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MFN 06-308
Supplement 9

Docket No. 52-010

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Subject: **Response to Portion of NRC Request for Additional Information Letter No. 51 – Classification of Structures, Systems and Components - RAI Number 3.2-1 S02**

Enclosure 1 contains GEH's response to the subject RAI transmitted via Reference 1, which was a supplemental request to GEH's response submitted via Reference 2. Reference 3 transmitted the first supplemental request to GEH's original response transmitted via Reference 4. The original RAI was transmitted via Reference 5.

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

Sincerely,

Kathy Sedney for

James C. Kinsey
Project Manager, ESBWR Licensing

D068

NRO

References:

1. E-mail dated May 24, 2007 from Chandu Patel (NRC)
2. MFN 06-308, Supplement 4 – Letter from GE to the U.S. Nuclear Regulatory Commission, *Response to Portion of NRC Request for Additional Information Letter No. 51 Related to ESBWR Design Certification Application – Turbine Main Steam System – RAI Number 3.2-1 S01*, March 30, 2007
3. E-mail dated November 20, 2006 from Jim Gaslevic (NRC)
4. MFN 06-308 – Letter from GE to the U.S. Nuclear Regulatory Commission, *Response to Portion of NRC Request for Additional Information Letter No. 51 Related to ESBWR Design Certification Application – Classification of Structures, Systems and Components – RAI Number 3.2-1 through 3.2-62*, September 8, 2006
5. MFN 06-277 – Letter from U.S. Nuclear Regulatory Commission to David H. Hinds, *Request for Additional Information Letter No. 51 Related to ESBWR Design Certification Application*, August 8, 2006.

Enclosure:

1. MFN 06-308, Supplement 9, Response to Portion of NRC Request for Additional Information Letter No. 51 RAI Number 3.2-1 S02

cc:

AE Cubbage	USNRC (with enclosures)
RE Brown	GEH/Wilmington (with enclosures)
GB Stramback	GEH/San Jose (with enclosures)
LE Fennern	GEH/San Jose (with enclosures)
eDRF	0000-0069-7710

Enclosure 1

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Response to Portion of NRC Request for Additional Information Letter No. 51 Related to ESBWR Design Certification Application

Classification of Structures, Systems and Components

RAI Number 3.2-1 S02

For historical purposes, the original text and the GE response of RAI 3.2-01 and 3.2-01 S01 are included.

NRC RAI 3.2-1

It should be noted that the current 10 CFR 50.55a rule requires that an ASME Code N-symbol stamp be applied to all ASME Code Class 1, 2, and 3 pressure boundary components. This is contrary to a footnote b to Table 1 included in the currently issued Revision 3 of RG 1.26, which states that such a stamp need not be applied. The staff is currently in the process of revising RG 1.26 to conform to the requirements of 10 CFR 50.55a. Please confirm that all pressure retaining components designed to meet ASME Code requirements for Code Class 1, 2, and 3 components will have the Code N-symbol stamp applied, in accordance with 10 CFR 50.55a.

GE Response

GE confirms that all pressure retaining components designed to meet ASME Code requirements for Code Class 1, 2 and 3 components will meet the requirements of 10 CFR 50.55a and will therefore have the Code N-symbol stamp applied per Table NCA-8100-1 of the ASME Code, Section III, Subsection NCA.

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

NRC RAI 3.2-1 Supplement 1

Question Summary:
Table 3.2-1 for the N11 system shows that TMSS piping designed to ASME Section III Code Class 2 is not code stamped and does not require ASME inspections. Please correct or clarify the basis for this apparent discrepancy.

Full Text:

Item 3.2-1 a
The response to RAI 3.2-1 clarified that ASME Section III Code Class 1,2, and 3 components will have the Code N-Symbol stamp applied. However, resubmitted Table 3.2-1 for the N11 system shows that TMSS piping designed to ASME Section III Code Class 2 is not code stamped and does not require ASME inspections. Please correct or clarify the basis for this apparent discrepancy.

