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MFN 09-293

Docket No. 52-010

May 5, 2009

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

Subject: **Partial Response to NRC RAI Letter No. 314 Related to ESBWR Design Certification Application – DCD Tier 2 Section 3.9 – Mechanical Systems and Components; RAI Number 3.9-252**

The purpose of this letter is to submit the GE Hitachi Nuclear Energy (GEH) partial response to the U.S. Nuclear Regulatory Commission (NRC) Request for Additional Information (RAI) letter number 314 sent by NRC letter dated March 18, 2009 (Reference 1). RAI Number 3.9-252 is addressed in Enclosure 1. Verified DCD changes associated with this RAI response are identified in the enclosed DCD markups by enclosing the text within a black box.

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

Sincerely,

Richard E. Kingston

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Vice President, ESBWR Licensing

Reference:

1. MFN 09-174 Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, GEH, *Request For Additional Information Letter No. 314 Related to ESBWR Design Certification* dated March 18, 2009

Enclosure:

1. Partial Response to NRC RAI Letter No. 314 Related to ESBWR Design Certification Application - DCD Tier 2 Section 3.9 – Mechanical Systems and Components; RAI Number 3.9-252

cc:	AE Cubbage	USNRC (with enclosures)
	JG Head	GEH/Wilmington (with enclosures)
	DH Hinds	GEH/Wilmington (with enclosures)
	eDRF Section	0000-0101-2524 (RAI 3.9-252)

ENCLOSURE 1

MFN 09-293

Partial Response to NRC RAI Letter No. 314

Related to ESBWR Design Certification Application

DCD Tier 2 Section 3.9 – Mechanical Systems and Components

RAI Number 3.9-252

NRC RAI 3.9-252

Provide additional clarification / discussion of the design basis requirements applied in the construction of non-safety related reactor internal structures.

(Ref. ESBWR DCD Section 3.9.5.4, Rev. 5) The final paragraph of DCD Section 3.9.5.4 requires additional explanation. The design requirements presented for equipment classified as non-safety related class internals are not consistent with requirements presented in other design basis related documents, e.g., Topical Report NEDE-33313P for the steam dryer. Additional discussion should be included in DCD Section 3.9.5.4 to clarify the following:

(a) Which non-safety related internals components use selected ASME Code requirements as their design basis.

(b) What are the specific ASME Code requirements adopted as the design basis for those components identified in (a) above.

(c) For those non-safety related internals components which do not use ASME Code requirements for their design, identify the "accepted industry or engineering practices" which are used for their design.

GEH Response

The nonsafety-related reactor internal components are identified in DCD Tier 2, Section 3.9.5. These components are the chimney and partitions, chimney head and steam separator assembly, steam dryer assembly, feedwater spargers, RPV vent assembly, and surveillance sample holders. None of these components are ASME Code components, but the designs will comply with the requirements of ASME Code Subsection NG-3000 except for the weld quality and fatigue factors for secondary structural non-load bearing welds. Primary structural load bearing welds use quality and fatigue factors as given NG-3000. The steam dryer assembly uses weld quality and fatigue factors as discussed in Subsections 4.1 and 7.1 of NEDE-33313P.

DCD Tier 2 Sections 3.9.5.4 and 3.9.10 will be revised to include the applicability of ASME Code requirements for nonsafety-related reactor internal components.

DCD Impact

DCD Tier 2 Sections 3.9.5.4 and 3.9.10 will be revised as noted in the attached markup.

NG-3000 and are constructed so as not to adversely affect the integrity of the core support structures (NG-1122).

