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Subject: **Response to Portion of NRC Request for Additional Information Letter No. 93 Related to ESBWR Design Certification Application – Chapter 14 – Selection of Tier 1 Criteria and Processes – RAI Number 14.3-131**

Enclosure 1 contains GHNEA's response to the subject NRC RAI transmitted via the Reference 1 letter.

If you have any questions or require additional information regarding the information provided here, please contact me.

Sincerely,

Kathy Sedney for

James C. Kinsey
Project Manager, ESBWR Licensing

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NRO

Reference:

1. MFN 07-106, Letter from U.S. Nuclear Regulatory Commission to David Hinds, *Request for Additional Information Letter No. 93 Related to ESBWR Design Certification Application,* January 31, 2007

Enclosure:

1. MFN 07-266 – Response to Portion of NRC Request for Additional Information Letter No. 93 Related to ESBWR Design Certification Application – Chapter 14 – Selection of Tier 1 Criteria and Processes – RAI Number 14.3-131

cc:

AE Cubbage	USNRC (with enclosures)
DH Hinds	GHNEA (with enclosures)
RE Brown	GHNEA (w/o enclosures)
eDRF	0000-0066-3892

Enclosure 1

MFN 07-266

Response to Portion of NRC Request for

Additional Information Letter No. 93

Related to ESBWR Design Certification Application

Chapter 14 – Selection of Tier 1 Criteria and Processes

RAI Number 14.3-131

NRC RAI 14.3-131

The staff has identified inadequacies in Tier 1, Revision 2, ITAAC.

Examples include:

A. The NRC staff expects that any system that contains ASME Code Class 1, 2, and 3 components, has inspection, tests, analyses, and acceptance criteria (ITAAC) to ensure that the as-built systems meet the applicable ASME Code requirements. The ITAAC should include a description of the type of documentation that is required to satisfy the ITAAC.

The ITAAC for the Reactor Pressure Vessel (RPV) Listed in Table 2.1.1-2 includes the following Inspections, Tests, Analyses (ITA) :

1. Inspections of the as built system will be performed.

2. Inspections of the ASME Code required documents will be conducted.

3. A hydrostatic test will be conducted on those components of the system required to be hydrostatically tested by ASME Code.

4. Inspections of the system fabrication records will be conducted.

The aforementioned ITA should be applicable to all ASME Code Class 1, 2, and 3 components. In Tier 1, Revision 2, ITA 1 and 3 are listed with ITAAC for ASME Code Class 1, 2, and 3 components. ITA 2 and 4 above are not currently listed.

Although Section 1.2.2.1 (1) "Verification for Basic Configuration for Systems discusses the ITA 1 above, it only applies to as-built pressure boundary welds. The staff considers the applicants ITAAC for several systems to be incomplete and vague. The staff's expectation is that all metallic components and systems have clearly defined ITAAC to ensure that (a) the as-built system is inspected against the functional arrangement of the system and (b) inspections are conducted of the as-built ASME Code Section III piping, welds, and components against ASME Code Section III design, fabrication and testing requirements. The staff expects the ITAACs to reflect appropriate documentation for the inspections and satisfaction of the

ASME Code Section III design, fabrication, and testing requirements. Below is a list of some but not all of the systems that contain ASME Code Class 1, 2 or 3 piping and components that should have very similar ITAAC.

2.1.2 Nuclear Boiler System (NBS)

2.2.2 Control Rod Drive System

2.2.4 Standby Liquid Control System

2.4.1 Isolation Condenser System

2.4.2 Emergency Core Cooling System - Gravity-Driven Cooling System

2.6.1 Reactor Water Cleanup/Shutdown Cooing System

2.6.2 Fuel And Auxiliary Pools Cooling System

2.11.1 Turbine Main Steam System

B. In Table 2.1.2-2 ITAAC for the NBS under the ITA for ITAAC number 2, the applicant states that ASME Code Data Reports will be reviewed and inspections of Code stamps will be conducted for ASME components in the NBS. The applicant should include a requirement to compare the data reports with the actual as-built system. The acceptance criteria for ITAAC 2 should include a report which concludes that the ITA has been performed and that the ITAAC 2 acceptance criteria has been met.

