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

May 2, 2014

The Honorable Allison M. Macfarlane
Chairman
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

SUBJECT: SUMMARY REPORT - 613th MEETING OF THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS, APRIL 10-11, 2014

Dear Chairman Macfarlane:

During its 613th meeting, April 10-11, 2014, the Advisory Committee on Reactor Safeguards (ACRS) discussed several matters and completed the following reports and memoranda:

REPORTS

Reports to Allison M. Macfarlane, Chairman, NRC, from John W. Stetkar, Chairman, ACRS:

- Review and Evaluation of the NRC Safety Research Program, dated April 15, 2014
- Credit for Containment Accident Pressure to Ensure Operation of US-APWR Emergency Core Cooling System Pumps, dated April 21, 2014
- Supplemental Final Safety Evaluation Report (FSER) on the General Electric-Hitachi (GEH) Nuclear Energy Application for Certification of the Economic Simplified Boiling Water Reactor (ESBWR) Design, dated April 17, 2014

MEMORANDA

Memoranda to Mark A. Satorius, Executive Director for Operations, NRC, from Edwin M. Hackett, Executive Director, ACRS:

- Withdrawal of Regulatory Guides – 1.37, 3.28, and 3.29, dated April 18, 2014
- Draft Final Regulatory Guides – 1.60, Revision 2, and 3.50, Revision 2, dated April 18, 2014

HIGHLIGHTS OF KEY ISSUES

1. Economic Simplified Boiling Water Reactor (ESBWR) Supplemental Final Safety Evaluation Report (FSER)

In a closed session, the Committee met with representatives of the NRC staff to discuss the supplemental FSER for the ESBWR design certification. The staff discussed errors identified in General Electric-Hitachi (GEH) licensing topical reports (LTRs) related to modeling of operating conditions for the steam dryer. Specifically, the NRC staff identified errors in the benchmarking used as a basis for determining pressure loads on the steam dryer, as well as errors in a number of the modeling parameters. The NRC staff was concerned that these errors may affect the conclusions in the FSER for the ESBWR design certification. GEH modified the ESBWR steam dryer evaluation methodology to address these concerns. Neither the ESBWR steam dryer nor the overall ESBWR design was changed. The NRC staff determined that the modified ESBWR steam dryer evaluation methodology described in revised engineering reports is acceptable.

Committee Action

The Committee issued a report to the NRC Chairman on this matter dated April 17, 2014, concluding that the ESBWR steam dryer design is adequate, and the associated structural analysis and planned startup test program are acceptable. There is reasonable assurance that the ESBWR design can be constructed and operated without undue risk to the health and safety of the public.

2. Overview of NRC Operating Experience Program

The Committee met with representatives of the NRC staff to discuss the NRC Reactor Operating Experience Program. The purpose of the Program is to collect, evaluate, and communicate operating experience information in a timely and systematic manner. The staff presented a brief history of the Program, discussed the types and sources of operating experience, domestic and international, which are input to the Program, outlined the screening and evaluation process, and described the Program's internal communication options. External communication of operating experience is through NRC generic communications. The staff also explained the Program's relationship with the Institute of Nuclear Power Operations related to operating experience.

Committee Action

This was an information briefing. No Committee action was necessary

3. Overview of the B&W mPower Small Modular Reactor Design

The Committee met with representatives of the NRC staff and B&W Generation mPower to discuss the mPower small modular reactor design for an integral pressurized water reactor (iPWR). In addition to key features of the plant and reactor design, the mPower representatives described the defense in depth and safety strategies, use of PRA, and an overview of the mPower test program. There were discussions on ASME code development regarding some unique aspect of the design and inservice inspection requirements.

Committee Action

This was an information briefing. No Committee action was necessary. The Committee plans to review the development of mPower specific review standards during a future meeting.

4. NRC Staff Activities Regarding Small Modular Reactors (SMRs)

The Committee met with representatives of the NRC staff to discuss activities associated with small modular reactors. The staff presented a summary of their pre-application activities with various iPWR vendors including the current status. The staff also discussed the design concepts and challenges associated with licensing non-light water reactor SMRs. The staff noted their commitment to ensuring that policies, requirements, and internal and external guidance are in place to support the review of SMR designs. The staff plans to continue their engagement with potential applicants and stakeholders throughout the licensing process.

Committee Action

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

5. Biennial Review of the NRC Safety Research Program

The Committee completed and documented their review and evaluation of the NRC safety research program. In its evaluation of NRC research activities, the Committee considered the programmatic justification for the research as well as the technical approaches and progress of the work.

Committee Action

The Committee issued an advance copy of the ACRS report entitled, “Review and Evaluation of the Nuclear Regulatory Commission Safety Research Program,” to the NRC Chairman on April 15, 2014. The final report will be issued as Volume 11 to NUREG-1635.

