



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

March 13, 2014

Mr. Mark A. Satorius  
Executive Director for Operations  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555-0001

**SUBJECT: CHAPTERS 3 (PARTIAL) AND 14 OF THE SAFETY EVALUATION REPORT  
WITH OPEN ITEMS FOR CERTIFICATION OF THE US-APWR DESIGN**

Dear Mr. Satorius:

During the 612<sup>th</sup> meeting of the Advisory Committee on Reactor Safeguards, March 6-8, 2014, we met with representatives of the NRC staff and Mitsubishi Heavy Industries, Ltd. (MHI) to review the following chapters of the Safety Evaluation Report (SER) with Open Items associated with the United States Advanced Pressurized Water Reactor (US-APWR) design certification application:

- Chapter 3, "Design of Structures, Systems, Components and Equipment"
- Chapter 14, "Verification Programs"

Our review of Chapter 3 did not address Section 3.7, "Seismic Design," and Section 3.8, "Design of Category I Structures." These sections of the SER will be submitted at a later date.

Our US-APWR Subcommittee also reviewed these chapters during meetings on November 20-21, 2013, and March 4, 2014. Technical aspects of the US-APWR design as well as the open items identified in each of these SER chapters were discussed at those meetings. We also had the benefit of the documents referenced.

## **CONCLUSIONS**

1. We have not identified any issues in SER Chapter 3 or Chapter 14 that would preclude certification of the US-APWR design.
2. We plan to review the staff's resolution of the open items in these SER chapters during future meetings.
3. Hazards evaluated in Chapter 3 have the potential to affect multiple structures and systems. We will comment on potential safety implications from these hazards in future interim letters and in our final report.

## **BACKGROUND**

The US-APWR is a four-loop pressurized water reactor with a large dry containment. The design includes a combination of active and passive safety systems, arranged in four divisions. Reactor protection, safeguards actuation, and other instrumentation and control functions are developed through integrated digital platforms. Other notable design features include advanced passive accumulators, elimination of low pressure injection pumps, a refueling water storage pit inside the containment, a core debris spreading area below the reactor vessel, and gas turbine generator emergency power supplies.

MHI submitted a Design Control Document (DCD) with its application for the US-APWR design certification on December 31, 2007. Revision 3 of the DCD was submitted on March 31, 2011, and Revision 4 on September 10, 2013.

We have agreed to review the SER on a chapter-by-chapter basis to identify technical issues that may merit further consideration by the staff. This process aids the resolution of concerns and facilitates timely completion of the US-APWR design certification review. Accordingly, the staff has provided Chapters 3 and 14 of the SER with Open Items for our review. The staff's SER and our review of these chapters address DCD Revision 3 and supplemental material that has since been included in DCD Revision 4.

## **DISCUSSION**

The staff has identified several open items in their review of these chapters of the US-APWR design certification application. We plan to review the resolution of these open items during future meetings.

We did not identify any additional issues that would preclude certification of the US-APWR design. As part of our review, we have requested information about details of selected evaluations and tests that are addressed in these chapters. Based on our experience to date, we expect that these questions will be resolved to our satisfaction before all open items are closed and the final SER chapters are issued. At this time, we do not have any observations or recommendations on these chapters.

Chapter 3 summarizes evaluations of hazards such as high winds, tornadoes, hurricanes, flooding that originates inside plant structures, flooding from external sources, ruptures of high energy piping, turbine missiles, wind-generated missiles, and aircraft crashes. These evaluations depend on the characterization of the site meteorology and geohydrology for the

certified design. They also depend on structural design information from the sections of Chapter 3 that we have not yet reviewed. These hazards have the potential to affect multiple structures and systems. Except for internal flooding, these hazards have only cursory treatment in the design certification probabilistic risk assessment, and their risk is not quantified. We will examine potential safety implications from these hazards in future steps of our review of this application.

Sincerely,

*/RA/*

John W. Stetkar  
Chairman

## REFERENCES

1. Mitsubishi Heavy Industries, MUAP-DC003, Revision 3, Design Control Document for the US-APWR, Chapter 3, "Design of Structures, Systems, Components and Equipment," March 31, 2011 (ML110980211)
2. Mitsubishi Heavy Industries, MUAP-DC014, Revision 3, Design Control Document for the US-APWR, Chapter 14, "Verification Programs," March 31, 2011 (ML110980222)
3. Mitsubishi Heavy Industries, MUAP-DC003, Revision 4, Design Control Document for the US-APWR, Chapter 3, "Design of Structures, Systems, Components and Equipment," September 10, 2013 (ML13262A464 & ML13262A466)
4. Mitsubishi Heavy Industries, MUAP-DC014, Revision 4, Design Control Document for the US-APWR, Chapter 14, "Verification Programs," September 10, 2013 (ML13262A480)
5. Mitsubishi Heavy Industries, MUAP-07028-P, Revision 2, "Probability of Missile Generation from Low Pressure Turbines," June 28, 2013 (ML13196A154)
6. Mitsubishi Heavy Industries, MUAP-07029-P, Revision 3, "Probabilistic Evaluation of Turbine Valve Test Frequency," June 28, 2013 (ML13196A155)
7. Mitsubishi Heavy Industries, MUAP-08009, Revision 1, "US-APWR Test Program Description," October 29, 2009 (ML093070197)
8. United States – Advanced Pressurized Water Reactor Design Certification Application – Safety Evaluation with Open Items for Chapter 3, "Design of Structures, Systems, Components and Equipment," October 2, 2013 (ML13276A301)
9. United States – Advanced Pressurized Water Reactor Design Certification Application – Safety Evaluation with Open Items for Chapter 14, "Verification Programs," January 30, 2014 (ML14029A230)

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