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Supplement 3

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**Subject: Response to Portion of NRC Request for Additional Information  
Letter No. 63 Related to ESBWR Design Certification Application -  
Technical Specifications - RAI Number 16.2-45 S01**

Enclosure 1 contains the subject supplemental RAI response resulting from a March 27, 2007 e-mail from the NRC. GE's original response was provided in the Reference 1 letter.

If you have any questions or require additional information regarding the information provided here, please contact me.

Sincerely,



James C. Kinsey  
Project Manager, ESBWR Licensing



NLO

References:

1. MFN 07-022, Letter from Jim Kinsey to U.S. Nuclear Regulatory Commission, *Response to Portion of NRC Request for Additional Information Letter No. 63 Related to ESBWR Design Certification Application – Technical Specifications – RAI Numbers 16.2-23, 16.2-30, 16.2-45, 16.2-50, 16.2-54, 16.2-73, 16.2-74, 16.2-76, and 16.2-77*, January 19, 2007

Enclosures:

1. MFN 07-022, Supplement 3 - Response to Portion of NRC Request for Additional Information Letter No. 63 Related to ESBWR Design Certification Application - Technical Specifications - RAI Number 16.2-45 S01

cc: AE Cubbage USNRC (with enclosures)  
DH Hinds GEH (with enclosures)  
RE Brown GEH (w/o enclosures)  
eDRF 0069-9454

**Enclosure 1**

**MFN 07-022, Supplement 3**

**Response to Portion of NRC Request for**

**Additional Information Letter No. 63**

**Related to ESBWR Design Certification Application**

**- Technical Specifications -**

**RAI Number 16.2-45 S01**

**NRC RAI 16.2-45**

*Justify deviations from NUREG-1434, Rev.3, STS 3.6.1.3 Applicability - are no ESBWR containment isolation instrumentation functions required in Mode 5?*

**GE Response**

NUREG-1434, Revision 3, Standard Technical Specification (STS) Limiting Condition for Operation (LCO) 3.6.1.3, "Primary Containment Isolation Valves (PCIVs)," specifies the requirements for PCIVs. LCO 3.6.1.3 is applicable in Modes 1, 2, and 3, and in other Modes when the associated instrumentation is required to be Operable per LCO 3.3.6.1, "Primary Containment Isolation Valve Instrumentation." A review of NUREG-1434, LCO 3.3.6.1 shows that the following Primary Containment Isolation Instrumentation Functions are required to be Operable in Modes other than Modes 1, 2, or 3:

- Primary Containment Isolation due to Containment and Drywell Ventilation Exhaust Radiation – High (required during movement of recently irradiated fuel assemblies in primary or secondary containment, or operations with a potential for draining the reactor vessel); and
- Shutdown Cooling System Isolation due to Reactor Vessel Water Level – Low, Level 3 (required in Modes 4 and 5).

ESBWR Design Control Document (DCD), Tier 2, Revision 1, Chapter 16 LCO 3.6.1.3, "Containment Isolation Valves (CIVs)," specifies the requirements for ESBWR CIVs. LCO 3.6.1.3 is applicable in Modes 1, 2, 3, and 4. With respect to isolation instrumentation, the requirements of NUREG-1434, LCO 3.3.6.1 were reformatted into four specifications. LCO 3.3.6.1, "Main Steam Isolation Valve (MSIV) Instrumentation," specifies the requirements for instrumentation associated with MSIV isolation and LCO 3.3.6.3, "Isolation Instrumentation," specifies the requirements for instrumentation associated with CIVs and the reactor building boundary isolation dampers. In addition, the actuation logic associated with these instrumentation specifications is separately specified in LCO 3.3.6.2, "Main Steam Isolation Valve (MSIV) Actuation," and in LCO 3.3.6.4, "Isolation Actuation," respectively. With respect to containment isolation, a review of the related specifications (i.e., LCO 3.3.6.1, LCO 3.3.6.2, LCO 3.3.6.3, and LCO 3.3.6.4 shows that none of the specified Functions are applicable in Modes other than Modes 1, 2, 3, and 4. Therefore, the applicability of LCO 3.6.1.3 is consistent with the requirements LCO 3.3.6.1, LCO 3.3.6.2, LCO 3.3.6.3, and LCO 3.3.6.4.