6. Thermal Conductivity Degradation

The Committee met with representatives of the NRC staff to discuss the status of staff's actions to address fuel thermal conductivity degradation (TCD). The legacy fuel rod thermal-mechanical computer codes did not include the reduction in thermal conductivity with increasing burnup because earlier test data were inconclusive as to the significance of this effect. Beginning in the 1990s, measurements collected from instrumented fuel assemblies at the Halden research reactor indicated a steady degradation in the thermal conductivity of uranium fuel pellets with increasing burnup. Without considering the effects of TCD, steady state and transient analyses result in inaccurate fuel temperature predictions which impact calculations of stored energy, pellet thermal expansion, fission gas release, fuel melting point, and Doppler reactivity. The staff discussed the status of the fuel performance codes for both PWRs and BWRs and described corrective actions to ensure a high level of confidence in model predictions. Some of the legacy fuel performance codes are being replaced by computer codes that explicitly account for TCD with burnup. The staff also discussed TCD impacts on emergency core cooling system evaluations and summarized the various approaches used by fuel vendors and licensees to address these effects.

Committee Action

This was an information briefing. No Committee action was necessary. The Committee plans to review future versions of fuel codes which address TCD.

7. Withdrawal of Regulatory Guides

The Committee considered the staff's bases for withdrawal of the following Regulatory Guides and has no objection to the staff's proposal to withdraw them.

- Regulatory Guide 1.37, "Quality Assurance Requirements for Cleaning of Fluid Systems and Associated Components of Water-Cooled Nuclear Power Plants"

- Regulatory Guide 3.28, "Welder Qualification for Welding in Areas of Limited Accessibility in Fuel Reprocessing Plants and in Plutonium Processing and Fuel Fabrication Plants"

- Regulatory Guide 3.29, "Preheat and Interpass Temperature Control for the Welding of Low-Alloy Steel for Use in Fuel Reprocessing Plants and in Plutonium Processing and Fuel Fabrication Plants"

8. Draft Final Regulatory Guides

The Committee considered the draft final revisions to the following Regulatory Guides and decided not to review them. The Committee has no objection to the staff's proposal to issue these Guides.

- Regulatory Guide 1.60, Revision 2, “Design Response Spectra for Seismic Design of Nuclear Power Plants”

- Regulatory Guide 3.50, Revision 2, “Standard Format and Content of a License Application for an Independent Spent Fuel Storage Installation or a Monitored Retrievable Storage Facility”

RECONCILIATION OF ACRS COMMENTS AND RECOMMENDATIONS

- The Committee considered the EDO’s response of March 20, 2014, to conclusions and recommendations included in the February 18, 2014, ACRS letter on the Monticello Nuclear Generating Plant Maximum Extended Load Line Limit Analysis Plus (MELLLA+) license amendment request. The Committee decided that it was satisfied with the EDO’s response.

- The Committee considered the EDO’s response of March 20, 2014, to conclusions and recommendations included in the February 19, 2014, ACRS letter on 10 CFR Part 61 – Revisions to Low-Level Radioactive Waste Disposal Requirements. The Committee decided that its report and the staff’s response adequately describe the differing points of opinion on this matter and no further written exchange is needed at this time.

- The Committee considered the EDO’s response of February 24, 2014, to the conclusions and recommendations in the December 24, 2013, ACRS letter regarding Chapters 6 and 7 of the Safety Evaluation Report with Open Items associated with the US-APWR design and related long-term core cooling issues. The Committee decided that it was not satisfied with the EDO’s response regarding their recommendation to perform best estimate analyses with explicit consideration of uncertainties to determine the available net positive suction head (NPSH) for containment spray, residual heat removal, and high head injection pumps for design basis loss of coolant accidents. The Committee issued a letter to the Chairman on this matter dated April 21, 2014. The Committee is concerned that reliance on containment accident pressure (CAP) credit directly jeopardizes a fundamental principle of defense in depth, the independence of barriers against the release of harmful radioactive materials. The Committee reaffirmed their position that CAP credit should not be accepted for new reactors without a thorough assessment of feasible design alternatives and a full understanding of the associated risk. Since the current US-APWR design-level probabilistic risk assessment does not satisfy the scope, level of detail, or technical quality attributes to support a risk-informed evaluation of this issue, the Committee recommends that best estimate analyses with explicit consideration of uncertainties should be performed to evaluate the available NPSH margins for the limiting loss of coolant accident event and a range of ECCS operating configurations. This would better inform the understanding of the extent and the duration for which CAP credit is needed, and why practical design alternatives are not feasible.

- The Committee considered the EDO's Response of February 10, 2014, to the conclusions and recommendations in the November 20, 2013, ACRS letter regarding Regulatory Guides 1.169 through 1.173, regarding software processes for digital computers in safety systems of nuclear power plants. The Committee decided that it was satisfied with the EDO's response.

SCHEDULED TOPICS FOR THE 614th ACRS MEETING

The following topics are scheduled for the 614th ACRS meeting, to be held on May 8-10, 2014:

- Early Site Permits
- SECY-14-0016, "Ongoing Staff Activities to Assess Regulatory Considerations for Power Reactor Subsequent License Renewal"
- Meeting with Commissioner Magwood
- Human Reliability Analysis (HRA) Method Development and Progress

Sincerely,

/RA/

John W. Stetkar
Chairman

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John W. Stetkar
Chairman

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