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U.S. Nuclear Regulatory Commission
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Subject: **Response to Portion of NRC Request for Additional Information Letter No. 326 Related to ESBWR Design Certification Application ESBWR RAI Number 14.3-451.**

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 April 8, 2009 (Reference 1).

The GEH response to RAI Number 14.3-451 is in Enclosure 1. The DCD markup associated with this response is in Enclosure 2.

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

Sincerely,

Richard E. Kingston

Richard E. Kingston
Vice President, ESBWR Licensing

Reference:

1. MFN 09-248, *Letter from U.S. Nuclear Regulatory Commission to Jerald G. Head, GEH, Request For Additional Information Letter No. 326 Related To ESBWR Design Certification Application*, dated April 8, 2009.

Enclosures:

1. Response to Portion of NRC Request for Additional Information Letter No. 326 Related to ESBWR Design Certification Application DCD Tier 1 RAI Numbers 14.3-451 DCD Tier 1

2. MFN 09-291 DCD Markups

| | | |
|---|---|---|
| cc: | AE Cubbage | USNRC (with enclosure) |
| | JG Head | GEH/Wilmington (with enclosure) |
| | DH Hinds | GEH/Wilmington (with enclosure) |
| | eDRFSection | 0000-0101-7401 RAI 14.3-451 |

# Enclosure 1

# MFN 09-291

# Response to Portion of NRC Request for

# Additional Information Letter No. 326

# Related to ESBWR Design Certification Application

# DCD Tier 1

# RAI Number 14.3-451

**NRC RAI 14.3-451**

*Tier 2 Designation*

*The staff requests that the following text in Section 14.3A.2, Design Acceptance Criteria ITAAC For Piping is marked as Tier 2* information:*

*"The ESBWR piping Design Acceptance Criteria ITAAC consists of both the piping/piping component analysis and the pipe break analysis for safety-related ASME Code components. These are identified in separate Design Acceptance Criteria ITMC in Tier 1. The piping design may be completed on a system-by-system basis for applicable systems and, in order to support closure of the Design Acceptance Criteria ITAAC, information will be made available for NRC review, inspection, and audit on a system basis. Information will be made available to the NRC to facilitate reviews, inspections, and audits throughout the process and, if appropriate, the NRC may inform the licensee of any concerns as they are identified so that adjustments may be made in a timely manner."*

*"For completing the pipe break analysis Design Acceptance Criteria ITAAC, the analyses will document that structures, systems, and components (SSCs) which are required to be functional during and following a safe shutdown earthquake have adequate high-energy and moderate energy pipe break mitigation features. The pipe break analysis report verifies that the criteria used to postulate pipe breaks, the analytical methods used to analyze pipe breaks, and the method to confirm the adequacy of the results of the pipe break analyses are appropriate. The pipe break analysis report provides assurance that the high-energy and moderate-energy line break analyses have been completed. The content of the report is discussed in Subsection 3.6.2.5 of the ESBWR Tier 2 DCD."*

**GEH Response**

Section 14.3A.2 will be revised to designate the requested paragraphs as Tier2* information.

**DCD Impact**

DCD Tier 2, Section 14.3A.2 will be revised to designate the requested paragraphs as Tier2* information.

# Enclosure 2

# MFN 09-291

# DCD Markups

# RAI Number 14.3-451
# DCD Tier 2, Section 14.3A.2

## 14.3A.1 DESIGN ACCEPTANCE CRITERIA ITAAC CLOSURE OPTIONS

There are typically three options to close Design Acceptance Criteria ITAAC, all of which involve essentially the same level of design detail. The design information necessary to close Design Acceptance Criteria ITAAC should be that level which would have been provided during design certification review if Design Acceptance Criteria ITAAC had not been used. The three options for Design Acceptance Criteria ITAAC closure, as they might apply to the ESBWR, are as follows:

- *Resolution through amendment of a design certification rule.*
- *Resolution through the COL application review process.*
- *Resolution through Design Acceptance Criteria ITAAC after COL issuance.*

The third option is discussed below as it would be implemented for the first standard ESBWR plant and initially reviewed, inspected, or audited by the NRC for Design Acceptance Criteria ITAAC closure. Treatment in subsequent standard ESBWR plants may be based on the initial closure of Design Acceptance Criteria ITAAC under the concept of "one issue, one review, one position" in NRC guidance (see RG 1.206, C.III.5). GEH may submit Licensing Topical Reports (LTR) for NRC review of the material supporting Design Acceptance Criteria ITAAC closure and request that the NRC issue a Safety Evaluation in conjunction with a closure letter or Inspection Report conclusion that the acceptance criteria of the Design Acceptance Criteria ITAAC have been met. Subsequent licensees could reference the LTRs and NRC closure documents for Design Acceptance Criteria ITAAC closure unless the design certification rule has been amended to reflect the design information. Each COL Applicant will provide a Design Acceptance Criteria ITAAC closure schedule in the COL application and identify whether the standard approach will be used (COL 14.3A-1-A). This schedule may simply be an indication that the Design Acceptance Criteria ITAAC completion for the first standard plant will be used.

