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**Subject: Response to Portion of NRC Request for Additional  
Information Letter No. 126 Related to ESBWR Design Certification  
Application, RAI Number 14.3-210**

The purpose of this letter is to submit the GE Hitachi Nuclear (GEH) response to the U. S. Nuclear Regulatory Commission (NRC) Request for Additional Information (RAI) sent by NRC Letter dated December 20, 2007 (Reference 1).

The GEH response to RAI Number 14.3-210 is addressed in Enclosure 1. The enclosed changes will be incorporated in the upcoming DCD Revision 5 submittal.

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

Sincerely,

James C. Kinsey  
Vice President, ESBWR Licensing

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NRO

Reference:

1. MFN 07-718, Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, *Request For Additional Information Letter No. 126 Related To ESBWR Design Certification Application*, dated December 20, 2007.

Enclosure:

1. Response to Portion of NRC Request for Additional Information Letter No. 126 Related to ESBWR Design Certification Application RAI Number 14.3-210

cc: AE Cabbage USNRC (with enclosure)  
GB Stramback GEH/San Jose (with enclosure)  
RE Brown GEH/Wilmington (with enclosure)  
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eDRF 0000-0080-4821 (RAI 14.3-210)

**Enclosure 1**

**MFN 08-086 Supplement 28**

**Response to Portion of NRC Request for**

**Additional Information Letter No. 126**

**Related to ESBWR Design Certification Application**

**RAI Number 14.3-210**

**NRC RAI 14.3-210**

*NRC Summary:*

*Provide schedule for DAC closure*

*NRC Full Text:*

*RG 1.206 Section C.III.5.1, "Detailed Design Information and the Combined License Application, "states that "the NRC staff recommends, to the greatest extent practicable, that the COL applicant include detailed design information in the areas where design acceptance criteria (DAC) were used during the design certification. The applicant should submit this information early enough in the process to allow the NRC staff sufficient time to review it and determine compliance with the DAC and associated ITAAC. Early submission of such information should help avoid potential impacts on the licensee's plans and schedules for loading fuel. The COL applicant should identify those design areas where detailed information cannot be provided and should supply the NRC with a schedule for completion of detailed engineering, procurement, fabrication, installation, and testing information. The applicant should similarly do this in a manner to support timely NRC inspection of DAC information."*

*In accordance with RG 1.206 guidance, the staff requests GEH to add a COL information item to the DCD for the applicant to identify those design areas where detailed information cannot be provided and should supply the NRC with a schedule for completion of detailed engineering supporting implementation of the Design Acceptance Criteria (DAC) in the areas that DAC was approved for the ESBWR design certification.*

**GEH Response**

As referenced in the RAI, NRC guidance in Regulatory Guide 1.206, Section C.III.5.1, specifies that a COL applicant include a schedule for completing DAC. GEH agrees that the information regarding a schedule for completion of DAC is useful information for the NRC to use in resource planning; however, GEH disagrees with the need to add a COL Information Item to the DCD for the following reasons:

- A COL Information Item would be duplicative of the NRC guidance and is, therefore, unnecessary.
- COL Information Items become mandatory for a COL applicant to address, even though the applicant may justify an alternative approach. Thus, including a COL Information Item in the DCD inappropriately elevates the regulatory significance of NRC guidance for an item that is largely administrative.
- For those COLAs submitted which reference the design certification application prior to completion of the design certification, the information may not be available at the time of the submittal. For example, currently, the ESBWR design certification application is

under review and two COLAs have already been filed with reference to the ESBWR design certification application. While there are indications that DAC ITAAC will be acceptable in certain areas, GEH has not yet finalized the Design Control Document, include Tier 1 and the DAC ITAAC, and the NRC has not yet issued a final design approval/final safety evaluation report. Therefore, the request for a DAC ITAAC closure schedule is currently premature.

- GEH expects a number of plants will use a standard ESBWR design before evolutions in technology will result in a revision to the ESBWR design certification rule (once issued). It is expected that the DAC ITAAC will be completed for the first standard ESBWR plant and that subsequent standard ESBWR plants in the group of plants will implement the completion in the same manner. This approach supports the NRC's position regarding standardization in the DAC process stated in RG 1.206, C.III.5.