Item 3.2-1b
Regulatory Guide 1.26 Position C.1.c identifies that those portions of the steam systems of boiling water reactors extending from the outermost containment isolation valve up to but not including the turbine stop and bypass valves or shutoff valves and connected piping be classified as Quality Group B. Although Table 3.2-1 correctly classifies this piping as Quality Group B, the classification criteria is not included in Section 3.2.2.2. The applicant is requested to add the classification criteria as a basis used to identify the quality group for the N11 system piping including connected piping.

GE Response

Item 3.2-1a Response
GE confirms that pressure retaining components designed to meet ASME Code requirements for Code Class 1, 2 and 3 components will meet the requirements of 10 CFR 50.55a and will therefore have the Code N-symbol stamp applied per Table NCA--8100--1 of the ASME Code, Section III, Subsection NCA with the exceptions allowed in Regulatory Guide 1.26, revision 3, for nonsafety-related Main Steam piping and components. In accordance with Regulatory Guide 1.26, revision 3, the Quality Group B Main steam piping downstream of the seismic interface restraint is not required to be code stamped.

Item 3.2-1b Response

The Turbine Main Steam System (TMSS) piping downstream of the seismic interface restraint is nonsafety-related piping. The piping from the outboard MSIVs to the seismic interface restraint is B21 piping that is Quality Group B, seismic category I as shown on Figure 3.2-1 in the DCD. The TMSS piping from the seismic interface restraint up to, but not including the Stop Valves and the Turbine Bypass Valves and including the first valve that is normally closed or capable of automatic closure, are Quality Group B,

Seismic Category II. This is as Figure 3.2-1 indicates. This Nonsafety-Related TMSS Quality Group B piping downstream of the seismic interface restraint will not be code stamped.

DCD Impact

No DCD changes will be made in response to this RAI. All of the DCD Tier 2, Section 3.2 changes required as a result of this RAI response were incorporated in Revision 3 of the DCD submittal.

NRC RAI 3.2-1 S02

RAI 3.2-1 S02: Comment on response to RAI 3.2-1 Supplement 1 (MFN 06-308):

In the response to RAI 3.2.1 Supplement 1, GE clarified that the nonsafety-related Quality Group B Main Steam piping and components downstream of the seismic interface restraint is not required to be code stamped. This is identified in the DCD Tier 2 Table 3.2-1 notes for N11 Item 1 and it is further noted that this piping does not require ASME authorized inspection.

The practice to not Code stamp or apply ASME authorized inspection to this Quality Group B piping is contrary to the requirement in 10 CFR 50.55a relative to Quality Group B components and the guidance included in Regulatory Guide 1.26, Rev. 4 that specifically identifies that components classified Quality Group B must meet the requirements for Class 2 components in Section III of the ASME Boiler and Pressure Vessel Code. The basis for requiring N stamping is further explained in NRC RIS 2005-17 which clarifies that compliance with 10 CFR 50.55a is expected to be a Tier 1 requirement. The applicant is requested to review Tier 1 and Tier 2 commitments relevant to 10 CFR 50.55a and modify their position or explain and justify why such piping and components are not to be N stamped and inspected by an authorized ASME inspector. Specific information necessary to evaluate a proposed alternative position should include:

(1) An explanation as to why the applicant does not consider ASME N stamping and authorized inspection to be feasible. Any explanation should include factors such as hardship or unusual difficulty without compensating increase in the level of quality and safety, precedence, available N stamp suppliers, a cost-benefit analysis, alternative stamping and inspection provisions.

(2) A demonstration that the proposed alternative approach for stamping and inspection would provide an acceptable level of quality and safety equivalent to the ASME required code certification activities.

(3) Confirmation that, other than stamping and inspection, all other Code required design, material, fabrication, inspection, testing, quality assurance and documentation are in conformance with the ASME Section III Code Class 2 or equivalent alternative methods.

(4) Confirmation that inservice inspection and testing for these Quality Group B piping and components will be consistent with ASME Section XI or equivalent alternative methods. If inservice inspection (ISI) will not be performed according to ASME Section XI due to hardship or unusual difficulty, describe the hardship or unusual difficulty this presents and the alternative inspection approach including the technical justification.

