



HITACHI

GE Hitachi Nuclear Energy

James C. Kinsey
Vice President, ESBWR Licensing

PO Box 780 M/C A-55
Wilmington, NC 28402-0780
USA

T 910 675 5057
F 910 362 5057
jim.kinsey@ge.com

MFN 07-303 Supplement 2

Docket No. 52-010

March 19, 2008

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

Subject: Response to Portion of NRC Request for Additional Information Letter No. 148 Related to ESBWR Design Certification Application – Design of Structures, Components, Equipment, and Systems – RAI Number 3.9-166 S02

The purpose of this letter is to submit the GE Hitachi Nuclear Energy (GEH) response to a portion of to the U.S. Nuclear Regulatory Commission Request for Additional Information (RAI) sent by NRC Letter 148 dated February 10, 2008 (Reference 1). The GEH response to RAI Number 3.9-166 S02 is addressed in Enclosure 1.

The GEH response to RAI 3.9-166 was submitted via Reference 3 in partial response to NRC Letter 67 (Reference 2). The GEH response to RAI 3.9-166 S01 was submitted via Reference 5 in response to a request received via email (Chandu Patel) dated July 10, 2007 (Reference 4).

Should you have any questions about the information provided here, please contact me.

Sincerely,

James C. Kinsey
Vice President, ESBWR Licensing

J068
URO

Reference:

1. MFN 08-158, Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, Senior Vice President, Regulatory Affairs, ESBWR, General Electric Company, Request For Additional Information Letter No. 148 Related To ESBWR Design Certification Application, February 19, 2008
2. MFN 06-378, Letter from U.S. Nuclear Regulatory Commission to David H. Hinds, Manager, ESBWR, General Electric Company, Request For Additional Information Letter No. 67 Related To ESBWR Design Certification Application, October 10, 2006
3. MFN 07-303, *Response to Portion of NRC Request for Additional Information Letter No. 67 Related to ESBWR Design Certification Application – Mechanical Systems and Components – RAI Numbers 3.9-166, 3.9-167, 3.9-169 and 3.9-170*, May 30, 2007
4. E-Mail from Chandu Patel (NRC), Supplement 1 to RAI 3.9-166, Dated July 10, 2007
5. MFN 07-303 Supplement 1, *Response to Portion of NRC Request for Additional Information Letter Number 67 Related to ESBWR Design Certification Application -Inservice Testing of Pumps and Valves - RAI Number 3.9-166 S01*, January 22, 2008

Enclosure:

1. Response to Portion of NRC Request for Additional Information Letter No. 148 Related to ESBWR Design Certification Application – Design of Structures, Components, Equipment, and Systems - RAI Number 3.9-166 S02

cc: AE Cabbage USNRC (with enclosure)
RE Brown GEH/Wilmington (with enclosure)
DH Hinds GEH/Wilmington (with enclosure)
GB Stramback GEH/San Jose (with enclosure)
eDRF 0000-0082-3177, Revision 0

Enclosure 1

MFN 07-303 Supplement 2

Response to Portion of NRC Request for

Additional Information Letter No. 148

Related to ESBWR Design Certification Application

Design of Structures, Components, Equipment, and Systems

RAI Number 3.9-166 S02

For historical purposes, the original text of RAI 3.9-166 and the GE response is included. The responses do not include any attachments or DCD mark-ups.

NRC RAI 3.9-166

Verify that all sections of containment penetration piping which may be isolated with trapped liquid are protected from thermally-induced pressurization by a pressure relief device. Verify that these devices are included in the IST program. Identify those sections of isolated piping which are protected from excessive pressurization by other methods and describe the methods. Verify that the resulting thermally-induced pressurization and resulting differential pressure loads on isolation valves do not exceed that for which the valves are qualified.

GE Response

The current level of detail to which the design of piping and piping penetrations for primary containment does not permit the verifications requested. The unit in-service testing (IST) program is identified as a COL holder responsibility in DCD Tier 2 Subsection 3.9.9.3, which will include the relief valves within the scope of the IST program boundary determined from the plant process and instrument diagrams and piping isometric drawings. All penetration piping and isolation valves are designed to the requirements of the ASME Code, Section III, Class 2, and the ASME Code requires a design report for each piping system as identified under DCD Tier 2 Subsection 3.9.3. These design reports include an evaluation for overpressure protection for design base pressurization events.

Containment isolation functional design is covered in DCD Tier 2 Subsection 6.2.4, although there is not a specific discussion regarding consideration for potential penetration piping pressurization events. The actual choice of protection method for penetration piping overpressure protection must be evaluated on a case-by-case basis. Relief valves may not be a preferred method since this involves additional component maintenance and testing and creates an additional leakage pathway for each affected penetration. Several valve types characteristically provide penetration pressure self-relieving capability. These include penetration piping with a check valve as the inboard isolation valve, penetration piping with a globe valve where the penetration piping pressure can lift the disk off the seat to relieve inward, or penetrations isolated by spring-loaded ball valves oriented to relieve inward due to penetration piping pressurization. Also, penetrations with both valves outside containment do not have the potential to create an isolated volume of liquid within the penetration. DCD Impact DCD Tier 2, Subsection 6.2.4, will be revised as noted in the attached markup.

NRC RAI 3.9-166 S01

The following Supplementary RFI was received from the NRC (Chandu Patel) on July 10, 2007, via e-mail to Regulatory Affairs (Jim Rogers).

Comment on response to RAI3.9-166 (MFN 07-303, May 30,2007):

GHNEA is requested to discuss the basis for assigning the responsibility for pressure relief devices to the COL Holder rather than the COL Applicant. This comment also applies to RAls 167, 169, and 170.

