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 06-127
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 – Depressurization Valve (DPV) Test Program - RAI Number 3.9-1 S03**

The purpose of this letter is to submit the GE Hitachi Nuclear Energy (GEH) response to a portion of the U.S. Nuclear Regulatory Commission Request for Additional Information (RAI) sent by NRC Letter 148, dated February 19, 2008 (Reference 1). The GEH response to RAI Number 3.9-1 S03 is addressed in Enclosure 1.

The GEH response to RAI 3.9-1 S02 was submitted via Reference 6 in response to a request received via email (Chandu Patel) dated June 21, 2007 (Reference 5). The GEH response to RAI 3.9-1 S01 was submitted via Reference 6 in response to a request received via email (Larry Rossbach) dated September 12, 2006 (Reference 4). The original RAI 3.9-1 response was submitted via Reference 3 in partial response to NRC Letter No. 18 (Reference 2).

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

Sincerely,

R. E. Brown for

James C. Kinsey
Vice President, ESBWR Licensing

D068
NRO

References:

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 06-113, Letter from U.S. Nuclear Regulatory Commission to David H. Hinds, Manager, ESBWR, General Electric Company, Request For Additional Information Letter No. 18 Related To ESBWR Design Certification Application, April 24, 2006
3. MFN 06-127, Response to Portion of NRC Request for Additional Information Letter Number 18 Related to ESBWR Design Certification Application – Mechanical Systems and Components -RAI Number 3.9-1
4. E-Mail from Lawrence Rossbach, U.S. Nuclear Regulatory Commission, to David Hinds, GE, dated September 12, 2006 (ADAMS Accession Number ML070740641)
5. E-Mail from Chandu Patel, U.S. Nuclear Regulatory Commission, to John Leatherman, GE, dated June 21, 2007 (ADAMS Accession Number ML073050299)
6. MFN 06-127 Supplement 1, Response to Portion of NRC Request for Additional Information Letter Number 18 Related to ESBWR Design Certification Application – Mechanical Systems and Components -RAI Numbers 3.9-1 S01 and 3.9-1 S02

Enclosure:

1. Response to Portion of NRC Request for Additional Information Letter No. 148 Related to ESBWR Design Certification Application – Depressurization Valve (DPV) Test Program – RAI Number 3.9-1 S03

cc:

AE Cubbage	USNRC (with enclosure)
RE Brown	GEH/Wilmington (with enclosure)
DH Hinds	GEH/Wilmington (with enclosure)
GB Stramback	GEH/San Jose (with enclosure)
eDRF	0000-0081-8754, Revision 0

Enclosure 1

MFN 06-127 Supplement 2

Response to Portion of NRC Request for

Additional Information Letter No. 148

Related to ESBWR Design Certification Application

Depressurization Valve (DPV) Test Program

RAI Number 3.9-1 S03

For historical purposes, the original text of RAI 3.9-1 and the GE response is included. The responses do not include any attachments or DCD mark-ups.

NRC RAI 3.9-1

During the pre-application phase of the ESBWR review, GE stated that full-size testing of the DPV and the VB were conducted to demonstrate the operation and reliability of these valves. However, the technical evaluation of the design and the testing programs for the DPV and VB were not part of the ESBWR pre-application review scope. Provide additional information regarding the design and testing of DPV and VB.

GE Response

The testing of the DPV and VB valves were conducted during the development of the SBWR in the 1990 time frame, and information was submitted during that time period for NRC review. The design of these valves remains the same for ESBWR except that the quantity of valves has increased to accommodate the larger plant size. The following is a listing of correspondence and reports from that time period:

DPV Testing – Enclosure 2

- MFN 136-95, "SBWR – Response to Request for Additional Information (RAI) Regarding the Simplified Boiling Water Reactor (SBWR) Design (Q900.102 – Q900.181," 7/28/95
- GE Report GEFR-00879, "Depressurization Valve Development Test Program Final Report," October 1990 – to be provided under separate cover.

VB Testing – Enclosure 3

- MFN 065-94, "NRC Requests for Additional Information (RAI) on the Simplified Boiling Water Reactor (SBWR) Design," 5/2/94
- MFN 113-94, "Responses to the Referenced letters," 9/26/94
- MFN 155-94, "NRC Requests for Additional Information (RAIs) on the Simplified Boiling Water Reactor (SBWR) Design," 12/15/94 – non proprietary attachments
  - UTE I/EA Doc. No. 02-STS-0002-1, "SBWR Study Vacuum Breaker FMCA"
  - ED45833, "SBWR Vacuum Breaker Prototype Experimental Qualification General Test Procedure"
  - ED45834, "SBWR Vacuum Breaker Prototype Experimental Qualification FIAT CIEI Test Procedure"
  - ED45894, "SBWR Vacuum Breaker Prototype Experimental Qualification Thermal Ageing Procedure"

- MFN 021-95, "Request for Exemption of the SBWR Drywell to Wetwell Vacuum Breaker from Single Failure Criteria," 2/16/95
- MFN 018-95, "Approach to Achieve Closure of Items Related to the GE SBWR TAPD," 2/14/95
- MFN 216-95, "SBWR – Vacuum Breaker Single Failure Exemption," 11/7/95
- MFN 021-96, "Vacuum Breaker Test Program," 2/14/96
- MFN 035-96, "SBWR – Closure of the Vacuum Breaker Test Program," 3/12/96
- NEDO-32391, Revision A., "SBWR Test and Analysis program Description," September 1994

VB Testing – Enclosure 4 (Contains GE Proprietary Information)