(5) If the applicant prefers to change Tier 1 and Tier 2 commitments and designate this nonsafety-related piping as within scope of RTNSS with augmented design, fabrication, inspection and quality requirements, all supporting information to technically justify such an alternative classification should be presented for staff review.

GEH Response

GEH will modify applicable DCD Tier 1 and Tier 2 Sections to remove portions which denote an exemption from requirements to include applying ASME Code N-symbol stamp and authorized ASME inspections for the nonsafety-related Quality Group B Main Steam piping and components downstream of the seismic interface restraint.

DCD Impact

DCD Tier 1, Section 2.11.1 will be revised as noted in the attached markup.
DCD Tier 2, Section 1.2.2.11.1, Section 10.3.1.1, and Table 3.2-1 will be revised as noted in the attached markup.

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MARKUPS

2.11 POWER CYCLE

The following subsections describe the major power cycle (i.e., generation) systems for the ESBWR.

2.11.1 Turbine Main Steam System

Design Description

The Turbine Main Steam System (TMSS) supplies steam generated in the reactor to the Turbine Generator, moisture separator reheaters, steam auxiliaries and turbine bypass system. The TMSS does not include the seismic interface restraint, main turbine stop valves or bypass valves.

The TMSS:

- Accommodates operational stresses such as internal pressure and dynamic loads.
- Provides a seismically analyzed fission product leakage path to the main condenser.
- Has suitable access to permit in-service testing and inspections.
- Closes the Steam Auxiliary Isolation Valve(s) (SAIVs) on branch lines between the Main Steam Isolation Valves (MSIVs) and main turbine stop valves on an MSIV isolation signal. These valves fail closed on loss of electrical power to the valve actuating solenoid or on loss of pneumatic pressure.
- Opens the drain valve(s) on a MSIV isolation signal that are required to change position to provide the MSIV leakage path to the main condenser. The required drain valve(s) are equipped with reliable power sources or designed to fail to the open position on loss of electrical power to the valve actuating solenoid or on loss of pneumatic pressure.

The TMSS main steam piping consists of four lines from the seismic interface restraint to the main turbine stop valves. The header arrangement upstream of the turbine stop valves allows the valves to be tested on-line and supplies steam to the turbine bypass system and power cycle auxiliaries, as needed.

The TMSS is nonsafety-related. However, the TMSS is analyzed, fabricated and examined to ASME Code Class 2 specifications. Inservice inspection shall be performed in accordance with ASME Section XI requirements for Code Class 2 piping. ~~Inspection by an ASME authorized nuclear inspector and ASME Code stamping are not required.~~

TMSS piping, including the Steam Auxiliary Isolation Valve(s), from the seismic interface restraint to the main stop and main turbine bypass valves is analyzed to demonstrate structural integrity under Safe Shutdown Earthquake (SSE) loading conditions. The MSIV fission product leakage path to the main condenser is analyzed to demonstrate structural integrity under Safe Shutdown Earthquake (SSE) loading conditions. The drain valve(s), that are required to change position to provide the MSIV leakage path to the main condenser are equipped with reliable power sources or designed to fail to the required position on loss of power or air.

The TMSS is located in the Reactor Building steam tunnel and Turbine Building.

1.2.2.11 Power Cycle

1.2.2.11.1 Turbine Main Steam System

The Turbine Main Steam System (TMSS) supplies steam generated in the reactor to the turbine, Moisture Separator Reheaters, steam auxiliaries and turbine bypass valves. The TMSS does not include the seismic interface restraint or main turbine stop or bypass valves.

The TMSS:

- Accommodates operational stresses such as internal pressure and dynamic loads without failures;
- Provides a seismically analyzed fission product leakage path to the main condenser;
- Includes suitable access and/or remote functions to permit in-service testing and inspections; and
- Closes the steam auxiliary isolation valve(s) on branch lines between the main steamline isolation valves (MSIVs) and main turbine stop valves (excluding the fission product leakage path to the condenser) on an MSIV isolation signal. These valves fail closed on loss of electrical power to the valve actuating solenoid or on loss of pneumatic pressure.