In discussion during the NRC February 14, 2008, meeting on Tier 1, GEH agreed to include a description of the areas that are the subject of DAC ITAAC and explain a high-level DAC ITAAC closure process in Tier 2. The DAC ITAAC closure process description is being added as Appendix A to Section 14.3, Tier 2, of the ESBWR DCD. Upon completion of the NRC review of the design certification, information regarding a DAC ITAAC closure schedule may be available. It may be necessary to establish a generic schedule for only the first COL applicant and adapt the generic schedule to all subsequent COL applicants. GEH expects to have sufficient information to establish such a generic DAC ITAAC closure schedule during the period following completion of Tier 1, Revision 5, and before design certification completion. Providing such information in COL applications submitted prior to GEH establishing such a DAC ITAAC closure schedule would be premature.

In addition, the new appendix discusses NRC guidance regarding certain actions a licensee should take as part of the ITAAC closure process. It is not necessary to include COL Information Items for any of these actions because the ITAAC themselves will specify what actions will be necessary for the licensee to take regarding the ITAAC.

### **DCD Impact**

DCD Tier 2, Section 14.3, will be revised as shown on the attached markups.

### **14.3A DESIGN ACCEPTANCE CRITERIA ITAAC CLOSURE PROCESS**

The general ITAAC closure process is set forth in NRC regulations. Specifically, 10 CFR 52.99 establishes the regulatory process for ensuring that ITAAC are performed. 10 CFR 52.99(a) requires a licensee to submit an initial schedule for completing ITAAC, and to then submit periodic updates throughout construction. The licensee must submit the initial schedule within one year of issuance of the COL, or at the start of construction, whichever is later.

Schedule updates are to be submitted every 6 months thereafter up to one year prior to the scheduled fuel loading date when the licensee then submits the updates every 30 days. These updates continue until the final notification is submitted to the NRC and all ITAAC are thus completed. 10 CFR 52.99(b) clarifies that an applicant for a COL may perform design and procurement activities subject to ITAAC at its own risk, even though the NRC may not have found that the associated acceptance criteria for those ITAAC are met.

10 CFR 52.99 (c) specifies the notification requirements for completion of ITAAC to ensure that the NRC has sufficient information to complete all of the activities necessary for the Commission to make a determination as to whether all of the ITAAC have been or will be met prior to initial operation. The most current regulations will apply when implementing the ITAAC closure process.

Design Acceptance Criteria (DAC) are a special type of ITAAC and consist of a set of prescribed limits, parameters, procedures, and attributes upon which the NRC may rely in making a final safety determination to support a design certification (reference SECY 92-053). The ESBWR includes DAC in the areas of piping, digital instrumentation and controls (I&C), and human factors engineering (HFE). The DAC are identified in Tier 1 as DAC ITAAC (the designation used is {{Design Acceptance Criteria}}), which are established to demonstrate that the design is completed to the level that would have been necessary if it had been completed for certification (see SECY-90-377). Following completion of the DAC ITAAC, the aspects of the related structure, system, or component will be verified through an as-built ITAAC, which will be performed to demonstrate that the as-built facility conforms to the design as completed through the DAC ITAAC.

NRC provides regulatory guidance regarding DAC ITAAC in RG 1.206, Section C.III.5. The guidance provides an outline of the level of design detail that may be necessary to comply with the DAC ITAAC process and that should be available for NRC review and inspection as the information becomes available. RG 1.206, Section C.III.5, should be used for guidance regarding NRC expectations on the level of detail and design elements for DAC ITAAC closure, as these expectations are not repeated in detail herein. However, this appendix provides a high-level description of the DAC ITAAC closure process based on NRC guidance as one acceptable means of implementing the regulations associated with the ITAAC process. Where references are made to actions to be taken by the COL licensee, this is in accordance with NRC guidance and reflects that a COL licensee may implement this process. However, because this is based on NRC guidance, a COL licensee may elect to establish a different process and present it to the NRC as an acceptable means of closing DAC ITAAC. In this regard, no COL holder items are established by this process description.

