**

# **TECHNICAL ISSUES (Cont'd)**

- **Head Loss**
  - **Screen sizing**
- **Chemical Effects**

# **ACRS ISSUES**

- **Limitations of the present knowledge base**
- **Maturity of the technical content of RG 1.82, Rev. 3**
- **Adequacy of industry guidance**
- **Use of risk information**

# **ACRS ISSUES (Cont'd)**

- **Alternative solutions, if uncertainties are too large**
- **Need for additional research**



# **PRA QUALITY FOR DECISIONMAKING**

**George E. Apostolakis**

# **PRA QUALITY FOR DECISIONMAKING**

- **The NRC staff has developed a practical strategy that would encourage the development of guidance documents necessary to implement the Commission's phased approach to PRA quality**

# **PRA QUALITY (Cont'd)**

- **The phased approach is contingent on the availability of guidance documents (i.e., consensus standards and regulatory guides)**

# **PRA QUALITY (Cont'd)**

- **The staff should be prepared to develop guidance documents independently, if consensus standards are not developed in a timely manner to meet the Commission's deadline for achieving Phase 3**

# **PRA QUALITY (Cont'd)**

- **It is more appropriate to refer to the technical adequacy of PRA for a specific regulatory decision rather than its quality**

# **PRA QUALITY (Cont'd)**

- **An application that uses a PRA scope greater than that for which guidance documents exist should not be given low-priority staff review**
- **Proactive licensees should not be discouraged from pushing the boundaries of the state of the practice**

# **PRA QUALITY (Cont'd)**

- **Licensees should be encouraged to address in their application the relevant technical issues, as discussed in the December 18, 2003 SRM**
- **The staff should give high priority to these reviews**

# **PRA QUALITY (Cont'd)**

- **Development of guidance on how to perform sensitivity and uncertainty analyses should receive a higher priority in the action plan**



**RISK-INFORMING**  
**10 CFR 50.46**

**William J. Shack**

# **Risk-Informing 10 CFR 50.46**

- **The risk-informed revision to 10 CFR 50.46 should permit a wide range of applications**
- **RG 1.174 is appropriate for evaluating the acceptability of changes proposed under a revised rule**

# **RISK-INFORMING 10 CFR 50.46 (Cont'd)**

- **Explicit criteria for mitigative capability should be developed to ensure that sufficient defense-in-depth is maintained as plant changes are made**

# **RISK-INFORMING**

## **10 CFR 50.46 (Cont'd)**

- **The appropriate metric for the design basis maximum break size is the LOCA initiating event frequency**
- **It is possible and desirable to make generic definitions of maximum break size applicable to categories of plants**

# **RISK-INFORMING**

## **10 CFR 50.46 (Cont'd)**

- **The number and kind of plant changes allowable will depend on the scope and technical detail of the licensee's PRA**

# **RISK-INFORMING**

## **10 CFR 50.46 (Cont'd)**

- **If a limited scope PRA is used, contributions to the total risk and the change in risk from the omitted portions of the PRA must be estimated**
- **A convincing demonstration that the resulting changes in risk are small enough is needed**

# **RISK-INFORMING 10 CFR 50.46 (Cont'd)**

- **The results of the expert elicitation for the frequency of LOCA events are not yet final**
- **The results need to be peer reviewed**
- **The process is well structured and the expert panel has an appropriate range of expertise**

# **RISK-INFORMING 10 CFR 50.46 (Cont'd)**

- **The results will help provide a technical basis for the selection of the maximum break size**
- **Will review the draft final NUREG report on LOCA frequencies**



# **ACRS 2004 REPORT ON NRC SAFETY RESEARCH PROGRAM**

**Dana A. Powers**

# **SCOPE**

- **Research projects dealing with the safety of existing plants**

# **CONSIDERATIONS**

- **Programmatic justification**
- **Technical approach**
- **Progress of the work**

# **GENERAL OBSERVATIONS**

- **NRC has a well-focused, well-planned Safety Research Program**
- **Research effort may well be near the minimum needed to support regulatory activities**
- **Resources for exploratory research are minimal and may limit the agency's ability to anticipate future needs**

# HIGHLIGHTS

- **High-burnup fuel research for reactivity-initiated accidents**
- **PRA research in support of ROP**
- **Rejuvenation of human factors research**
- **Realism in severe accident analysis**

# **SOME PROJECTS HAVE ACHIEVED SUCCESS**

- **Realistic structural capacity of existing reactor containments**
- **Seismic engineering of existing reactors**