The TMSS main steam piping consists of four lines from the seismic interface restraint to the main turbine stop valves. The header arrangement upstream of the turbine stop valves allows the valves to be tested on-line and supplies steam to the power cycle auxiliaries, as needed.

The TMSS is nonsafety-related. However, the TMSS is analyzed, fabricated and examined to ASME Code Class 2 requirements, and classified as Seismic Category II. Inservice inspection shall be performed in accordance with ASME Section XI requirements for Code Class 2 piping. ~~ASME authorized nuclear inspector and ASME Code stamping is not required.~~

Turbine MS piping and all branch lines 63.5 mm (2.5 inches) or larger in diameter, including the steam auxiliary valve(s), from the seismic interface restraint to the main stop and main turbine bypass valves are analyzed to demonstrate structural integrity under safe shutdown earthquake (SSE) loading conditions. The MSIV fission product leakage path to the main condenser is also analyzed to demonstrate structural integrity under SSE loading conditions.

The TMSS is located in the steam tunnel and Turbine Building.

1.2.2.11.2 Condensate and Feedwater System

The Condensate and Feedwater System (C&FS) consists of the piping, valves, pumps, heat exchangers, controls and instrumentation and the associated equipment and subsystems, which supply the reactor with heated feedwater in a closed steam cycle utilizing regenerative feedwater heating. The C&FS extends from the main condenser outlet up to but not including the seismic interface restraint outside of containment.

The C&FS provides a dependable supply of high quality feedwater to the reactor at the required flow, pressure and temperature. The condensate pumps take the deaerated condensate from the condenser hotwell and deliver it through the SJAE condenser, the gland steam condenser, the offgas condenser, the condensate filters and demineralizers, and through three strings of low

10.3 TURBINE MAIN STEAM SYSTEM

The Turbine Main Steam System (TMSS) conveys steam generated in the reactor to the turbine plant. The TMSS is bounded by, but does not include, the seismic interface restraint, turbine stop valves and turbine bypass valves. Steam supply lines to auxiliary loads, up to and including their isolation valves, are also part of the TMSS.

The main steamline Safety Relief Valves (SRVs), main steamline flow restrictors, Main Steam Isolation Valves (MSIVs), and main steam piping from the reactor nozzles through the outboard MSIVs to the seismic interface restraint are part of the Nuclear Boiler System (NBS) and are described in Subsections 5.2.2, 5.4.4, 5.4.5, and 5.4.9, respectively.

10.3.1 Design Bases

10.3.1.1 Safety (10 CFR 50.2) Design Bases

The TMSS is not required to perform or support any safety-related function. However, the supply system is designed to:

(1) Accommodate operational stresses such as internal pressure and dynamic loads without failures

(2) Provide a seismically analyzed fission product leakage path to the main condenser

(3) Allow suitable access to permit in-service testing and inspections

(4) Close the steam auxiliary isolation valve(s) on branch lines between the MSIVs and Main Turbine Stop Valves (excluding the fission product leakage path to the condenser) on an MSIV isolation signal. These valves fail closed on loss of electrical power to the valve actuating solenoid or on loss of pneumatic pressure.

The TMSS piping consists of four lines from the seismic interface restraint to the main turbine stop valves. The header arrangement upstream of the turbine stop valves allows them to be tested online, and supplies steam to the power cycle auxiliaries, as required, and turbine bypass valves.