### 14.3A.1 DAC ITAAC CLOSURE OPTIONS

There are typically three options to close DAC ITAAC, all of which involve essentially the same level of design detail. The design information necessary to close DAC ITAAC should be that level which would have been provided during design certification review if DAC ITAAC had not been used. The NRC has indicated three options that might be used for resolution of DAC, as (1) resolution through amendment of a design certification rule, (2) resolution through the COL application review process, or (3) resolution through DAC ITAAC after COL issuance. The three options for DAC ITAAC closure, as they might apply to the ESBWR, are as follows:

- Resolution through amendment of a design certification rule – under this option, GEH would submit an amendment to the design certification rule with the design information that provides additional detail to complete the design. Any related DAC ITAAC also would be deleted from the set of ITAAC; however, the as-built ITAAC would remain (or be modified, as necessary) to demonstrate that the as-built facility conforms to the design. The NRC would review the amendment request, issue a safety evaluation, and conduct rulemaking to amend the design certification rule.
- Resolution through the COL application review process – the COL application may contain the additional detailed design information needed to complete the DAC ITAAC. The NRC would review the design and include the results of its review in the safety evaluation for the COL. The COL would reflect that the design necessary for DAC ITAAC has been completed. The as-built ITAAC would remain (or be modified as part of the NRC review of the COL application, as necessary) to demonstrate that the as-built facility conforms to the design.
- Resolution through DAC ITAAC after COL issuance – in this case, the COL referencing the ESBWR design certification application is issued and then the design is completed and available for review by the NRC as part of the ITAAC closure process. However, there likely will be preliminary steps and NRC review, inspection, and audit activities of the design information as it becomes available, rather than waiting until the licensee notifies the NRC that the DAC ITAAC is completed. It is expected that the NRC will involve technical reviewers in the review, inspection, and audit activities prior to the ITAAC completion notification letters being issued by the licensee.

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 as part of the Construction Inspection Program. Treatment in subsequent standard ESBWR plants will be different in that the design activities to complete the DAC will have been completed and implemented (see additional discussion below).

Regarding the initial DAC ITAAC closure, depending upon the area of DAC ITAAC, the closure process may vary. In the area of piping DAC 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 DAC ITAAC, leading to a final design, as described in RG 1.206, Section C.III.5. As discussed in NRC Inspection Manual Chapter 2504, the NRC will conduct engineering design verification inspections throughout the process in order to evaluate closure of the DAC ITAAC. Each of the three ESBWR DAC ITAAC areas is discussed below.

### 14.3A.2 DAC ITAAC FOR PIPING DESIGN

The ESBWR piping DAC 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 DAC 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 DAC ITAAC, information will be made available for NRC review, inspection, and audit on a system basis. Tier 1 includes the provision that would allow closure on a system-by-system basis so that systems may be placed in service throughout construction as the work is completed. The documentation for verifying that the acceptance criteria are met also may be compiled on a system-by-system basis. In this manner, a licensee may elect to notify the NRC that an ITAAC is completed either as each system is completed or at the time when all of the systems to which the ITAAC apply are completed. It is expected that the NRC will conduct reviews, inspections, and audits throughout the process and 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 DAC 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 DAC ITAAC can be completed in a timely manner after the DAC 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 DAC 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 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 line break analyses have been completed.

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. Issues that may be identified by the NRC should 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 applicable to subsequent standard ESBWR plants. Therefore, the piping DAC ITAAC are applicable to only the first standard ESBWR plant. Subsequent standard ESBWR plants will use the results of piping design completion (including pipe break analysis) and not apply the DAC ITAAC, which



will be considered completed and standard design information. The as-built ITAAC for reconciliation and as-built verification will continue to apply for subsequent standard ESBWR plants.

### **14.3A.3 DIGITAL INSTRUMENTATION AND CONTROL DAC ITAAC CLOSURE**

NRC guidance in RG 1.206, Section C.III.5, describes a phased DAC ITAAC process for digital I&C. The set of ESBWR digital I&C DAC ITAAC establishes a phased DAC ITAAC closure process for the digital I&C design. The set of digital I&C DAC ITAAC identifies the process and requirements necessary to develop the design information and acceptance criteria for the various stages of design and subsequent construction and testing. By following the set of digital I&C DAC ITAAC, the COL licensee should have sufficient information to determine which elements of the design are necessary for each phase of the digital I&C DAC ITAAC closure.

