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Subject: **Response to Portion of NRC Request for Additional Information Letter No. 109 Related to ESBWR Design Certification Application, RAI Number 19.1-86 S01**

The purpose of this letter is to submit the GE Hitachi Nuclear Energy (GEH) response to the U.S. Nuclear Regulatory Commission (NRC) Request for Additional Information (RAI) sent by NRC letter dated October 12, 2007 (Reference 1). Previous RAIs and responses were transmitted in References 2 and 3. The GEH response to RAI Number 19.1-86 S01 is in Enclosure 1.

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

Sincerely,

James C. Kinsey
Vice President, ESBWR Licensing

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NRO

Reference:

1. MFN 07-555, Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, *Request for Additional Information Letter No. 109 Related to ESBWR Design Certification Application*, October 12, 2007.

2. MFN 07-422. *Response to Portion of NRC Request for Additional Information Letter No. 88 Related to ESBWR Design Certification Application ESBWR Probabilistic Risk Assessment RAI Numbers 19.1-81 through 19.1-95 and 19.1-97 through 19.1-101.* August 8, 2007.

3. MFN 06-551, Letter from U.S. Nuclear Regulatory Commission to David H. Hinds, *Request for Additional Information Letter No. 88 Related to ESBWR Design Certification Application.* December 26, 2006.

Enclosure:

1. Response to Portion of NRC Request for Additional Information Letter No. 109 Related to ESBWR Design Certification Application ESBWR Probabilistic Risk Assessment, Regulatory Treatment of Non-Safety Systems (RTNSS) RAI Number 19.1-86 S01

cc:	AE Cubbage	USNRC (with enclosure)
	GB Stramback	GEH/San Jose (with enclosure)
	RE Brown	GEH/Wilmington (with enclosure)
	eDRFSection	0000-0078-5806

Enclosure 1

MFN 07-422

Supplement 3

Response to Portion of NRC Request for Additional Information Letter No. 109 Related to ESBWR Design Certification Application

ESBWR Probabilistic Risk Assessment

RAI Numbers 19.1-86 S01

NRC RAI 19.1-86

The staff reviewed P&IDs for the Reactor Water Cleanup/Shutdown Cooling System (RWCU/SDC), evaluated piping penetrations in the reactor vessel bottom head upstream of containment isolation valves in the RWCU/SDC, and found numerous piping connections to low conductivity waste and the process sampling system. To justify that draindown events do not need to be quantified in the shutdown PRA, please document: (1) the sizes of the lines in the reactor vessel bottom head and (2) the administrative controls necessary to prevent these lines from becoming RCS draindown paths from operator error.

GEH Response (original)

RWCU pipe drawings have been evaluated. Two potential draindown paths exist upstream of the containment isolation valves per train (a total of four). The first one on each train is a 20mm line to the Primary Sample System. This line has a 20 mm drain connection upstream of the containment isolation valves and a line that goes to the Primary Sample System. The drain connection has two normally closed manual isolation valves and is a capped connection. The line to the Primary Sample System has two normally closed/fail closed isolation valves with valve position indication available. The second path on each train is a 20mm vent line with two normally closed manual isolation valves and a pipe cap installed. Because of the small sizes associated with these lines (20mm), they are not assumed to be credible RCS drain paths needing detailed analysis.

DCD/NEDO-033201 Impact

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

No changes will be made to. NEDO-33201 Rev 2 in response to this RAI .

NRC RAI 19.1-86 S01

The staff has reviewed GEH's responses to RAI 19.1-86 and 19.1-87. Based on the submitted information, the staff cannot conclude that operator induced leaks are negligible compared to pipe breaks with a frequency of 1E-7 per year. (EPRI reported an initiating event frequency for leaks or diversions of 2.8E-5 per hour.) Based on review of the P&IDs for the RWCU/SDC system, the staff found numerous piping penetrations in the vessel bottom head to Low Conductivity Waste. The staff also found piping lines to the Primary Sample System that are upstream of the RWCU/SDC containment isolation valves. Also, the staff is aware of the use of freeze seals on the "first-off" isolation valves in the RWCU drain lines in operating BWRs. Failure of these freeze seals can result in an unisolable leak (See Information Notice 91-41). GEH responded that these lines are small. However, pipe breaks of instrument lines are modeled in the PRA. In addition, the drain connection valves and the Primary Sample System valves have no position or alarm indication in the control room. Please justify in the PRA why control room position indication and position alarms and administrative controls on the use of freeze seals are not needed given reported pipe break frequencies on the order of 1E-7 per year.

GEH Response

One design goal of the ESBWR is to eliminate the need for freeze seal activities on lines attached to the reactor vessel. All power operated equipment and valves that require maintenance have maintenance valves installed such that freeze seals will not be required.

The drawing reviewed in developing the above question has been revised. Current P&IDs show that the lines in question to Low Conductivity Waste (LCW) have been relocated. The lines leading to LCW are now located downstream of the isolation valves. Any leaks or flow diversions from these lines would be automatically isolated. The other lines in question are to the Primary Sample System. These lines are monitored by the Leak Detection & Isolation System (LD&IS) and have two redundant isolation valves.

The only piping penetrations in the vessel bottom on the current P&ID go to RWCU/SDC, and the Primary Sample System. All flow paths associate with these systems or attached to them are downstream of isolation valves. The only exceptions to this are 20mm drain and vent lines near the isolation valves. These small lines have two normally closed manual valves and a threaded cap. The ESBWR PRA has assumed that these small lines (20mm) are not credible RCS drain paths needing detailed analysis. Refer to DCD Revision 4, Section 2.6.1 for additional information on the RWCU/SDC system.

With the current design, only two leak and diversion scenarios exist. In one scenario, the leak or inventory loss is somewhere downstream of redundant isolation valves. In these cases, the system would automatically isolate the leak on either RPV low level, or SDC flow mismatch (both provide auto isolation signal via the LD&IS). The only other leak scenarios involve 20mm lines. These lines are too small to provide a significant leak. Based the current system design, the risk associated with operator induced primary coolant leaks during shutdown is negligible.

DCD/NEDO-33201 Impact

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

No NEDO-33201 changes will be made in response to this RAI.