Quality group B portions of t~~T~~he TMSS ~~is~~ are designed in accordance with ~~analyzed, fabricated and examined to~~ ASME Boiler and Pressure Vessel Code, Section III, Class 2 requirements~~,~~ and classified as Nonsafety-related, Seismic Category II. ~~, and subject to pertinent QA requirements of Appendix B, 10 CFR 50~~. In-service inspection is performed in accordance with ASME Section XI requirements for Code Class 2 piping. ~~ASME authorized nuclear inspector and ASME Code stamping is not required.~~

TMSS piping from the seismic interface restraint to the main stop valves and main turbine bypass valves (including the steam auxiliary valves) is analyzed to demonstrate structural integrity under SSE loading conditions.The MSIV fission product leakage path to the main condenser is analyzed to demonstrate structural integrity under SSE loading conditions. This portion of the TMSS is designated as Seismic Category II and analyzed using a dynamic seismic analysis method to satisfy the Safe Shutdown Earthquake (SSE) design loads in combination with other appropriate loads. Seismic qualification of the MSIV fission product leakage path complies with recommendations provided in SECY-93-087.

Table 3.2-1

Classification Summary

Principal Components[1]	Safety Class.[2]	Location[3]	Quality Group[4]	QA Req.[5]	Seismic Category[6]	Notes
N POWER CYCLE SYSTEMS						
N11 Turbine Main Steam System (TMSS)						
1. Turbine Main Steam System (TMSS) consists of the piping (including supports) for the MSL from the seismic interface restraint (or seismic guide) to the turbine stop valves, turbine bypass valves and the connecting branch lines up to and including their isolation valves.	N	TB	B	B	II	**Main Steam Lines** – TMSS lines are designed to ASME Section III Code, Class 2. ~~TMSS piping is not code stamped and does not require ASME authorized inspection.~~ Lines smaller than 63.5 mm (2.5 inches) are NS. Also see Figure 3.2-1.
2. Other mechanical and electrical modules	N	TB	D	E	NS	
N21 Condensate and Feedwater System (C&FS)						Feedwater lines from seismic isolation restraint to last feedwater heater are Quality Group B, Seismic Category II. See Figure 3.2-2.
1. Main feedwater line (FW) beyond seismic interface restraint	N	TB	D	E	NS	
N22 Heater Drain and Vent System (HDVS)	N	TB	—	E	NS	
N25 Condensate Purification System (CPS)	N	TB	D	E	NS	
N31 Main Turbine	N	TB	—	E	NS	
N32 Turbine Generator Control System (TGCS)	N	TB	D	E	NS	(9)
N33 Turbine Gland Seal System (TGSS)	N	TB	D	E	NS	
N34 Turbine Lubricating Oil System (TLOS)	N	TB	—	E	NS	
N35 Moisture Separator Reheater (MSR)	N	TB	—	E	NS	
N36 Extraction System	N	TB	—	E	NS	

Table 3.2-1

Classification Summary

Principal Components[1]	Safety Class.[2]	Location[3]	Quality Group[4]	QA Req.[5]	Seismic Category[6]	Notes
N37 Turbine Bypass System (TBS)	N	TB	D	E	II	TBS lines are designed to ASME Section III Code, Class 2. ~~TBS piping is not code stamped and does not require ASME authorized inspection.~~ Lines smaller than 63.5 mm (2.5 inches) are NS. Also see Figure 3.2-1.
N38 Turbine Hydraulics	N	TB	—	E	NS	
N39 Turbine Auxiliary Steam System (TASS)	N	TB	—	E	NS	
N41 Generator	N	TB	—	E	NS	
N42 Hydrogen Gas Control System (HGCS)	N	TB	—	E	NS	
N43 Stator Cooling Water System (SCWS)	N	TB	—	E	NS	
N44 Generator Lube and Seal Oil System (GLSOS)	N	TB	—	E	NS	
N45 Hydrogen and Carbon Dioxide Bulk Gas Storage System	N	OO	—	E	NS	
N51 Generator Excitation System (GES)	N	TB	—	E	NS	
N61 Main Condenser and Auxiliaries						See Figure 3.2-1.
1. Condenser anchorage	N	TB	—	E	NS (see note)	The condenser anchorage is seismically analyzed for SSE.
2. Condenser air removal system	N	TB	D	E	NS	
3. All other main condenser and auxiliaries components	N	TB	—	E	NS	
N71 Circulating Water System (CIRC)	N	TB, OO	D	E	NS	