According to NRC guidance, based on the DAC ITAAC, the COL licensee should develop procedures and test programs necessary to demonstrate that the DAC ITAAC requirements are met at each phase. The COL licensee should certify to the NRC that the design through each phase is in compliance with the certified design. It is expected that the NRC will review, audit, and inspect the work to confirm that the COL licensee has adequately implemented commitments of the DAC ITAAC at the various phases. The "phased" digital I&C DAC ITAAC process consists of a set of sequential steps or phases that require successful completion, as described in NRC guidance in RG 1.206, C.III.5.

According to NRC guidance, a COL licensee is not required to certify that each phase is completed sequentially. However, if the NRC determines that a phase of the digital I&C DAC ITAAC was not successfully completed, the design process may need to be repeated to meet the DAC ITAAC acceptance criteria. It is expected that the NRC will conduct reviews, inspections, and audits throughout the process in order to identify any concerns with the various phases of design completion in a timely manner so that adjustments may be made as the process proceeds. With early NRC interactions, the licensee should be able to avoid or limit unnecessary rework.

Only the first of any standard ESBWR need complete the digital I&C DAC ITAAC actions. Each subsequent standard ESBWR will use the summary reports or design completion elements that are developed to complete the first of a standard ESBWR digital I&C DAC ITAAC. That is, the digital I&C DAC ITAAC are not required for subsequent standard ESBWR plants, but a subsequent COL licensee must use the results summary report or design elements (as specified in each DAC ITAAC) unless there was an approved exemption to the ESBWR design certification rule as part of NRC review of the COL application. In this manner, the fleet of standard ESBWR plants will be based on the same set of results summary reports and design elements for digital I&C.

Notwithstanding the standard bases established by the first standard ESBWR, the fleet may identify through operating experience changes that may be made in accordance with the appropriate change process. As with any other elements of the standard ESBWR design certification, a generic change to the digital I&C design process may also be the subject of a change to the design certification amendment. In that case, the amendment would address whether the digital I&C DAC ITAAC are to be amended and whether any of the results summary reports or design elements would need to be modified. As technology in the area of digital I&C evolves, a revised standard ESBWR design may be certified, which would address how new

summary reports and design elements would be developed and implemented in subsequent ESBWR plants in the fleet.

#### **14.3A.4 HUMAN FACTORS ENGINEERING DAC ITAAC CLOSURE**

NRC guidance in RG 1.206, Section C.III.5, describes a phased DAC ITAAC process for HFE. The Tier 1 Design Descriptions and DAC ITAAC delineate the process and requirements to develop the design information required in each area of HFE, as described in NRC guidance document NUREG-0711, "Human Factors Engineering Program Review Model." The Design Commitments specify certain actions that are taken in accordance with an associated ESBWR HFE implementation plan. These HFE implementation plans are reviewed as part of the design certification review and are designated as Tier 2\* information.

Each element of the phased process established by the HFE DAC ITAAC results in a summary report of the specific activity. Acceptance Criteria are specified in Tier 1 for the development process at various stages of detailed design, with an ITAAC for verifying the final as-built condition through subsequent construction and testing. Acceptance Criteria for HFE DAC ITAAC consist of a series of results summary reports that are developed and which verify that the specific associated Design Commitment is met.

As the DAC closure process proceeds, procedures and test programs are developed as necessary to demonstrate that the DAC requirements are met at each stage. These procedures and test programs will be available for NRC review and inspection as they become available.

The DAC ITAAC closure process for HFE is a "phased" process because it consists of a set of sequential steps or phases that require successful completion. As each phase of the HFE DAC ITAAC process is completed, the supporting documentation will be available for the NRC to review and inspect to ensure that the design through that phase is in compliance with the certified design information that describes the HFE elements. The information will be made available throughout the phased process so that the NRC may review, audit, and inspect the work to confirm that the DAC ITAAC commitments have been adequately implemented for the various phases. NRC guidance discusses that it is not necessary that each phase be completed sequentially. However, if the NRC identifies a concern that a DAC ITAAC, or an element thereof, was not successfully met, the design process may need to be repeated to meet the DAC ITAAC before final as-built activities are completed.

