ACRS MEETING WITH THE U.S. NUCLEAR REGULATORY COMMISSION

June 7, 2007

OVERVIEW

William J. Shack

Accomplishments

- Since our last meeting with the Commission on October 20, 2006, we issued 24 Reports:
- Topics included:
  - Draft Final Rule to Risk-Inform 10 CFR 50.46, “Acceptance Criteria for Emergency Core Cooling Systems for Light Water Nuclear Power Reactors”

- Draft Final Regulatory Guide DG-1145, “Combined License Applications for Nuclear Power Reactors”
- Draft Final NUREG-1824, “Verification and Validation of Selected Fire Models for Nuclear Power Plant Applications”
- Development of the TRACE Thermal-Hydraulic System Analysis Code

- Draft Final Revision 3 to Regulatory Guide 1.7, “Control of Combustible Gas Concentrations in Containment Following a Loss-of-Coolant Accident”
- Development of an Integrated Long-term Regulatory Research Plan
- License Renewal and Extended Power Uprate Applications

Future Plant Designs

- Established design-specific Subcommittees
- Completed review of revisions to high-priority SRP Sections and Regulatory Guides
- Reviewing ESBWR probabilistic risk assessment
- Reviewing the licensing framework for future plant designs

The ACRS will:

- Perform pre-application review of the EPR design

- Review SER for the ESBWR design certification, chapter-by- chapter, as requested by the staff

- Review Vogtle early site permit application

Dissimilar Metal Weld Issue

- Support staff and industry agreement on the resolution of pressurizer nozzle weld issues
  - Allow the final nine plants to complete inspection and mitigation activities in spring 2008, contingent on additional industry analysis results

- Industry developing advanced finite element analysis to provide basis for leak-before-break

- Licensees committed to enhanced leakage detection as compensatory action

- Staff should encourage industry to perform inspections prior to mitigation activities

- Plan to review results of advanced finite element analysis when available

Ongoing/Future Activities

- Advanced reactor design certifications
- Assessment of research quality
- Combined license applications
- Commission paper on rulemaking to make risk-informed change to loss-of-coolant accident technical requirements, 10 CFR 50.46a

- Digital instrumentation and control systems
- Early site permit applications
- Extended power uprates
- Fire protection
- High-burnup fuel and cladding issues
- Human reliability analysis
- License renewal applications

- Operating plant issues
- Report on the NRC Safety Research Program
- Resolution of GSI-191, “Assessment of Debris Accumulation on PWR Sump Performance”
- Revisions to Regulatory Guides
- Risk-Informing 10 CFR Part 50
- Safeguards and security matters

- SPAR models development program
- State-of-the-art reactor consequence analysis
- Technology-neutral regulatory framework
- Thermal-hydraulic codes

FRAMEWORK FOR FUTURE PLANT LICENSING

Thomas S. Kress

The ACRS should provide its views to the Commission with respect to staff's work on technology neutral licensing framework with a focus on ensuring the value of such an approach versus the development of a licensing framework for specific designs, such as high temperature gas cooled reactor or a liquid metal cooled reactor (SRM, November 8, 2006)

General Views on Framework

- Develop top-down technology-neutral approach
- Test framework concepts on PBMR design

Risk-Informed Performance-Based Part 50

- Concur with the staff's recommendation to defer rulemaking until after development of the licensing strategy for NGNP
- Completed framework should help guide the licensing strategy for NGNP
- Framework is incomplete and needs modification

DIGITAL I&C ACTIVITIES

George E. Apostolakis

The Committee should provide its view to the Commission on staff's efforts related to digital instrumentation and controls. The Committee should consider potential means for providing reasonable backup, if appropriate

(SRM, November 8, 2006)

- Concur with the staff's approach to developing a project plan that defines a process to improve deployment of digital I&C technology for new and operating reactors

- The staff should develop an inventory and classification, (e.g., by function and other characteristics, of the various types) of digital and software systems that are being used and are likely to be used in the near future in nuclear power plants

- The staff should evaluate the operating experience with digital systems in the nuclear and other industries to obtain insights regarding potential failure modes

- The information obtained through evaluation of operating experience and the development of an inventory and classification of digital and software systems should be used in developing regulatory guidance on defense in depth and diversity for digital I&C systems
- This information is necessary to develop our response regarding the need and potential means for backup

LICENSE RENEWAL/ EXTENDED POWER UPRATES

MARIO V. BONACA

License Renewal

- Performed interim (Subcommittee) reviews of three applications and final (Full Committee) review of two applications since October 2006
- Will perform interim review of one application and final review of two applications during the remainder of CY 2007
- Will perform three interim reviews and four final reviews in CY 2008

- Recommended continued operation of Palisades during the entire period of extended operation contingent on the resolution of three time-limited aging analysis issues associated with reactor pressure vessel integrity

License conditions for Oyster Creek license renewal:

- Identify options to eliminate or reduce leakage in the refueling cavity liner
- Perform 3-dimensional finite element analysis of the drywell shell
- Increase frequency of drywell inspections and monitor two drywell trenches

Extended Power Uprates

- Reviewed 5% power uprate amendment for Browns Ferry Unit 1
  - Containment overpressure credit during long-term LOCA and Appendix R fire scenarios at 120% power will require more complete evaluations

- Will review the extended power uprates for Browns Ferry Units 1, 2, and 3 after receiving complete safety evaluation reports
- Will review extended power uprates for Hope Creek and Susquehanna in CY 2007

HUMAN RELIABILITY ANALYSIS MODELS

George E. Apostolakis

The Committee should work with the staff and external stakeholders to evaluate the different Human Reliability models in an effort to propose either a single model for the agency to use or guidance on which model(s) should to be used in specific circumstances (SRM, November 8, 2006)

- The staff and EPRI are making progress in developing a plan to evaluate several human reliability analysis models
- The goals and important milestones of the project will need to be clearly articulated

- The objective should be to develop a common understanding of the relative importance of factors affecting human performance and ways in which they could be integrated into analyses
- Achieving this objective will allow the staff to develop guidance on which model(s) should be used for specific regulatory applications

- The staff is currently organizing an HRA Empirical Study to perform model-to-model comparisons to assess the strengths and weaknesses of HRA models using the simulator in Halden, Norway
- ACRS views this study as part of the broader effort to collect evidence regarding the validity of HRA models

- The Empirical Study by itself will not be sufficient to develop meaningful quantitative estimates of the probability of errors
- Additional evidence should be collected from operating experience, especially the Augmented Inspection Team reports on past incidents

ABBREVIATIONS

ACRS	Advisory Committee on Reactor Safeguards
CFR	Code of *Federal Regulations*
CY	Calendar year
DG	Draft guide
EPR	Evolutionary Power Reactor
EPRI	Electric Power Research Institute
ESBWR	Economic Simplified Boiling Water Reactor
GSI	Generic Safety Issue
HRA	Human reliability analysis
I&C	Instrumentation and control
LOCA	Loss-of-coolant accident
NGNP	Next Generation Nuclear Plant
NRC	Nuclear Regulatory Commission
PBMR	Pebble Bed Modular Reactor
PRA	Probabilistic risk assessment
PWR	Pressurized water reactor
SER	Safety evaluation report
SPAR	Standardized Plant Analysis Risk Model
SRM	Staff Requirements Memorandum
SRP	Standard Review Plan
U.S.	United States