C. The Design Commitment in ITAAC number 5 states The ASME Code portions of the NBS retain their integrity under internal pressure that will be experienced during service. The staff believes that this ITAAC should state "The ASME Code portions of the NBS retain their pressure boundary integrity at design pressure values.

The staff requests that the applicant develop ITAAC that address the issues identified above and apply those ITAAC to all systems that contain ASME Code Class 1, 2, 3 and safety significant pressure retaining piping and components in the ESBWR design.

GE Response

A. Refer to the response to RAI 3.9-107, which describes "Design Reports" which are required under ASME Code, Section III. All ASME piping and components are designed, fabricated, installed, and tested in accordance with the requirements in ASME Code, Section III. It is the responsibility of the owner to review the Design Reports for conformance with these requirements.

This requirement can be incorporated as a general ITAAC item for all systems containing ASME Code Class 1, 2, or 3 piping and components. The wording of the ITAAC should be similar to the one that has already been applied to the Nuclear Boiler System (See Table 2.1.2-2, Item 2).

A description will be added to Tier 1 Section 3.1, similar to that added in Tier 2 Subsection 3.9.3 as a result of RAI 3.9-107. A generic ITAAC item shall be added to Tier 1 Table 3.1-1 to require the inspection of all ASME Section III piping and components. The corresponding NBS ITAAC (Tier 1, Table 2.1.2-2, Item 2) will be deleted.

B. Tier 1 Table 2.1.2-2, Item 2 has been deleted and replaced with a generic ITAAC for all systems as described in Part A above. This generic ITAAC has been updated to specify the design reports will be compared with the "as-built" system.

C. The ITAAC items related to conducting hydrostatic testing are taken almost word for word from the ABWR ITAAC tables. The rationale for using this wording is that the

ASME Code contains the testing requirements and the Code is referenced in the acceptance criteria. Therefore it is not necessary to specify the requirements a second time in Tier 1.

DCD Impact

A. Tier 1, Section 3.1 shall be revised as shown in the attached DCD markup to specify a generic ITAAC for all ASME Section III components.

B. Tier 1, Table 2.1.2-2 shall be modified as shown in the attached DCD markup to delete Item 2 (which is redundant after the changes described in Part A)

C. No DCD impact.

3. NON-SYSTEM BASED MATERIAL

3.1 ~~PIPING~~ DESIGN OF PIPING AND COMPONENTS

Design Description

Piping associated with fluid systems is categorized as either safety-related (i.e., Seismic Category I) or nonsafety-related (i.e., non-Seismic Category I). The piping has a design life of 60 years. Piping systems and their components are designed and constructed in accordance with their applicable design code requirements identified in the individual system design specifications.

Safety-related piping systems are designed to ASME Code class and Seismic Category I requirements.

For ASME Code Class 1 piping systems, a fatigue analysis shall be performed in accordance with the ASME Code Class 1 piping requirements. Environmental effects shall be included in the fatigue analysis. The Class 1 piping fatigue analysis shall show that the ASME Code Class 1 piping fatigue requirements have been met.

For ASME Code Class 2 and 3 piping systems, piping stress ranges due to thermal expansion shall be calculated in accordance with the ASME Code Class 2 and 3 piping requirements. The piping stress analysis shall show that the ASME Code Class 2 and 3 piping thermal expansion stress range requirements have been met. For the ASME Code Class 2 and 3 piping systems and their components, which will be subjected to severe thermal transients, the effects of these transients shall be included in the design.

Piping systems that are qualified for leak-before-break design may exclude design features to mitigate the dynamic effects from postulated high energy pipe breaks.

