

## **UNITED STATES - ADVANCED PRESSURIZED WATER REACTOR DESIGN RELIABILITY ASSURANCE PROGRAM AUDIT REPORT**

### NRC Audit Team:

The following NRC staff members from the Office of New Reactors (NRO) participated in the regulatory audit:

- Todd Hilsmeier, Technical Staff (PRA and Severe Accidents Branch of NRO)
- Tarun Roy, Project Manager (Licensing Branch 2 of NRO)

Enclosure 2 lists the key individuals from Mitsubishi Heavy Industries, Ltd. (MHI) and Mitsubishi Nuclear Energy Systems Inc. (MNES) who participated in this audit:

### 1.0 SUMMARY

The regulatory audit was conducted at the MNES facility located in Arlington, Virginia on October 2, 2013. The plan for this audit was issued on September 11, 2013 and is available in the Agencywide Document Access and Management System (ADAMS) under accession number ML13246A071. The NRC staff conducted this audit in accordance with the NRO Office Instruction NRO-REG-108, "Regulatory Audits," April 2, 2009 (ADAMS ML081910260).

The regulatory audit focused on examining the procedures and records associated with the US-APWR D-RAP, listed in Enclosure 3, that were provided by MHI (previous revisions of these documents were also made available to the staff).

### 2.0 BASIS

In December 2007, Mitsubishi Heavy Industries, Ltd. (MHI) submitted to the U.S. Nuclear Regulatory Commission (NRC) the United States - Advanced Pressurized Water Reactor (US-APWR) Design Control Document (DCD). US-APWR DCD Tier 2, Section 17.4, "Reliability Assurance Program," and US-APWR DCD Tier 1, Section 2.13, "Design Reliability Assurance Program," form the basis of the US-APWR design reliability assurance program (D-RAP), which address the recommendations of SECY-95-132, "Policy and Technical Issues Associated with the Regulatory Treatment of Non-Safety Systems (RTNSS) in Passive Plant Designs," Item E, "Reliability Assurance Program" (May 22, 1995), approved by the Commission in the staff requirements memorandum to SECY-95-132 (June 28, 1995).

The NRC safety evaluation review of US-APWR DCD Tier 2, Section 17.4 includes confirming that the list of systems, structures, and components (SSCs) within the scope of the D-RAP (referred to hereafter as the "D-RAP list") is comprehensive and is based on a methodology that uses a combination of probabilistic, deterministic, and other methods of analysis. To facilitate the review of the D-RAP list, the NRC staff considered the information in US-APWR DCD Tier 2 and Technical Report MUAP-07030, "US-APWR Probabilistic Risk Assessment." However, to complete its review of the D-RAP list, the staff identified the need to perform a regulatory audit of MHI's D-RAP procedures and records, which are retained in accordance with Part d, "Records," of US-APWR DCD Tier 2, Section 17.4.4. The purpose of the regulatory audit is to examine the procedures and records associated with the US-APWR D-RAP to confirm the following:

- The categorization of SSCs determined by the expert panel to be not risk-significant and, therefore, not included in Table 17.4-1, "Risk-Significant SSCs," of the US-APWR DCD Tier 2, with focus on those SSCs not modeled in the US-APWR probabilistic risk assessment (PRA), and
- The implementation of D-RAP procedures in accordance with US-APWR DCD Tier 2, Section 17.4.4, "Quality Controls."

### 3.0 OBSERVATIONS AND RESULTS

The regulatory audit commenced with an entrance meeting. At this meeting, MHI and the NRC discussed the schedule of activities for the audit, documents for review, and introduced key participants of the audit. The staff had the opportunity to review a large number of documents and discuss the documents with MHI. The staff held a question-and-answer session with MHI to address staff's questions based on its review of these documents. At the exit briefing, the staff communicated audit findings and identified potential requests for additional information (RAIs) based on these findings.

The NRC audit team found MHI's staff very cooperative and forthcoming in their support of this audit. MHI made available key members to answer NRC staff questions and discuss any topics that arose. A large amount of information was made available in a well-organized manner. The following discussion summarizes the findings from this audit:

- The staff audited MHI's procedures associated with the US-APWR D-RAP provided during the regulatory audit. These procedures are clear, contain sufficient detail, and are consistent with the D-RAP description in US-APWR DCD Tier 2, Section 17.4, including the methodology for identifying SSCs within the scope of the D-RAP.
- Based on the staff's audit of numerous D-RAP expert panel meeting records, the expert panel has been thoroughly engaged in the D-RAP process and in applying the D-RAP programmatic controls during design certification activities, such as clarifying the roles and responsibilities of the expert panel in D-RAP procedures, including the use of the expert panel in identifying risk-significant SSCs.
- In accordance with MHI's D-RAP procedures, the expert panel evaluates all plant SSCs for risk significance, including those SSCs not modeled in the US-APWR PRA. With the exception of a few SSCs, the staff confirmed the categorization of SSCs determined by the expert panel to be not risk-significant and, therefore, not included in Table 17.4-1, "Risk-Significant SSCs," of the US-APWR DCD Tier 2. Based on the documentation available during the regulatory audit, it was not clear whether the expert panel had evaluated for risk significance those SSCs associated with cavity water level and cumulative firewater flow amount, which appear in Table 19.2-10, "Equipment and Instruments Used in Severe Accident Management," of the US-APWR DCD Tier 2. Also, based on a discussion with MHI, the dedicated batteries (and associated SSCs) for 11 out of the 20 hydrogen igniters have not yet been incorporated into the US-APWR PRA and evaluated for risk significance by the expert panel. As such, the staff will compose a RAI requesting MHI provide the expert panel's assessment of the risk significance of these SSCs.

#### 4.0 CONCLUSION

Based on the documentation available during the regulatory audit, it was not clear whether the expert panel had evaluated for risk significance those SSCs associated with cavity water level and cumulative firewater flow amount, which appear in Table 19.2-10, "Equipment and Instruments Used in Severe Accident Management," of the US-APWR DCD Tier 2. Also, based on a discussion with MHI, the dedicated batteries (and associated SSCs) for 11 out of the 20 hydrogen igniters have not yet been incorporated into the US-APWR PRA and evaluated for risk significance by the expert panel. As such, the staff will compose a RAI requesting MHI provide the expert panel's assessment of the risk significance of these SSCs.