# **EXPERTISE BEING MAINTAINED**

- **Neutronic Analysis**
- **Criticality Safety**
- **Radiation Effects**
- **Reactor Fuels**

# **ADDITIONAL EFFORTS NEEDED**

- **Independent analysis and evaluation of operational data**
- **Fire safety research**
- **PWR sump blockage issue**
- **Integration of TRACE code into regulatory process**



# **ADDITIONAL PLANNING NEEDED**

- **ACRS supports plans to examine the utility of a proactive materials degradation initiative at NRC**
- **RES should examine activities in pressure vessel embrittlement**

# **QUALITY OF RESEARCH PROGRAMS**

- **RES is required to have an independent evaluation of the quality of its research programs**
- **At the request of RES, the ACRS has agreed to this major undertaking**

# **ESBWR PRE-APPLICATION REVIEW**

**Thomas S. Kress**

# **BACKGROUND**

- **Analytical methods and supporting experimental data for LBLOCA and containment scenarios**
- **Based on previous work done for SBWR**

# **CONCLUSION AND OBSERVATIONS**

- **TRACG computer code is acceptable for analyzing ESBWR response to a LOCA scenario**
- **Large design margins (core never uncovers)**
- **Many conservative assumptions**

# **FUTURE USE OF TRACG**

- **Code application and input assumptions for licensing**
- **Degree of conservatism**
- **Sources of margin**
- **Scaling evaluation assessment**
- **Vacuum breaker performance**

# **INTERIM REVIEW OF THE AP1000 DESIGN**

**Thomas S. Kress**

# **THE AP1000 DESIGN**

- **Completed the Phase-2 pre-application review -- ACRS report dated March 14, 2002 concluded that:**
  - **The staff has made a competent and thorough review of the Phase-2 issues**
  - **ACRS agrees that the proposal by Westinghouse to use Design Acceptance Criteria (DAC) for the piping should be approved**



# **AP1000 (Cont'd)**

- **On March 17, 2004, the ACRS issued an interim letter to the EDO commenting on several technical areas**
- **Will hold further discussions with the Staff and Westinghouse in June 2004**

# **AP1000 (Cont'd)**

- **ACRS reviews have not addressed security matters related to the design**
- **ACRS will review FSER in July 2004**

# ACRONYMS

<b>ACR</b>	<b>Advanced CANDU Reactor</b>
<b>ACRS</b>	<b>Advisory Committee on Reactor Safeguards</b>
<b>ADS</b>	<b>Automatic Depressurization System</b>
<b>AECL</b>	<b>Atomic Energy of Canada Limited</b>
<b>CFR</b>	<b>Code of Federal Regulations</b>
<b>CY</b>	<b>Calendar Year</b>
<b>DAC</b>	<b>Design Acceptance Criteria</b>
<b>DSER</b>	<b>Draft Safety Evaluation Report</b>
<b>EDO</b>	<b>Executive Director for Operations</b>
<b>ESBWR</b>	<b>Economic Simplified Boiling Water Reactor</b>
<b>ESP</b>	<b>Early Site Permit</b>
<b>FSER</b>	<b>Final Safety Evaluation Report</b>
<b>FCI</b>	<b>Fuel-Coolant Interaction</b>
<b>GALL</b>	<b>Generic Aging Lessons Learned Report</b>
<b>I&amp;C</b>	<b>Instrumentation and Control</b>

# **ACRONYMS (Cont'd)**

<b>LBLOCA</b>	<b>Large break Loss-of- Coolant Accident</b>
<b>MOX</b>	<b>Mixed Oxide</b>
<b>NRC</b>	<b>Nuclear Regulatory Commission</b>
<b>PRA</b>	<b>Probabilistic Risk Assessment</b>
<b>PWR</b>	<b>Pressurized Water Reactor</b>
<b>RES</b>	<b>Office of Nuclear Regulatory Research</b>
<b>RG</b>	<b>Regulatory Guide</b>
<b>ROP</b>	<b>Reactor Oversight Process</b>
<b>SBWR</b>	<b>Simplified Boiling Water Reactor</b>
<b>SER</b>	<b>Safety Evaluation Report</b>
<b>SRM</b>	<b>Staff Requirements Memorandum</b>
<b>SRP</b>	<b>Standard Review Plan</b>
<b>TMI</b>	<b>Three Mile Island</b>