



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 06-299
Supplement 2

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**Subject: Response to Portion of NRC Request for Additional
Information Letter No. 75 Related To ESBWR Design
Certification Application -- Evaluation of Postulated Pipe
Breaks – RAI 3.6-6 S01**

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 (NRC) Request for Additional Information (RAI) sent by NRC letter No. 75 dated October 10, 2006, Reference 1. The previous response was submitted via Reference 2 in response to NRC Letter No. 45, Reference 3. RAI 3.6-6 S01 is addressed in Enclosure 1.

Please note that NRC letter no. 45, dated August 3, 2006, submitted NRC request 3.6-6b; however, the request did not specify a response date. Subsequently, NRC letter no. 75 identified a requested response date for this item. For processing and tracking purposes, GEH assigned RAI number 3.6-6 S01 to NRC request 3.6-6b.

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

Sincerely,

James C. Kinsey
Vice President, ESBWR Licensing

DOB
NRC

References:

1. MFN 06-387, Letter from the U.S. Nuclear Regulatory Commission to David H. Hinds. *Request for Additional Information Letter No. 75, Related To ESBWR Design Certification Application*, dated October 10, 2006.
2. MFN 06-299, Letter from David Hinds to the U.S. Nuclear Regulatory Commission, *Response to Portion of NRC Request for Additional Information Letter No. 45 Related to ESBWR Design Certification Application - Protection against Dynamic Effects Associated with the Postulated Rupture of Piping - RAI Numbers 3.6-1 through 3.6-10*, dated August 28, 2006.
3. MFN 06-271, Letter from the U.S. Nuclear Regulatory Commission to David H. Hinds, *Request for Additional Information Letter No. 45, Related To ESBWR Design Certification Application*, dated August 3, 2006.

Enclosure:

1. MFN 06-299 Supplement 2, Response to Portion of NRC Request for Additional Information Letter No. 75 Related to ESBWR Design Certification Application Evaluation of Postulated Pipe Breaks -- RAI Number 3.6-6 S01

cc:	AE Cubbage	USNRC (with enclosure)
	RE Brown	GEH/Wilmington (with enclosure)
	GB Stramback	GEH/San Jose (with enclosure)
	DE Hinds	GEH/Wilmington (with enclosure)
	eDRF 0000-0075-1590	(RAI 3.6-6 S01)

Enclosure 1

MFN 06-299 Supplement 2

Response to Portion of NRC Request for

Additional Information Letter No. 75

Related to ESBWR Design Certification Application

Evaluation of Postulated Pipe Breaks

RAI Number 3.6-6 S01

NRC RAI 3.6-6

In DCD Tier 2, Rev. 1, Section 3.6.2.2, GE states that blowdown forcing functions are determined by the method specified in Appendix B of ANSI/ANS-58.2. However, GE did not provide any details as to how the blowdown forces are calculated for the ESBWR design, and also did not provide any sample calculation to illustrate the adequacy of any analytical method. Also, there does not appear to be any consideration of how potential feedback between the jet and any nearby reflecting surface(s), which can increase substantially the dynamic jet forces impinging on the nearby target component and the dynamic thrust blowdown forces on the ruptured pipe through resonance, is considered.

Provide details (including the methods and computer programs, if any), with examples, for calculating the blowdown forcing functions at break locations that will be used by COL applicant. Also, include a description of how feedback amplification of dynamic blowdown forces will be considered in the calculation.

GE Response

Enclosure 2 provides sample calculations prepared for a typical ABWR Plant for the pipe break forcing functions for main steam pipe break at terminal ends, RPV nozzle and Turbine Stop Valve which is a representative method to be used for ESBWR Plant.

DCD Impact

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

NRC RAI 3.6-6 S01

Part (b) of RAI 3.6-6 was not answered in the GE Response MFN 06-299, dated 8/28/06. Part (b) reads as follows:

(b) Also, include a description of how feedback amplification of dynamic blowdown forces will be considered in the calculation.

This portion dealing with ANS 58.2 issues was deferred pending further discussion. In NRC Letter #75 [MFN 06-387], NRC specified a response date of 11/22/06.

GEH Response

The feedback amplification of dynamic blowdown forces to the broken pipe is calculated by nonlinear time history analysis of the piping system. The calculated time history responses automatically includes the appropriate amplification factors.

The feedback/resonance amplification for jet impingement to the component/structure interacting due to the blowdown loads is accounted for in the analysis by modeling the structure and applying the jet impingement time history load. Also, instead of a dynamic analysis, an equivalent static analysis can be performed with the use of a dynamic load factor as follows:

$$FS = DLF (F_{imp \max})$$

Where,

FS = Equivalent static impingement force

DLF = Dynamic load factor

Fimp max = Maximum value of the jet impingement force

The impingement force may conservatively be assumed to occur instantaneously and a DLF = 2.0 is used. A separate value for DLF may be analytically established based on DLF = dynamic deflection/ static deflection of the object being impinged upon.

DCD Impact

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