



**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 07-422, Supplement 1

Docket No. 52-010

December 6, 2007

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. 109 Related to ESBWR Design  
Certification Application, RAI Number 19.1-100S01**

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). The initial RAI transmittal (Reference 2) responded to the NRC request of Reference 3. The GEH response to RAI Number 19.1-100S01 is in Enclosure 1.

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

Sincerely,

James C. Kinsey  
Vice President, ESBWR Licensing

DAG  
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 Hinds, *Request for Additional Information Letter No. 88 for the 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 Regulatory ESBWR Probabilistic Risk Assessment, Regulatory Treatment of Non-Safety Systems (RTNSS) RAI Number 19.1-100S01

cc: AE Cubbage    USNRC (with enclosure)  
GB Stramback    GEH/San Jose (with enclosure)  
RE Brown        GEH/Wilmington (with enclosure)  
eDRFSection    0000-0078-1993

**Enclosure 1**  
**MFN 07-422, Supplement 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 19.1-100S01**

**NRC RAI 19.1-100(original)**

*Address common cause failure of non-safety related components for loss of shutdown cooling. As described in PRA Section 20.4.4.6, Loss of Shutdown Cooling was excluded from the initiating events assessment since both trains of RWCU/SDCS need to fail to cause a loss of the decay heat removal function. Common cause failure of the non-safety related RWCU/SDC pumps or the common cause failure of the non-safety related Reactor Component Cooling Water System (RCCWS) pumps was not considered. Please revise the RTNSS evaluation to consider common cause failure of non-safety related components associated with RWCU/SDCS and its support systems for the shutdown initiating events evaluation.*

**GEH Response**

The initiating event frequency for 'Loss of both RWCU/SDC trains' has been revised to now include several common cause failures that could lead to loss of both trains. The value does not, however, include loss of RCCWS pumps. The initiating event 'Loss of all Service Water PSWS/RCCWS' accounts for loss of the RCCWS pumps. The value for that initiator is from Chapter 2 of NEDO-33201 (Table 2.3-3).

The Loss of both RWCU/SDC initiating event in revision 1 of NEDO-33201 was obtained from the common cause failure of the RWCU pumps to run. The new initiating event is the sum of several RWCU common cause failures.

The new number includes CCF failures for:

- Pumps to run,
- AOV/NOV valves to spuriously transfer to de-energized position,
- MOVs to close, and
- Suction Transmitters failing low.

The frequency does not include RWCU pumps CCF failure to start, and breakers failing to close. Since at least one train is running during shutdown, these events were not credited in determining the shutdown initiating event for loss of both trains (NEDO-33201 Chapter 16, Table 16.3-3b).

The evaluation section in Section *DCD chapter 19* states:

***i. PRA Initiating Events Assessment***

*The At-Power and Shutdown PRA models are reviewed to determine whether non-safety SSCs could have a significant effect on the estimated frequency of initiating events. The following screening criteria are imposed on the at-power and shutdown initiating events:*

- *Are nonsafety related SSCs considered in the calculation of the initiating event frequency?*
- *Does the unavailability of the nonsafety-related SSCs significantly affect the calculation*

*of the initiating event frequency?*

- *Does the initiating event significantly affect CDF or LRF for the baseline PRA?*

*If the answer to all three of these questions is "Yes", then the non-safety SSC is a RTNSS candidate. The results are discussed below.*

With the above criteria, RWCU/SDC is not a candidate for regulatory oversight. The answer to the third questions above is 'No' for RWCU. There is no RWCU initiating event in the Level 1 PRA model. Loss of RWCU/SDC is only an initiating event during shutdown. Additionally, with a higher initiating event frequency than the previous revision, Loss of both RWCU/SDC trains accounts for less than 1% of the total shutdown CDF (NEDO 33201, Chapter 16, Table 16.9-2).

**DCD/NEDO-033201 Impact**

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

NEDO-33201 Rev 2 will be revised as noted above.

**NRC RAI 19.1-100 S01**

*The staff has reviewed GEH's response to RAI 19.1-100 regarding the RTNSS evaluation of RWCU/SDC. The staff learned that the failure data for loss of both RWCU/SDC trains, the loss of Preferred Power, and the loss of the RCCWS is based on the data for operating plants. However, in current plants, the RHR system and its support systems have Technical Specifications. The staff does not believe that this data is applicable for a new design in which the RHR function is provided by non-safety-related equipment with no increased regulatory treatment (RTNSS). The staff also noted that if these non-safety-related systems become unreliable, failure of these systems become a dominant risk contributor. Please revise the RTNSS evaluation to either include the RWCU/SDC and its support systems in the RTNSS program, or describe what controls will be in place to maintain the availability of these systems consistent with what was assumed in the PRA.*

**GEH Response**

Although the RWCU/SDC system does not satisfy the RTNSS criteria, residual heat removal (RHR) is also provided by ICS, which is safety-related, and by three FAPCS functions that are within the scope of RTNSS. The FAPCS functions of coolant injection, suppression pool cooling, and backup shutdown cooling are in the RTNSS category. FAPCS has regulatory oversight in the form of availability controls.

The reliability and availability of RWCU/SDC and its support systems are managed by the licensee per the requirements in 10 CFR 50.65(a)(4), as described in DCD Tier 2 Section 17.4. RWCU/SDC components also have an impact on power generation. Also, because shutdown risk is dominated by loss of coolant events, RWCU/SDC components have a relatively low importance. Therefore, it is unlikely that their performance would degrade to the point where there is a measurable effect on Core Damage Frequency.

**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.