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

July 2, 2008

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

SUBJECT: SUMMARY REPORT – 553rd MEETING OF THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS, JUNE 4-6, 2008, AND OTHER RELATED ACTIVITIES OF THE COMMITTEE

Dear Chairman Klein:

During its 553rd meeting, June 4-6, 2008, the Advisory Committee on Reactor Safeguards (ACRS) discussed several matters and completed the following report and memoranda.

REPORT

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

- ARTIST Test Program, dated June 13, 2008

MEMORANDA

Memoranda to R. W. Borchardt, Executive Director for Operations, NRC, from Frank P. Gillespie, Executive Director, ACRS:

- Draft Final Revision to 10 CFR 50.55a, "Codes and Standards," dated June 9, 2008
- Draft Final Regulatory Guide 4.21, "Minimization of Contamination and Radioactive Waste Generation: Life-Cycle Planning," dated June 9, 2008
- Withdrawal of Regulatory Guide 1.139, "Guidance for Residual Heat Removal," dated June 9, 2008
- Draft Regulatory Guides 1186, 4013, and 3034, dated June 9, 2008

HIGHLIGHTS OF KEY ISSUES

1. ARTIST Test Program

The Committee met with representatives of the NRC staff to review the results of the tests conducted by Paul Scherrer Institut (PSI) at the Aerosol Trapping in a Steam Generator Test (ARTIST) facility in Switzerland. The objective was to investigate the retention of aerosols representative of those produced during several core damage accidents as they pass through a ruptured steam generator tube and transported through the secondary side of the steam generator. The ARTIST test program was sponsored by an international consortium, including NRC. This was a four-year program and completed testing in 2007. During this four-year program, a number of separate effects tests as well as large-scale integral tests were performed. It was found that there was limited deposition of aerosols in the steam generators. The staff plans to use the test data obtained from the ARTIST test program to refine the MELCOR code.

Committee Action

The Committee issued a report to the NRC Chairman on this matter dated June 13, 2008, concurring with the staff that the ARTIST test program has provided sufficient experimental data to closeout Item 3.3a, “Development of Experimental Information on Aerosol Source Term Attenuation on the Secondary Side of Steam Generators,” of the NRC Steam Generator Action Plan.

2. Risk Assessment Standardization Project (RASP)

The Committee met with representatives of the NRC staff to discuss the Risk Assessment Standardization Project (RASP) and related matters. This Project is intended to provide consistent methods between the Accident Sequence Precursor (ASP) calculations, the Significance Determination Process (SDP) Phase 3 programs, and incident investigation programs. Thus, the focus of RASP is to standardize the event assessment programs.

Based on the user need requests, the RASP project was divided into four tasks:

Task 1: Develop guides for the analysis of internal events during power operations.

Task 2: Develop new methods and guides for the analysis of external events, internal events during low power and shutdown operations

Task 3: Enhance the Standardized Plant Analysis Risk (SPAR) models and SAPHIRE/GEM code package

Task 4: Provide on-going technical support

The RASP handbook was issued in January 2008. This handbook provides guidelines for performing internal and external event analysis to address the first two tasks.

To address Task 3, the SPAR models are under active development. There are now internal events models for essentially all operating plants. In addition, there are 15 external events models and five shutdown events models. Also, two Level II models are under development. Finally, a new version of the SAPHIRE/GEM code package is being developed, including a new user interface and improved features and capabilities. The Office of Nuclear Regulatory Research continues to provide technical support to address Task 4. The staff briefly discussed the future activities that it plans to perform in this area.

Committee Action

This was an information briefing. No Committee action was necessary. The Committee plans to discuss this matter with the staff during future meetings.

3. Overview of the U.S. Evolutionary Power Reactor (EPR) Design

The Committee met with representatives of the NRC staff and AREVA NP Inc. regarding the design concepts, major safety systems, and components of the U.S. EPR design, as well as the main differences in design between the U.S. EPR and a standard Pressurized Water Reactor (PWR) now in operation in the U.S.

The staff discussed the schedule for reviewing the Design Certification Application for the US EPR, which was accepted for review on March 26, 2008. The target date for completing the Safety Evaluation Report (SER) with Open Items is March 5, 2010. The staff plans to group several chapters of the SER with Open Items and submit them to the ACRS for review. The staff also stated that the Reference Combined License Application (RCOLA) for the US EPR at the Calvert Cliffs site in Lusby, MD is under review.

AREVA provided information on the design objectives for the US EPR, the general plant layout, the core design, digital instrumentation and control systems, severe accident mitigation, steam generator tube rupture and small-break loss-of-coolant accident mitigation, and the probabilistic risk assessment prepared for the EPR design. Major design differences between the U.S. EPR and an uprated 4-loop PWR were presented. The major components and systems for safety were discussed, including the radial design of the safeguards buildings, the four trains of safety systems, aircraft impact protection of the reactor and safeguards buildings, and the main safety systems for the primary and secondary sides of the reactor.