The ASME Code, Section III, requires that a design specification be prepared for ASME Class 1, 2 and 3 components. The design specifications for ASME Class 1, 2 and 3 components, supports, and appurtenances are prepared under administrative procedures that meet the ASME Code rules. The specifications conform to and are certified to the requirements of the applicable subsection of the ASME Code, Section III. The ASME Code also requires design reports for

Class 1, 2 or 3 components be prepared which demonstrate that the as-built components satisfy the requirements of the respective ASME design specification for each component and the applicable ASME Code. These design specifications and the design reports are completed in accordance with the responsibilities outlined under the ASME Code, Section III. The ASME Code design reports include the records of as-built reconciliations. For example, the evaluations of changes to piping support locations, the pre-operational testing and results and reported construction deviation resolutions, and also includes the small-bore piping analysis.

Inspections, Tests, Analyses and Acceptance Criteria

Table 3.1-1 provides a definition of the inspections, test and/or analyses, together with associated acceptance criteria for the Piping and Components Design.

Table 3.1-1

ITAAC For The Generic Piping and Component Design

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. Each safety-related piping system shall be designed to meet its ASME Code Class and Seismic Category I requirements.	1. Inspections of ASME Code required documents will be conducted.	1. On an individual safety-related system basis, an ASME Code Certified Stress Report concludes that the design complies with the requirements of ASME Code, Section III.
2. Systems, structures, and components, that are required to be functional during and following an SSE, shall be protected against or qualified to withstand the dynamic and environmental effects associated with postulated failures in Seismic Category I and nonsafety-related piping systems.	2. Inspections of the pipe analysis report will be conducted. An inspection of the as-built high and moderate energy pipe break mitigation features (including spatial separation) will be performed.	2. A pipe analysis concludes that for each postulated piping failure, the reactor can be shut down safely.
3. On an individual system basis, the as-built piping shall be reconciled with the piping design required in Section 3.1.	3. A reconciliation analysis using the as-designed and as-built information will be performed.	3. On an individual system basis, an as-built stress report concludes that the as-built piping has been reconciled with the design documents used for design analysis. For ASME Code Class piping, the as-built stress report includes the ASME Code Certified Stress Report and documentation of the results of the as-built reconciliation analysis.

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
4. Any system or portion of a system that is classified as ASME Code Class 1, 2, or 3 shall be designed, fabricated, installed, and inspected in accordance with ASME Code, Section III.	4. ASME Code Design Reports will be reviewed and inspections of Code Stamps will be conducted for "as-built" ASME components.	4. Inspection reports document that systems or portions of systems that are ASME Code Class 1, 2, or 3 have ASME Code, Section III, Design Reports and Code Stamps (or alternative markings permitted by the Code), that demonstrate their compliance with the Code.

Table 2.1.2-2

ITAAC For The Nuclear Boiler System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The basic configuration of the NBS is defined in Subsection 2.1.2.	1. Inspections of the as-built system will be conducted.	1. The as-built NBS conforms to the basic configuration as defined in Subsection 2.1.2.
2. Deleted~~Portions of the NBS are classified as ASME Code class as indicated in Subsection 2.1.2. They are designed, fabricated, installed, and inspected in accordance with the ASME Code, Section III.~~	2. Deleted~~ASME Code Data Reports will be reviewed and inspections of Code stamps will be conducted for ASME components in the NBS.~~	2. Deleted~~Those portions of the NBS identified as ASME Code Class in Subsection 2.1.2 have ASME Code Section III, Code Data Reports and Code stamps (or alternative markings permitted by the Code).~~
3. The throat diameter of each MSL flow limiter is less than or equal to 355 mm (14 in.).	3. Inspections of the as-built MSL flow limiters will be taken.	3. The throat diameter of each MSL flow limiter is less than or equal to 355 mm (14 in.).
4. Each MSL flow limiter has taps for two instrument lines. These instrument lines are used for monitoring the flow through each MSL.	4. Inspections of the as-built installation of the MSL flow instrumentation will be conducted to verify that it meets the design.	4. The as-built MSL flow measurement instrument lines match the instrument line design drawings and tolerances.
5. The ASME Code portions of the NBS retain their integrity under internal pressures that will be experienced during service.	5. A hydrostatic test will be conducted on those Code components of the NBS required to be hydrostatically tested by the ASME Code.	5. The results of the hydrostatic test of the ASME Code components of the NBS conform to the requirements in the ASME Code, Section III.