The reactor internal structures ~~design requirements for equipment~~ classified as nonsafety-related in Section 3.9.5~~(other) class internals (e.g., steam dryers, separators and chimney)~~ are not ASME Code components, but their design complies with the requirements of ASME Code Subsection NG-3000 except for the weld quality and fatigue factors for secondary structural non-load bearing welds. Primary structural load bearing welds use quality and fatigue factors as given in NG-3000. The steam dryer assembly weld quality and fatigue factor methodology is discussed in Reference 3.9-7.~~are specified with appropriate consideration of the intended service of the equipment and expected plant and environmental conditions under which it operates. Where Code design requirements are not applicable, accepted industry or engineering practices are used.~~

3.9.6 Inservice Testing of Pumps and Valves

Inservice testing of certain ASME Code, Section III, Class 1, 2, and 3 pumps and valves is performed in accordance with the ASME OM Code as required by 10 CFR 50.55a(f), including limitations and modifications set forth in 10 CFR 50.55a. The Inservice Testing (IST) Program does not include any non-Code Class valves. The design of the nuclear power plant structures, systems, and components will provide access for the performance of inservice testing and in-service inspection as required by the applicable ASME Code.

Inservice testing of pumps and valves is in conformance with the relevant requirements of 10 CFR Part 50, Appendix A, GDC 1, 37, 40, 43, 46, 54, and 10 CFR 50.55a(f). The relevant requirements are as follows:

(1) GDC 1, as it relates to testing safety-related components to quality standards commensurate with the importance of the safety-related functions to be performed.

(2) GDC 37, as it relates to periodic functional testing of the emergency core cooling system to ensure the leak tight integrity and performance of its active components.

(3) GDC 40, as it relates to periodic functional testing of the containment heat removal system to ensure the leak tight integrity and performance of its active components.

(4) GDC 43, as it relates to periodic functional testing of the containment atmospheric cleanup systems to ensure the leak tight integrity and the performance of the active components, such as pumps and valves.

(5) GDC 46, as it relates to periodic functional testing of the cooling water system to ensure the leak tight integrity and performance of the active components.

(6) GDC 54, as it relates to piping systems penetrating containment being designed with the capability to test periodically the operability of the isolation and determine valve leakage acceptability.

(7) Subsection 50.55a(f) of 10 CFR, as it relates to including pumps and valves whose function is required for safe operation in the IST Program to verify operational readiness by periodic testing.

The IST Program includes periodic tests and inspections that demonstrate the operational readiness of safety-related components and their capability to perform their safety-related

3.9.9-3-A Inservice Testing Programs

COL Applicant shall provide a full description of the IST Program and a milestone for full program implementation as identified in Subsection 3.9.6.1.

3.9.9-4-A A Snubber Inspection and Test Program

The Applicant shall provide a full description of the snubber preservice and inservice inspection and testing programs, and a milestone for program implementation, including development of a data table identified in Subsection 3.9.3.7.1(3)f.

3.9.10 References

3.9-1 General Electric Company, "BWR Fuel Channel Mechanical Design and Deflection," NEDE-21354-P, September 1976 (GE proprietary) and NEDO-21354, September 1976 (Non-proprietary).

3.9-2 GE Nuclear Energy, "BWR Fuel Assembly Evaluation of Combined Safe Shutdown Earthquakes (SSE) and Loss-of-Coolant Accident (LOCA) Loadings (Amendment 3)," NEDE-21175-3-P-A, October 1984 (GE proprietary) and NEDO-21175-3-A, October 1984 (Non-proprietary).

3.9-3 GE Nuclear Energy, "General Electric Environmental Qualification Program," NEDE-24326-1-P, Proprietary Document, January 1983.

3.9-4 M.A. Miner, "Cumulative Damage in Fatigue," Journal of Applied Mechanics, Vol. 12, ASME, Vol. 67, pages A159-A164, September 1945.

3.9-5 American Society of Mechanical Engineers Code for Operation and Maintenance of Nuclear Power Plants, 2001 Edition with 2003 Addenda.

3.9-6 (Deleted)~~General Electric Company, "ESBWR Reactor Internals Flow Induced Vibration Program", NEDE-33259P, Class III (Proprietary), Rev. 1, December 2007, and NEDO-33259, Class I (Non-proprietary), Rev. 1, December 2007.~~

3.9-7 GE Hitachi Nuclear Energy, "ESBWR Steam Dryer Structural Evaluation," NEDE-33313P, Class III (Proprietary), November 2007, and NEDO-33313, Class I (Non-Proprietary), November 2007.