Committee Action

This was an information briefing. No Committee action was necessary. The ACRS plans to review the Safety Analysis Report submitted by AREVA and the associated chapters of NRC staff's SER.

4. Status of the Development of Rules and Regulatory Guidance in the Areas of Safeguards and Security

The Committee met with representatives of the NRC staff regarding the status of the ongoing rulemaking and regulatory guidance development activities in the area of Safeguards and Security. Consistent with the Commission direction in the October 31, 2003 Staff Requirements Memorandum, the Committee is reviewing primarily four parts of the rule. These are: safety and security interface; cyber security; mitigative strategies for large area fires and explosions and contingency response to aircraft threats; and, aircraft impact assessment.

The staff discussed the major changes made to the rulemaking package in response to the public comments, and the logic behind moving parts of the rule outside 10 CFR Part 73. The mitigative strategies and response procedure for potential and actual aircraft attacks duplicate what was imposed on the operating rectors via orders, and are now in 10 CFR 50.54, as they will be imposed as license conditions.

Draft regulatory guides have been developed for safety/security interface and protection of digital computers and communication system (cyber security). While these draft guides have been made available to the ACRS, the draft guidance on mitigative strategies will not be available before July 2008. The staff requested ACRS comments on the draft final rule prior to the Committee's review of the draft guides. ACRS members commented that given the very general wordings in some draft rules, having the draft guidance will help in reviewing the draft final rule. The Chairman of the ACRS Subcommittee on Safeguards and Security noted the difficulty in preparing a report during the July 9-11, 2008, meeting, given the anticipated submittal of the rule package to the ACRS at the end of June.

Committee Action

This was an information briefing. No Committee action was necessary. The Committee plans to review the draft final rulemaking package during the July 9-11, 2008 ACRS meeting.

5. Status of the Quality Assessment of Selected Research Projects

The Committee discussed the status of the quality assessment of the research projects selected for FY 2008. The Committee agreed that the panel review of the research project on the FRAPCON/FRAPTRAN code work at the Pacific Northwest National Laboratory (PNNL) should be focused on the revised draft NUREG/CR report entitled, "Assessment of Predictive Bias and the Influence of Manufacturing, Model, and Power Uncertainties in NRC Fuel Performance Code Predictions."

Committee Action

The Committee plans to discuss the draft report on quality assessment of the selected research projects during September 4-6, 2008 ACRS meeting.

6. Meeting with the Commission

On June 5, 2008, the Committee met with NRC Commissioners to discuss topics of mutual interest, including the following:

- Safety Research Program Report
- Digital I&C Matters
- State-of-the-Art Reactor Consequence Analysis (SOARCA) Program
- ESBWR Design Certification
- Extended Power Uprates and related Technical Issues

Committee Action

In accordance with the June 26, 2008, Staff Requirements Memorandum resulting from this meeting, the ACRS will interact with the staff, as needed, to discuss the Committee concerns related to SOARCA, digital I&C, and containment overpressurization.

7. Overview of the US-Advanced Pressurized Water Reactor (US-APWR) Design

The Committee met with representatives of the NRC staff and Mitsubishi Heavy Industries, LTD (MHI) to discuss the design features and preliminary design certification review schedule for the US-APWR design. MHI submitted the application for US-APWR standard design certification on December 31, 2007. The staff acceptance review was completed and the application was docketed on February 29, 2008. The staff's review of the design certification application is currently under way along with the preparation of the SER with Open Items. The staff's proposed dates for ACRS review of the SER with Open Items and the final SER are June 2010 and August 2011, respectively. Luminant Generation Company, LLC has selected the US-APWR design for proposed new units at the Comanche Peak Nuclear Power Plant site. A COL application is expected to be submitted in September 2008.

Representatives of MHI provided an overview of the US-APWR design features. The US-APWR design is similar to the Japanese APWR that is currently undergoing licensing review in Japan. The MHI presentation included information about the fuel and core design, details of the system design and safety features, instrumentation and control (I&C) systems and architecture, and a discussion of MHI experience with digital I&C applications and reliability. MHI has developed a simulation facility near Pittsburgh, PA and stated that members of the ACRS were welcome to tour this facility.

Committee Action

This was an information briefing. No Committee action was necessary. During upcoming meetings the Committee will discuss and prioritize which US-APWR reports will be reviewed in detail. The Committee plans to send representatives to visit MHI's Pittsburgh simulation facility later this year.

