



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

July 21, 2008

Mr. R. W. Borchardt  
Executive Director for Operations  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555-0001

**SUBJECT: INTERIM LETTER 4: CHAPTER 3 OF THE NRC STAFF'S SAFETY  
EVALUATION REPORT WITH OPEN ITEMS RELATED TO THE  
CERTIFICATION OF THE ESBWR DESIGN**

Dear Mr. Borchardt:

During the 554<sup>th</sup> meeting of the Advisory Committee on Reactor Safeguards, July 9-11, 2008, we discussed Chapter 3 of the NRC staff's Safety Evaluation Report (SER) with open items related to the Economic Simplified Boiling Water Reactor (ESBWR) design certification application. Our ESBWR Subcommittee held a meeting on June 18 and 19, 2008, to discuss technical aspects of the ESBWR design as well as the open items and the Combined License (COL) action items identified in this Chapter. During these meetings, we had the benefit of discussions with representatives of the NRC staff and General Electric-Hitachi Nuclear Energy (GEH). We also had the benefit of the documents referenced. We previously commented on Chapters 2, 5, 8, 11, 12, and 17 in our November 20, 2007, letter; on Chapters 9, 10, 13, and 16 in our March 20, 2008, letter; and, on Chapters 4, 6, 15, 18, and 21 in our May 23, 2008, letter. Our reviews have not addressed security matters and their impact on ESBWR design.

### **CONCLUSIONS AND RECOMMENDATIONS**

1. The evolving nature of the ESBWR design makes it difficult for the staff and the ACRS to perform an efficient review.
2. Additional information is needed to demonstrate that dynamic forces from seismic events are treated properly in the analyses of heat exchangers immersed in elevated water pools.
3. We will review the resolution of open items in SER Chapter 3 during future meetings.

### **BACKGROUND**

The ESBWR is a direct-cycle power conversion system with natural circulation cooling in the reactor vessel under normal operation. It has a passive emergency core cooling system that operates without the need for emergency alternating current power systems or operator actions within the first 72 hours following a reactor transient or accident.

At the request of the staff, we have agreed to review the staff's SER on a chapter-by-chapter basis to identify technical issues that merit further consideration, thereby aiding effective resolution of any concerns, as well as assisting in the timely completion of the review of the ESBWR design certification application. Accordingly, the staff has provided at this time SER Chapter 3 with open items and COL action items for our review.

## DISCUSSION

The ESBWR design certification application was accepted formally by the staff in December 2005. Since that time, revisions to the Design Certification Document (DCD) have been issued, with the most recent being DCD Revision 5, dated June 1, 2008. These revisions have included updates to the overall design and modifications that address the staff's requests for additional information originating from the staff's review of DCD Revision 3. Although many of these updates have added more specificity and completeness to the ESBWR design, some design modifications have changed key systems as well as components. In addition, detailed design information for certain systems and components has been replaced with general specifications. Some examples to illustrate this design fluidity are:

- Addition of two ancillary diesel generators and associated switchgear in a new building,
- Changes in the method of structural support and fixture of the chimney and its internals to the core,
- Replacement of detailed design information for the main steam isolation valves with general specifications,
- Replacement of detailed design information for the gravity driven cooling system squib valves with general specifications.

The number and nature of design changes at this stage of the design certification affect the efficiency of the review.

The ESBWR has a passive emergency core cooling system that operates without the need for emergency alternating current power systems or operator actions in the first three days following a reactor transient or accident. It also has passive reactor isolation condenser and containment cooling system heat exchangers immersed in large elevated water pools to ensure heat transport to the ultimate heat sink during accidents. GEH and the staff discussed the effect of seismic events on these elevated pools. Seismically induced dynamic loads could affect the structural integrity of the heat exchangers submerged in these pools. We want to be assured that dynamic forces from seismic events have been treated properly in analyses of heat exchangers immersed in elevated water pools. During future meetings, we will review the resolution of open items in SER Chapter 3.

Sincerely,

*/RA/*

William J. Shack  
Chairman

**REFERENCES**

1. Memorandum from David B. Matthews, Director, Division of New Reactor Licensing (DNRL), Office of New Reactors (NRO), to Frank P. Gillespie, Executive Director, Advisory Committee on Reactor Safeguards and Advisory Committee on Nuclear Waste, dated May 19, 2008, transmitting SER with open items for Chapter 3, "Design of Structures, Components, Equipment, and Systems" (ML080600420 and ML080580503).
2. Letter from James C. Kinsey, Project Manager, ESBWR Licensing, GEH, to NRC, dated February 22, 2007, transmitting ESBWR Design Control Document, Revision 3 (ML070660561).
3. Letter from William J. Shack, Chairman, Advisory Committee on Reactor Safeguards, to Luis A. Reyes, Executive Director for Operations, dated November 20, 2007, "Interim Letter: Chapters 2, 5, 8, 11, 12, and 17 of the NRC Staff's Safety Evaluation Report With Open Items Related to the Certification of the ESBWR Design" (ML073070006).
4. Letter from William J. Shack, Chairman, Advisory Committee on Reactor Safeguards, to Luis A. Reyes, Executive Director for Operations, dated March 20, 2008, "Interim Letter Chapters 9, 10, 13, and 16 of the NRC Staff's Safety Evaluation Report with Open Items Related to the Certification of the ESBWR Design" (ML080670596).
5. Letter from William J. Shack, Chairman, Advisory Committee on Reactor Safeguards, to R. W. Borchardt, Executive Director for Operations, dated May 23, 2008, "Interim Letter 3: Chapters 4, 6, 15, 18, and 21 of the NRC Staff's Safety Evaluation Report with Open Items Related to the Certification of the ESBWR Design" (ML081330447).

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