Regarding the initial Design Acceptance Criteria ITAAC closure, depending upon the area of Design Acceptance Criteria ITAAC, the closure process may vary. In the area of piping Design Acceptance Criteria ITAAC, for example, the completion steps are basically as prescribed by the ASME Code. The more complex areas of digital I&C and HFE involve phases of work and a series of Design Acceptance Criteria ITAAC, leading to a final design, as described in RG 1.206, Section C.III.5. Each of the three ESBWR Design Acceptance Criteria ITAAC areas is discussed below.

## 14.3A.2 DESIGN ACCEPTANCE CRITERIA ITAAC FOR PIPING DESIGN

[*The ESBWR piping Design Acceptance Criteria ITAAC consists of both the piping/piping component analysis and the pipe break analysis for safety-related ASME Code components. These are identified in separate Design Acceptance Criteria ITAAC in Tier 1. The piping design may be completed on a system-by-system basis for applicable systems and, in order to support closure of the Design Acceptance Criteria ITAAC, information will be made available for NRC review, inspection, and audit on a system basis. Information will be made available to the NRC to facilitate reviews, inspections, and audits throughout the process and, if appropriate, the NRC may inform the licensee of any concerns as they are identified so that adjustments may be made in a timely manner.* ]*

The ASME Code prescribes certain procedures and requirements that are to be followed for completing the piping design. The piping Design Acceptance Criteria ITAAC includes a verification of the ASME Code design report to ensure that the appropriate code design requirements for each system's safety class have been implemented. The design information (including ASME design reports) will be available to the NRC for review, inspection, and audit as the information becomes available, in order to ensure that the closure of the Design Acceptance Criteria ITAAC can be completed in a timely manner after the Design Acceptance Criteria ITAAC closure notification letter is submitted.

A reconciliation of the applicable safety-related as-built piping systems is covered in an as-built ITAAC to demonstrate that the as-built piping reflects the design, as reconciled. The reconciliation report will be made available for NRC inspection or audit when it is has been completed.

[*For completing the pipe break analysis Design Acceptance Criteria ITAAC, the analyses will document that structures, systems, and components (SSCs) which are required to be functional during and following a safe shutdown earthquake have adequate high-energy and moderate-energy pipe break mitigation features. The pipe break analysis report verifies that the criteria used to postulate pipe breaks, the analytical methods used to analyze pipe breaks, and the method to confirm the adequacy of the results of the pipe break analyses are appropriate. The pipe break analysis report provides assurance that the high-energy and moderate-energy line break analyses have been completed. The content of the report is discussed in Subsection 3.6.2.5 of the ESBWR Tier 2 DCD.*]*

Following NRC review of the report and the supporting analyses, the NRC may review plans for the protection features that are determined necessary to mitigate the consequences of a pipe break. Information will be made available to the NRC so that, if appropriate, issues that may be identified by the NRC may be resolved prior to the final as-built installation of the protective features. Upon completion of the installation of the protective features, the as-built verification ITAAC will be performed. The Pipe Break Analysis Report shall conclude that, for each postulated piping failure, the reactor can be shut down safely and maintained in a safe shutdown condition (Stable Shutdown Mode) without offsite power.

The piping design completed for the first standard ESBWR plant will be available to subsequent standard ESBWR plants under the "one issue, one review, one position" approach for closure. The as-built ITAAC for reconciliation and as-built verification will be performed following completion of the Design Acceptance Criteria ITAAC and installation of the piping system component and mitigation features for pipe break.

*Text sections that are bracketed and italicized with an asterisk following the brackets are designated as Tier 2*. Prior NRC approval is required to change.

## 14.3A.3 DIGITAL INSTRUMENTATION AND CONTROL DESIGN ACCEPTANCE CRITERIA ITAAC CLOSURE

NRC guidance in RG 1.206, Section C.III.5, describes a phased Design Acceptance Criteria ITAAC process for digital I&C. The set of ESBWR digital I&C Design Acceptance Criteria ITAAC establishes a phased Design Acceptance Criteria ITAAC closure process for the digital I&C design. The set of digital I&C Design Acceptance Criteria ITAAC identifies the process