GEH Response

This response is applicable, as per the above supplemental request to RAls 3.9-166, 3.9-167,3.9-169 and 3.9-170.

GEH does not assign the responsibility for pressure relief devices to either the COL Applicant or COL Holder. The responsibility for design and selection of system overpressure protection is addressed under the ASME Code, as noted in the original response. System overpressure protection is within the scope of the Designer's responsibilities outlined in the Code. Thus, the responsibility is addressed within the overall scope of the DCD. For that reason, the original response to RAI 3.9-166 provided a markup that inserted an explicit requirement into DCD Tier 2 Subsection 6.2.4. The markup added language for the evaluation of containment penetration piping design and provision for required pressure relief in the event of thermally induced pressurization. On this basis, GEH verifies that the DCD does require evaluating penetration and system piping for thermal pressurization and providing an appropriate means to relieve excess pressure by venting fluid into containment.

The ESBWR design as described in the DCD invokes the ASME Code in compliance with Title 10CFR Part 50.55a. The ASME Code requires that the facility Owner be responsible for reviewing and accepting Code Design Reports. The Design Report is prepared upon completion of the installation of an ASME Code, Section III, piping component system.

The ASME Code, Section III, Subarticle NCA-3300, requires that the designer or certificate holder prepare a Design Report on each completed system subject to the Code requirements. The Design Report is required to include an evaluation of overpressure protection of the installed system. This will occur during the construction of an ESBWR facility as various ASME Code systems are installed, inspected and tested, and completed reports are submitted. Accordingly, the responsibility for the report review, acceptance and filing belongs to the COL Holder. This does not preclude the COL Applicant from including the pressure relief valves identified by the design documents in the initial plan for the IST Program submitted during COL application, which is identified as COL Applicant Item No. 3.9.9-3-A in DCD Tier 2, Revision 4, MFN 07-303, Subsection 3.9.9. Rather, the requirement for a Design Report at the completion of construction confirms the final as-built configuration, with any changes to the provision and/or arrangement of pressure relief valves installed for piping system protection that occurred during the system installation. These changes that are included in the accepted report are also the

responsibility of the Owner. Therefore, the COL Holder/Owner is responsible for any impact to the IST program resulting from such changes, as stated in the original response.

DCD Tier 2, Revision 4, Subsection 3.9.6, provides an outline of the plan for the initial in-service test program. On this and the above bases, GEH verifies that for piping protected from thermally-induced overpressure by the provision of a relief valve, the plan outline addresses inclusion of those applicable relief valves in the IST program.

DCD Impact

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

NRC RAI 3.9-166 S02

NRC Summary:

Responsibility for pressure relief devices

NRC Full Text:

In its response to RAI 3.9-166 S01 (MFN-303, Supplement 1, dated January 22, 2008), GEH states that it does not assign the responsibility for pressure relief valves to either the COL Applicant or COL Holder. GEH states that the responsibility for design and selection of system overpressure protection is addressed under the ASME Code. GEH refers to new provisions included in Subsection 6.2.4 of Revision 4 to ESBWR DCD Tier 2 that specify an evaluation of the containment penetration piping design, and a provision for required pressure relief in the event of thermally induced pressurization. It is unclear to the staff whether GEH intends to establish design requirements for the subject pressure relief devices in accordance with the applicable ASME Code requirements or if GEH is proposing design acceptance criteria (DAC) for these devices. The staff requests that GEH clarify whether it intends to provide the design requirements for the subject pressure relief devices and, if so, either provide or identify suitable ITAAC for verification that the pressure relief devices meet the design requirements as specified in the DCD. If GEH intends to propose DAC for these pressure relief devices, GEH should provide suitable ITAAC for establishment of appropriate design requirements and specification of the design process to be utilized and designing the subject pressure relief devices. In addition, GEH should provide suitable ITAAC for verification that the subject pressure relief devices meet their design requirements.

GEH Response

Piping between containment isolation valves (CIVs) is either Class 1 or 2 piping in accordance with the ASME Boiler & Pressure Vessel Code. Articles NB-7000 and NC-7000 of the Code establish requirements for overpressure protection of Class 1 and 2 piping, respectively. These articles allow overpressure protection by use of a pressure relief device or by ensuring the piping design does not exceed the Service Limits in the Design Specification. Detailed design requirements for pressure relief devices used in this way are also provided.

Where relief valves are used in the ESBWR to protect against thermally induced pressurization, the design requirement is that the relief valves are designed in accordance with ASME Code requirements (i.e., per NB-7000 or NC-7000). In these cases, verification that the relief valves meet their design requirements is covered by the following existing ITAACs:

- ITAAC 1 in Tier 1, Table 3.1-1 (ITAAC for the Design of Piping Systems and Components)
- System-specific ITAAC associated with ASME Code Section III piping. For example, for the Reactor Water Cleanup/Shutdown Cooling System, ITAAC 8b1 in Draft Revision 5, Tier 1, Table 2.6.1-2 (see response to RAI 14.3-214, MFN 08-086 Supplement 3, Dated 02/15/08), is a design commitment that the piping identified in Table 2.6.1-1 as ASME Code Section III piping is designed, fabricated, installed and inspected in accordance with ASME Code Section III requirements. Since Table 2.6.1-1 identifies

system piping up to the outboard CIVs as ASME Code Section III piping, this piping is covered by ITAAC 8b1.

Where the inboard CIV is used in the ESBWR to protect against thermally induced pressurization, the piping is shown not to exceed Service Limits in the Design Specification. The ITAACs referenced above also cover this verification. Design requirements for the inboard CIVs to limit system pressure are documented as part of the valve procurement process (e.g., in the valve purchase specification and data sheet). Verification that the CIVs meet their design requirements is covered by ITAAC item 5 in Table 3.1-1.

DCD Impact

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