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Rockville, MD 20852

Subject: **Follow-up Response to NRC Request for Additional Information Letter No. 360 Related to ESBWR Design Certification Application – Technical Specifications - RAI Number 16.2-32 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 No. 360, dated July 28, 2009 (Reference 1).

GEH response to RAI 16.2-32 S01 is provided in Enclosure 1. The original GEH response to RAI 16.2-32 is also included for completeness.

Sincerely,

Richard E. Kingston

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Vice President, ESBWR Licensing

Reference:

1. MFN 09-527 - Letter from U.S. Nuclear Regulatory Commission to Jerald G. Head, GEH, *Request For Additional Information Letter No. 360 Related To ESBWR Design Certification Application*, dated July 28, 2009

Enclosure:

1. MFN 06-431, Supplement 13 -Response to NRC Request for Additional Information Letter No. 360 Related to ESBWR Design Certification Application – Technical Specifications - RAI Number 16.2-32 S01.

cc:	AE Cubbage	USNRC (with enclosure)
	JG Head	GEH/Wilmington (with enclosure)
	DH Hinds	GEH/Wilmington (with enclosure)
	eDRF Section	0000-0106-0279 (RAI 16.2-32 S01)

MFN 06-431 Supplement 13

Enclosure 1

Response to Portion of NRC Request for Additional Information Letter No. 360 Related to ESBWR Design Certification Application Technical Specifications

RAI 16.2-32 S01

Original NRC RAI 16.2-32

Limiting conditions for operation (LCOs) are the lowest functional capability or performance levels of equipment required for safe operation of the facility. When an LCO of a nuclear reactor is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the technical specifications until the condition can be met (10 CFR 50.36(c)(2)). The Automatic Depressurization System (ADS) is an integral part of the ECCS because Gravity Driven Control System (GDCS) flow to the reactor pressure vessel (RPV) requires the RPV to be close to containment pressure (B 3.5.1 Automatic Depressurization System (ADS) - Operating). Currently, TS 3.5.1 ACTIONS require a shutdown if three or more ADS SRVs are inoperable OR three or more (depressurization valves) DPVs are inoperable, but would permit continued operation for up to two weeks if two ADS SRVs and two DPV (four valves total) were inoperable. Provide the LCO or Action that addresses combinations of degraded ADS SRV, DPV and GDCS, or justify not having combinations. For guidance, note that NUREG-1434 STS address combinations of ADS and low pressure systems being inoperable. For example, STS LCO 3.5.1 says: "One ADS valve inoperable AND One low pressure ECCS injection/spray subsystem inoperable."

Original GEH Response

Design Control Document (DCD) Tier 2, Rev. 4, Chapter 16, LCO 3.5.1, “Automatic Depressurization System (ADS) – Operating,” LCO 3.5.2, “Gravity-Driven Cooling System (GDCS) – Operating,” and LCO 3.5.4, “Isolation Condenser System (ICS) - Operating,” include Required Actions enclosed in brackets. As described in the response to RAI 16.2-32 (GE Letter MFN 06-431, November 13, 2006), these Required Actions were pending completion of analyses demonstrating that the Emergency Core Cooling System (ECCS) safety function is maintained under these conditions.

In DCD Revision 5, GEH is revising LCO 3.5.1, LCO 3.5.2, and LCO 3.5.4 and the supporting Bases to establish Required Actions based on the existing analyses described in DCD Tier 2, Rev. 4, Table 6.3-6, “Single Failure Evaluation.” This change establishes Actions and Completion Times (CTs) that require the plant be placed outside the Applicability when more than one ADS valve, more than one GDCS injection branch line, more than one GDCS equalizing train, or more than one ICS train is inoperable. Additionally, LCO 3.5.1, LCO 3.5.2, and LCO 3.5.4 are revised to require the operability of ECCS actuation by the Diverse Protection System (DPS) and add Actions when DPS actuator is not operable. Finally, the Surveillance Requirements (SRs) for periodic verification of squib continuity were expanded to include both squib actuators and solenoid actuators and include verification that the actuators are associated with electrical divisions that are required to be operable by LCO 3.8.6, “Distribution Systems - Operating,” to assure continuity with the corresponding instrumentation support systems.