8. Status of NRC Staff Activities Associated with the Resolution of Generic Safety Issue (GSI)-191, "Assessment of Debris Accumulation on Pressurized-Water Reactor (PWR) Sump Performance"

The Committee met with representatives of the NRC staff to discuss the status of staff activities associated with the resolution of GSI-191. GSI-191 addresses the impact and consequence of debris generated during a design basis-LOCA on the capability and performance of the emergency core cooling and containment spray systems in the recirculation mode. The staff discussed the areas that are still a challenge as the licensees work towards completion of the actions related to PWR sump performance.

The staff acknowledged the substantial work done by licensees so far, including the installation of new strainers with larger surface areas and better pressure drop performance under strainer clogging conditions. The licensees changed the buffers and removed insulations in the zone of influence (ZOI) that adversely contribute to the debris fibers and chemical effects. The staff had by large reviewed and accepted or commented on most of the testing protocols that are intended to demonstrate adequate strainer functions under conditions representative of the plant-specific characteristics. In reference to the December 31, 2007 implementation deadline, the staff stated that most licensees requested and were granted extensions for completion of certain corrective actions such as downstream effects analyses, integrated head loss testing, and plant modifications.

The staff approved the topical reports related to chemical effects and ex-vessel downstream effects. Although the draft safety evaluation of the in-vessel (core blockage) topical report was issued, the staff and the PWR owners group are currently addressing the concerns raised during the March 19, 2008 ACRS Subcommittee meeting.

The staff discussed some of the challenges still pending in resolution of GSI-191 and projected that the GSI-191 issue will be resolved by 2009. However, the staff also pointed out that the actions implemented so far have significantly reduced the risk of strainer clogging.

Committee Action

This was an information briefing. No Committee action was necessary. The Committee plans to review the proposed resolution of GSI-191 during future meetings.

RECONCILIATION OF ACRS COMMENTS AND RECOMMENDATIONS/EDO COMMITMENTS

- The Committee considered the EDO's response of May 27, 2008 to comments and recommendations included in the May 2, 2008 ACRS report on the Hope Creek Generating Station Extended Power Uprate Application. The Committee decided that it was satisfied with the EDO's response.

- The Committee considered the EDO's response of May 28, 2008 to comments and recommendations included in the April 29, 2008 ACRS report on the review of Digital Instrumentation and Control Systems Interim Staff Guidance. The Committee decided that it was satisfied with the EDO's response.

- The Committee considered the EDO's response of May 20, 2008 to comments and recommendations included in the April 21, 2008 ACRS report concerning the State-of-the-Art Reactor Consequences Analyses (SOARCA) Project. The staff has restated its justifications for the current SOARCA approach. The staff plans to clarify the SOARCA methodology. The staff's intent is not clear. The Committee plans to discuss this matter during future meetings.

OTHER RELATED ACTIVITIES OF THE COMMITTEE

During the period from May 10, 2008 through June 3, 2008, the following Subcommittee meetings were held:

- ESBWR — June 3, 2008

The Subcommittee discussed several Chapters of the SER with Open Items associated with the ESBWR design certification application.

- Planning and Procedures — June 3, 2008

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 review of the matters related to GSI-191 as well as the proposed resolution of this GSI.

- The Committee plans to review the U.S. EPR Safety Analysis Report submitted by AREVA and the associated Chapters of NRC staff's SER during future meetings.

- The Committee plans to review the draft final rulemaking package related to Security and Safeguards during its July 9-11, 2008 meeting.

- The Committee plans to discuss the draft report on quality assessment of selected research projects during its September 4-6, 2008 meeting.

- The Committee plans to review the US-APWR reports. The Committee plans to send representatives to visit Mitsubishi Heavy Industries' simulation facility in Pittsburgh later this year.

- The Committee would like the opportunity to review the draft final versions of the regulatory guides listed in the memorandum, "Draft Regulatory Guides 1186, 4013, and 3034," dated June 9, 2008, from Frank P. Gillespie, Executive Director, ACRS, to R. W. Borchardt, Executive Director for Operations.

PROPOSED SCHEDULE FOR THE 554th ACRS MEETING

The Committee agreed to consider the following topics during the 554th ACRS meeting, to be held on July 9-11, 2008:

- Stretch Power Uprate Application for Millstone Power Station, Unit 3
- Selected Chapters of the Safety Evaluation Report (SER) Associated with the Economic Simplified Boiling Water Reactor (ESBWR) Design Certification Application
- Draft Final/Proposed Rules in the Area of Safeguards and Security
- Status of NRC Staff Activities Associated with Seismic Design Issues at Nuclear Power Plants
- Technical Issues Related to Crediting of Containment Overpressure During Design Basis Accidents for the Extended Power Uprate for Browns Ferry Units 1, 2, and 3

Sincerely,

/RA/

William J. Shack
Chairman

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Sincerely,

/RA/

William J. Shack
Chairman

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