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MFN 08-673, Supplement 1

Docket No. 52-010

January 16, 2009

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555-0001

Subject: **Response to Portion of NRC Request for Additional Information
Letter No. 264 Related to ESBWR Design Certification Application
ESBWR RAI Number 19.1-174 S01**

The purpose of this letter is to submit the GE Hitachi Nuclear Energy (GEH) response to the U.S. Nuclear Regulatory Commission (NRC) Request for Additional Information (RAI) dated October 6, 2008 (Reference 1). Previous RAIs and responses were transmitted in References 2 and 3.

The GEH response to RAI Number 19.1-174 S01 is in Enclosure 1.

If you have any questions or require additional information, please contact me.

Sincerely,

Richard E. Kingston
Vice President, ESBWR Licensing

DEK
NRO

References:

1. MFN 08-810, Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, GEH, *Request For Additional Information Letter No. 264 Related To ESBWR Design Certification Application*, dated October 6, 2008.
2. MFN 08-552, Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, GEH, *Request For Additional Information Letter No. 214 Related To ESBWR Design Certification Application*, dated June 25, 2008.
3. MFN 08-673, *Response to Portion of NRC Request for Additional Information Letter No. 214 Related to ESBWR Design Certification Application ESBWR RAI Number 19.1-174*, dated September 9, 2008.

Enclosure:

1. Response to Portion of NRC Request for Additional Information Letter No. 264 Related to ESBWR Design Certification Application Probabilistic Risk Assessment RAI Number 19.1-174, S01

cc: AE Cabbage USNRC (with enclosure)
 RE Brown GEH/Wilmington (with enclosure)
 DH Hinds GEH/Wilmington (with enclosure)
 eDRF Section 0000-0095-5486

Enclosure 1

MFN 08-673, Supplement 1

Response to Portion of NRC Request for

Additional Information Letter No. 264

Related to ESBWR Design Certification Application

ESBWR Probabilistic Risk Assessment

RAI Number 19.1-174 S01

Original response, previously submitted under MFN 08-673, is included to provide historical continuity during review.

NRC RAI 19.1-174

Question Summary: Missing Shutdown Fire Risk Insights from DCD, Tier 2, Table 19.2-3

Please include the following key risk assumptions, or explain why they are missing

- a. Consistent with Regulatory Treatment of Nonsafety Systems (RTNSS) requirements, RCCW and PSW cables are to be separate and protected in fire area F4100, turbine building general area.*
- b. Consistent with RTNSS requirements, PSW cables are to be separate and protected in fire area F3700 [sic], service water building.*

GEH Response

ESBWR PRA has used a systematic process to identify key risk insights and assumptions. The key insights and assumptions for the fire PRA have been documented in NEDO-33201 Section 12.10.4, and summarized in DCD Tier 2 Table 19.2-3. The two assumptions identified in this RAI were not key assumptions.

a. Assumption for RTNSS cables in fire area F4100

As discussed in NEDO-33201 Revision 3 Section 12.8.4.1, Turbine Building General Area (F4100), the cables for the reactor component cooling water (RCCW) system and plant service water (PSW) system will be designed to meet the separation criteria because both systems have been identified as part of the Regulatory Treatment of Non-Safety System (RTNSS) program. The design requirements for RTNSS systems assure that a postulated fire would not damage both trains. DCD, Tier 2, Subsections 9.2.1.1 and 9.2.2.1 have the following statement on RTNSS functions for the PSW and RCCW systems:

Performance of RTNSS functions are assured by applying the defense-in-depth principles of redundancy and physical separation to ensure adequate reliability and availability as described in Subsection 19A.8.3.

Therefore, this assumption simply documents the basis for the postulated cable routing in fire area F4100 based on the separation criteria. The detail design will not be influenced by this assumption, which will follow all the design requirements, including the separation criteria documented in the relevant DCD subsections and NEDO-33201 Section 12.3.1.

b. Assumption for RTNSS cables in fire area F7300

A conservative assumption for fire area F7300 in Revision 2 fire PRA has been used, which treated the whole Service Water and Water Treatment building (SF/WT) as a single fire area. This is a bounding approach due to the limited design details available at the time. However, additional notes were added to NEDO-33201, Table 12.9-3 to document the limitations of the shutdown fire PRA model.

NEDO-33201, Section 22.12.3.1.4 evaluates the DCD Revision 5 change associated with fire area F7300 as follows:

(5) Change #5 deleted fire area designator F7300 near the Service Water and Water Treatment building (SF/WT) on Figure 9A.2-33 to be consistent with the current design. This change clarified the fire protection design in the SF/WT building, which resulted in the removal of another bounding assumption in the baseline fire PRA models.

Based on the above statements, the bounding assumption in the Revision 2 fire PRA models should be removed, which assumed that a fire in the SF/WT area would damage all the Plant Service Water (PSW) components.

The plant service water (PSW) system is part of the RTNSS program. Therefore, a fire in a single fire area should not damage both PSW trains. The assumption on PSW cable separation and protection simply documents the design requirements as the basis.

In summary, the identified assumptions in this RAI were documented as the basis for the fire PRA models, which were based on the separation criteria for RTNSS function design requirements. In a narrower sense, these assumptions reflect the RTNSS design requirements documented in the relevant DCD subsections and have no impact on detail designs. As a result, these assumptions were not identified as key assumptions.

DCD Impact

No DCD changes will be made in response to this RAI.

No changes to NEDO-33201 will be made in response to this RAI.

NRC RAI 19.1-174 S01

As stated in DCD Tier 2, Revision 5, Section 19.1.2, "The results and insights of the PRA are used to support other programs as follows:

- Support the process used to demonstrate whether the Regulatory Treatment of Non Safety Systems (RTNSS) is sufficient and, if appropriate, identify the structures, systems, and components (SSCs) included in RTNSS.*
- Support, as a minimum, regulatory oversight processes, and programs that are associated with plant operations, e.g., Technical Specifications, reliability assurance, human factors, and Maintenance Rule (10 CFR 50.65) implementation."*

The staff has reviewed GEH's response to 19.1.174. The staff agrees that RTNSS requirements for RCCW and PSW for fires in F4100, turbine building general area are not key PRA assumptions. Fires in the turbine building general area (fire area F4100) are assumed to result in a complete failure of the service air system due to cable failures, which results in the closure of all RWCU containment isolation valves outside the containment.

However, shutdown fires in the Service Water and Water Treatment Building (SF/WT) were shown to be risk significant without separation and protection of the PSW cables (which are required under the RTNSS program). Therefore, the separation of the PSW cables in the SF/WT should be included in DCD Tier 2, Table 19.2-3, A Risk Insights and Assumptions or it should be justified why it should not be included in the Table.

GEH Response

Current Service Water and Water Treatment Building (SF/WT) fire area design negates the need for adding PSW cable separation to DCD Tier 2, Table 19.2-3 as a PRA risk insight.

As shown in DCD Tier 2, Revision 5, Figure 9A.2-33, Site Fire Protection Zone ESBWR DCD Plot Plan, the SF/WT is no longer designated a single fire area. Section 9A.4.9 of DCD Tier 2, Revision 5, Service Water/Water Treatment Building, states that fire barriers of three hour minimum fire resistance rating shall be provided separating redundant RTNSS trains.

Based on DCD Tier 2 Revision 5, the PRA has been revised to model the SF/WT as two fire areas, each area housing one of the redundant PSW trains. Therefore, it is not appropriate to designate PSW cable separation as a PRA risk insight.

DCD Impact

No DCD changes will be made in response to this RAI.