October 26, 2012

Dr. J. Sam Armijo, Chairman
Advisory Committee on Reactor Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

SUBJECT: CHAPTER 9 OF THE SAFETY EVALUATION REPORT WITH OPEN ITEMS FOR THE US-APWR (ADVANCED PRESSURIZED WATER REACTOR) DESIGN CERTIFICATION APPLICATION

Dear Dr. Armijo:

Thank you for your letter dated September 18, 2012, regarding the safety evaluation report (SER) with open items associated with the United States–Advanced Pressurized Water Reactor (US-APWR) design certification application. As discussed during the 597th meeting of the Advisory Committee on Reactor Safeguards (ACRS) on September 6, 2012, the staff is currently working to resolve the open items associated with the review of Chapter 9, "Auxiliary Systems."

The staff is working with the applicant, Mitsubishi Heavy Industries, Ltd., to resolve (1) all of the open items and (2) the two recommendations in the "Conclusions and Recommendations" section of your letter. These two recommendations concern the component cooling water system nonsafety cooling headers and the technical specification for the essential chilled-water system.

Your first recommendation states that the staff should provide a justification for its acceptance of the analyzed single failure as the most limiting condition that requires manual isolation of the component cooling water system (CCWS) nonsafety cooling headers. You stated that the justification should consider the CCWS response during a variety of design basis accident scenarios, including associated assumptions about the timing and the types of the assumed single failures.

During the ACRS meetings on March 22-23, 2012, meeting participants stated that there could be more challenging single active failure scenarios than the one presented by Mitsubishi Heavy Industries, Ltd. Accordingly, in April 2012 the staff issued a request for additional information (RAI) to Mitsubishi Heavy Industries, Ltd., asking the company to address all failure scenarios that could occur with the cross-tie valve open.

In July 2012 Mitsubishi Heavy Industries, Ltd., responded to the RAI with proposed design changes. Shortly thereafter, the U.S. Nuclear Regulatory Commission (NRC) staff conducted a phone call with Mitsubishi Heavy Industries, Ltd., and identified several technical items for resolution, which Mitsubishi Heavy Industries, Ltd., is now evaluating. In summary, the staff is actively engaged with Mitsubishi Heavy Industries, Ltd., on this subject and will share its final conclusions with the ACRS in the Phase 4 Advanced Final Safety Evaluation Report and during Phase 5 interactions.

Your second recommendation states the staff should reconsider its justification for omission of the essential chilled-water system (ECWS) from the US-APWR technical specifications (TS).

The staff believes that the TS requirements established for the ECWS in the US-APWR design are consistent with the staff's guidance provided in improved standard technical specifications (STSs, NUREG-1430 through NUREG-1434) for the current operating fleet. Further, the logic applied for this system is consistent with the overall approach used for support systems of varying types, some examples of which you cited in your letter.

In the US-APWR design, the safety-related ECWS is a support system to various safety-related ventilation systems. In turn, these safety-related ventilation systems support primary (front line) systems, structures, and components (SSCs) (e.g., safety injection system, containment spray system) credited for mitigating the consequence of a design basis accident or transient.

The effect on the operability of a primary SSC due to an inoperable SSC in a non-TS support system, such as ECWS, is assessed through the concept of "OPERABLE – OPERABILITY" as defined in the definition for these terms in TS Section 1.1 (Chapter 16, Technical Specification, in the Agencywide Documents Access and Management System, Accession No. ML110980225). The definition of OPERABILITY states that an SSC is OPERABLE, "…when all necessary attendant instrumentation, controls, normal or emergency electrical power, cooling and seal water, lubrication, and other auxiliary equipment that are required for the system, subsystem, train, component, or device to perform its specified safety function(s) are also capable of performing their related support function(s)." For SSCs that are not explicitly called out (i.e., required) in a limiting conditions for operations, the guidance in Regulatory Issue Summary (RIS) 2005-20 and NRC Inspection Manual, Part 9900, "Operability Determinations & Functionality Assessments for Resolution of Degraded or Nonconforming Conditions Adverse to Quality or Safety," Section 4.0, Operability Determination Process, would apply for evaluating the supported TS SSC OPERABILITY.

The ECWS and the associated ventilation systems are designed to provide an acceptable environmental condition for the operation of safety-related equipment. The design criteria for these systems are the room temperature limits as listed in the Design Control Document, Table 9.4-1. Depending on the design of cooling loads for a specific safety-related system, a loss of the safety-related chilled water system in one redundant train will not result in a loss of the associated SSC in the primary system. For example, the designed cooling loads for the Class 1E Electrical Room ventilation system in Train A would have sufficient capacity to cover both Divisions A and B electrical equipment.

It is noteworthy to mention a difference between the US-APWR design and the U.S. Evolutionary Power Reactor (U.S. EPR) design with respect to the ECWS. In the U.S. EPR design, the NRC established technical specification requirements for the ECWS, because in addition to providing cooling water to the various safety-related ventilation systems, the ECWS also provides cooling to the low-head safety injection pump motor and seal coolers. In the case of the U.S. EPR, a loss of the safety-related chilled water system in one redundant train will result in a loss of the associated low-head safety injection pump (a primary SSC). As discussed earlier in this letter, this is not the case for the US-APWR ECWS.

In addition, in the US-APWR design, the ECWS does not trip any of the four criteria for inclusion in technical specifications as described in Section 50.36(c)(2)(ii) of Title 10 of the *Code of Federal Regulations* (10 CFR). Of the four criteria, Criterion 3 may be most applicable. It states that an item meeting the following description must have an established technical specification:

> A structure, system, or component that is part of the primary success path and which functions or actuates to mitigate a design basis accident or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.

When comparing the US-APWR ECWS to Criterion 3, we see that the ECWS is not "part of the primary success path and which functions or actuates to mitigate a design basis accident," and therefore does not require inclusion in the technical specification under that criterion.

The staff appreciates the willingness of ACRS to review the staff's SER with open items on a chapter-by-chapter basis during this phase of the review process. The staff looks forward to the next ACRS meeting.

Sincerely,

/RA MJohnson for/

R. W. Borchardt
Executive Director
for Operations

cc: Chairman Macfarlane
Commissioner Svinicki
Commissioner Apostolakis
Commissioner Magwood
Commissioner Ostendorff
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When comparing the US-APWR ECWS to Criterion 3, we see that the ECWS is not "part of the primary success path and which functions or actuates to mitigate a design basis accident," and therefore does not require inclusion in the technical specification under that criterion.

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