MFN 155-94, "NRC Requests for Additional Information (RAIs) on the Simplified Boiling Water Reactor (SBWR) Design," 12/15/94
Proprietary Contents:

- "RAI Number 900.62"
- ED45841, "SBWR Vacuum Breaker Prototype Experimental Qualification General Test Notification Plan"
- ED45933, "SBWR Vacuum Breaker Prototype Experimental Qualification Campaign – Technical Note"
- Inspection Certificates
- QPLVBR00001, "Vacuum Breaker Valve Design Basis Accident Simulation Quality Plan"
- TCE.MII.G.1002, "Drywell to Wetwell Vacuum Breaker Dynamic Qualification Quality Control Plan"
- ED45913, "SBWR Vacuum Breaker Prototype Experimental Qualification General Test Report"
- ED45914, "SBWR Vacuum Breaker Prototype Experimental Qualification FIAT CIEI/COMPES Test Report"
- ED45921, "SBWR Vacuum Breaker Prototype Experimental Qualification HATUICO Test Report"
- ED45915, "SBWR Vacuum Breaker Prototype Experimental Qualification Ferioli E Gianotti Test Report"

NRC RAI 3.9-1 S01

MFN 06-127 dated 6/16/06 responded to RAI 3.9-1 but the response said that part of the answer, GE Report GEFR-00879, was being reformatted and would be provided separately. When can we expect to receive this report?

GEH Response

Due to the involvement of other parties in DPV development, a copy of GEFR-00879 is available in the GEH Washington office for viewing.

DCD Impact

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

NRC RAI 3.9-1 S02

MFN 06-127 provided most of the response to RAI 3.9-1 but it didn't include GE Report GEFR-00879, "Depressurization Valve Development Test Program Final Report" October 1990. MFN 06-127 said GEFR-00879 was being reformatted and would be submitted separately. The NRC staff requested GE for this report by e-mail on January 4, 2007, (ML070740642). Please provide the schedule for submitting this report?

In addition, discuss the size of the prototypes in relation to the production valves, the replacement procedure in that the thermal aging testing is justified for 6 years, and the actions to be taken for the production valves.

GEH Response

Due to the involvement of other parties in DPV development, a copy of GEFR-00879 is available in the GEH Washington office for viewing.

The prototypes are full size in relation to the production valves. Revision 4 to DCD Tier 2, Section 5.4.13 now includes additional information regarding the Depressurization Valves including a Detailed Description and Testing and Inspection Requirements.

DCD Impact

No additional changes to the DCD are required as a result of this RAI response.

NRC RAI 3.9-1 S03

NRC Summary:

Depressurization Valve (DPV) Test Program

NRC Full Text:

In Supplement 2 to RAI 3.9-1, the NRC staff requested that GEH provide a schedule for submitting GE Report GEFR-00879, "Depressurization Valve Development Test Program Final Report." In its response to RAI 3.9-1, Supplement 2, GEH stated that the report was available for viewing at the GEH Washington office. On December 20, 2007, the NRC staff visited the GEH Washington office to review GE Report GEFR-00879. Based on that review, GEH is requested to discuss the following:

a. Size and rating of the DPVs to be installed in the ESBWR compared to valves tested for the Simplified Water Reactor (SBWR) Program as described in GE Report GEFR-00879.

b. Differences between the SBWR and the ESBWR relating to plant operation (where applicable) and DPV performance requirements.

c. Quality assurance programs implemented during performance of the DPV test program.

d. Overhaul and maintenance programs necessary for the DPV.

e. Implementation of design improvements based on the DPV test program.

f. Capacity of the test facility to test the DPV consistent with its capability requirements when installed in the ESBWR.

GEH Response

a. The valve tested for the SBWR program was a full-size prototype of the DPV to be installed in the ESBWR.

b. The DPVs in the ESBWR perform the same function as the DPVs in the SBWR. The performance requirements of the ESBWR DPVs are the same as for the SBWR DPVs; however, there are more DPVs in the ESBWR design.

c. The testing performed at Wyle Laboratories was performed in accordance with the Wyle Quality Assurance (QA) program, which met 10 CFR 50, Appendix B. The Wyle testing included operational and flow rate testing, seismic tests on the booster assemblies and indicator switch assemblies and seismic testing of the valve assembly. Testing performed by GE was performed in accordance with the GE QA program.

d. Required maintenance of the DPVs is discussed in Section 5.4.13.4 of DCD, Revision 4 and includes periodic initiator continuity checks, booster assembly testing and actuator internals inspections. Additional maintenance recommendations may be provided by the valve manufacturer.

e. GE Report GEFR-00879 identifies the following four design improvements, all of which will be addressed in the final DPV valve design. This action is being tracked in the GEH corrective action program.

- Redesign of the "nipple retainer" to minimize the potential for damage on squib valve firing.
- Redesign of the connection between the position switch and the cable or elimination of the position switch in favor of monitoring tailpipe temperature or vibration to verify valve opening.
- Redesign of the initiator assembly to improve reliability, in response to failures during EQ testing.
- Addition of locking mechanisms for various threaded connections to prevent loosening during service.

f. The steam volume available in the flow loop (which included three accumulators and the associated piping) was about 1442 ft^3. Four steam blowdown tests were performed, and based on the test results, the flow rate through the DPV valve at the design pressure of 1100 psia would be about $2.4x10^6$ lbs/hr, which bounds the design requirement of $1.9x10^6$ – $2.3x10^6$ lbs/hr at 1100 psia.

DCD Impact

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