In conjunction with these changes, GEH is revising the Bases to clarify requirements for the actuators (i.e., squib initiators and solenoid valves) needed to support ECCS valve operability. Each ECCS valve has four actuators - three that are initiated by Safety System Logic and Control/Engineered Safety Features (SSLC/ESF) instrumentation and one that is initiated by the DPS. Any one of the four actuators is capable of actuating the ECCS valve. Because only three of the four safety-related electrical and instrumentation actuation divisions are required to be operable, two of the three SSLC/ESF actuators are required for ECCS valve operability. Two SSLC/ESF actuators are necessary to ensure the minimum requirements for ECCS specified in Table 6.3-6 are met if a single failure occurs in one of the three required electrical or instrumentation actuation divisions. Because all ECCS valves will still actuate when a required electrical or instrumentation division fails, minimum ECCS requirements are met even when an individual ECCS valve fails concurrently with the failure of a required electrical or instrumentation actuation division. A 14 day Completion Time for restoration of an inoperable ADS valve, GDCS injection line, GDCS equalizing train, or ICS train is proposed based on engineering judgment considering the low probability of the failure of a required electrical or instrumentation actuation division concurrent with a design basis event during this period.

In addition to ECCS actuation by the SSLC/ESF actuators, each of the ECCS valves is independently actuated by the DPS. New Action A applies when one or more ADS, DCS, or ICS valves have an inoperable DPS actuator. In this Condition, required SSLC/ESF actuators will actuate the minimum number of valves assumed in the design basis LOCA analysis concurrent with any additional single failure. However, design features intended to mitigate the possibility of digital protection system common mode failures may not be available. The Completion Time for the inoperable DPS actuators allows restoration the next time the plant is placed in MODE 5 (i.e., prior to entering MODE 2 or MODE 4 from MODE 5). This Completion Time is acceptable because the required SSLC/ESF actuators will actuate the minimum number of GDCS valves required to respond to the design basis LOCA concurrent with any additional single failure.

DCD Impact

DCD Tier 2, Chapter 16, LCO 3.5.1, LCO 3.5.2, and LCO 3.5.4 and supporting Bases were revised in Revision 5.

NRC RAI 16.2-32 S01

The responses to RAI 16.2-32 (MFN 06-431, November 13, 2006, and MFN 06-431 Supplement 12, May 5, 2008), did not fully address the central issue raised by the staff, namely the need for action requirements addressing conditions in which two different types of ECCS subsystems or components are concurrently inoperable. Specifically, GEH is requested to revise Preliminary Revision 6 of GTS 3.5.2, GDCS - Operating, by inserting Condition E:

One branch line of the injection subsystem inoperable for reasons other than Condition A or B.

AND

One equalizing train inoperable for reasons other than Condition A or B.

with Required Actions E.1 and E.2:

Restore branch line of the injection subsystem to OPERABLE status.

OR

Restore equalizing train to OPERABLE status.

Each action should have a completion time of 24 hours or justify a longer time. Existing Condition E should be renumbered Condition F. GEH is also requested to make suitable additions and changes to the Actions Section of the bases for GTS 3.5.2.

GEH is requested to also consider whether a similar change is needed in GTS 3.5.3, and explain why not if no changes are proposed.

Without the requested changes, an ESBWR licensee could operate for up to 14 days with a branch line and an equalizing train concurrently inoperable. The bases do not discuss this situation or why 14 days would be acceptable.

GEH Response

In this RAI, the staff requested changes to GTS 3.5.2, and conforming changes to GTS 3.5.3, to address a condition for the combination of one branch line of the injection subsystem of GDCS and one equalizing train of GDCS inoperable. The GDCS injection subsystem and the GDCS equalization subsystem perform separate, independent functions. As such, an inoperability that includes the combination of one branch line of the injection subsystem of GDCS and one equalizing train of GDCS does not reflect a further degradation of the functional capability beyond that reflected individually in GTS 3.5.2 Conditions C and D. Additionally, there are no design basis events or credible failures that impair both the injection and the equalization functions simultaneously. For this reason, an inoperability that includes the combination of one branch line of the injection subsystem of GDCS and one equalizing train of GDCS does not represent additional risk above that represented by the individual cases of GTS 3.5.2 Conditions C and D. Based on the considerations above, no changes to GTS 3.5.2 or GTS 3.5.3 are warranted.

DCD Impact

No DCD changes will be made in response to this RAI