Only the first of any standard ESBWR need complete the HFE DAC ITAAC actions. Each subsequent standard ESBWR will use the summary reports that are developed to complete the first of a standard ESBWR HFE DAC ITAAC. That is, the HFE DAC ITAAC are not required for subsequent standard ESBWR plants, but a subsequent COL licensee must use the results summary report (as specified in each DAC ITAAC) unless there was an approved exemption to the ESBWR design certification rule as part of NRC review of the COL application. In this manner, the fleet of standard ESBWR plants will be based on the same set of results summary reports for HFE.

Notwithstanding the standard bases established by the first standard ESBWR, the fleet may identify through operating experience changes that may be made in accordance with the appropriate change process. As with any other elements of the standard ESBWR design certification, a generic change to the HFE process may also be the subject of a change to the

design certification amendment. In that case, the amendment would address whether the HFE DAC ITAAC are to be amended and whether any of the results summary reports would need to be modified. As HFE evolves, a revised standard ESBWR design may be certified, which would address how new summary reports would be developed and implemented in subsequent ESBWR plants in the fleet.

#### **14.3A.5 ACTIONS FOLLOWING DAC ITAAC COMPLETION AND CLOSURE**

Once the design of structures, systems, or components subject to DAC ITAAC is completed, the COL licensee issues an ITAAC closure notification letter to the NRC in accordance with 10 CFR 52.99. The NRC will conduct its closure process upon receipt of the closure notification letter.

Following DAC ITAAC closure by the licensee and NRC, the licensee should assess whether any changes to the licensing basis are necessary. The ESBWR design certification rule sets forth a process for assessing changes to determine whether NRC prior approval is necessary. Depending upon the results of the licensee's assessment of the change against the change process criteria, a FSAR change or a license amendment may be necessary. In addition, GEH may consider whether an amendment to the ESBWR design certification rule would be warranted. Subsequent standard ESBWR plants would rely on the results of the first standard ESBWR DAC ITAAC closure until technology changes warrant revisions to the DAC ITAAC results and similar changes to the licensing basis to reflect the standard design.

#### **14.3A.6 SUBSEQUENT COL PROJECTS**

The NRC has expressed a regulatory expectation that the DAC ITAAC closure establishes a strong regulatory precedent. Specifically, in its regulatory guidance regarding DAC ITAAC (RG 1.206, Section C.III.5), the NRC explains its expectations for standardization of the design as follows:

Although numerous detailed design configurations may satisfy a given set of DAC, the NRC staff expects standardization of the design in keeping with the letter and intent of 10 CFR Part 52. This will also support the NRC's design-centered review approach to licensing, as discussed in RIS 2006-06, "New Reactor Standardization Needed To Support the Design-Centered Licensing Review Approach," dated May 31, 2006. Deviations from standard designs or practices used to satisfy DAC may challenge the NRC's goal to implement its "one issue, one position, one review" approach.

For the ESBWR DAC ITAAC, closure information should be available to subsequent licensees through a design-centered technology approach, and each DAC ITAAC is written to reflect this standard approach. Subsequent licensees would be required to use the information developed for the first standard ESBWR DAC ITAAC closure, for implementation in a subsequent ESBWR plant, unless an exemption to the ESBWR design certification rule is approved by the NRC in its review of a COL application.

The approach of relying on the first standard ESBWR DAC ITAAC closure supports the goal of standardization for each group of standard plants before technology advances to a point where a different approach may be employed. In the case that an evolving technology is modified for subsequent standard ESBWR plants, the DAC ITAAC closure process would be similar to the first instance, as described above for the option after COL issuance. GEH would consider

amending the standard ESBWR design certification rule to address evolving technologies, particularly in the areas of digital I&C and HFE.

**14.3A.7 COL INFORMATION**

None.

**14.3A.8 REFERENCES**

None.