The isolation instrumentation provides the capability to generate isolation signals to the containment isolation valves and the reactor building boundary isolation dampers. The function of the isolation valves and dampers, in combination with other accident mitigation systems, is to limit fission product release during and following postulated Design Basis Accidents (DBAs). NUREG-1434, LCO 3.3.6.1 requires the Primary Containment Isolation due to Containment and Drywell Ventilation Exhaust Radiation – High Function to be Operable during movement of recently irradiated fuel assemblies in primary or secondary containment, or operations with a potential for draining the reactor vessel. A review of the NUREG-1434, LCO 3.3.6.1 Bases shows that this function is required to be Operable during movement of recently irradiated fuel assemblies in primary or secondary containment, or operations with a potential for draining the

reactor vessel because the Function is assumed to initiate isolation of the primary containment during a fuel handling accident. The Fuel Handling Accident described in the ESBWR DCD, Revision 1 Section 15.4.1, "Fuel Handling Accident," does not credit automatic isolation of CIVs or the reactor building boundary isolation dampers while showing acceptable dose consequences. Therefore, this function is not required to be Operable during movement of irradiated fuel or operations with a potential for draining the reactor vessel.

NUREG-1434, LCO 3.3.6.1 requires the Shutdown Cooling System Isolation due to Reactor Vessel Water Level – Low, Level 3 Function to be Operable in Modes 3, 4, and 5. A review of the NUREG-1434, LCO 3.3.6.1 Bases shows that this function is required to be Operable in Modes 3, 4, and 5 to support actions to ensure that the reactor pressure vessel water level does not drop below the top of the active fuel during a vessel draindown event caused by a leak (e.g., pipe break or inadvertent valve opening) in the Residual Heat Removal (RHR) Shutdown Cooling System. This Function is not required, in Modes 3, 4, and 5, to support containment isolation, but is required to support system isolation in these Modes.

The ESBWR is a passive plant and does not have the traditional RHR system. For normal shutdown and cooldown, residual and decay heat is removed via the main condenser and the Reactor Water Cleanup/Shutdown Cooling (RWCU/SDC) system, described in DCD, Tier 2, Revision 1, Section 5.4.8. The RWCU/SDC CIVs are instrumented to isolate the RPV upon detection of a leak from the RWCU/SDC system. This isolation feature protects the reactor core by minimizing the potential loss of RPV coolant inventory. Because this isolation function is not required to close CIVs to limit fission product release during and following postulated DBAs, RWCU/SDC isolation on it was not included as a required Function in LCO 3.3.6.3. GE proposes to revise DCD, Tier 2, Chapter 16 and 16B to include a new specification in Section 3.4, "Reactor Coolant System (RCS)," to address the RWCU/SDC system isolation valves and reactor vessel isolation function in shutdown modes.

#### **DCD Impact**

DCD Tier 2, Chapter 16 and Chapter 16 B will be revised in a future update as noted in the above discussion.

#### **NRC RAI 16.2-45, Supplement 1**

*Requiring containment isolation valves (CIVs) and associated instrumentation functions during operations with a potential for draining the reactor vessel (OPDRVs) and irradiated fuel movement should be considered for defense in depth. Also, GE's response to this RAI indicated that a new LCO for Reactor Water Cleanup/Shutdown Cooling (RWCU/SDC) isolation on RWCU system leak detection would be added in TS Section 3.4. When will this TS be added?*

#### **GEH Response**

Operations with a potential for draining the reactor vessel (OPDRVs) (Note: This is an undefined phrase historically used in BWR Standard Technical Specifications) reflect potential maintenance conditions where inadvertent unmitigated losses of coolant within the drywell could lead to core uncover. The condition of OPDRVs in the BWR/6 Standard Technical Specifications (NUREG-1434, Revision 3.1) requires mitigative features that essentially ensure capability of establishing a secondary containment boundary.

For the ESBWR, NEDO-33201, "ESBWR Certification Probabilistic Risk Assessment," dated September 2006, Section 16, "Shutdown Risk," evaluates drain down of the reactor pressure vessel (RPV) or Loss of Coolant Accidents (LOCAs) during shutdown. This evaluation concludes that closure of both lower drywell hatches provides the appropriate mitigative response for the shutdown LOCA below top of active fuel (TAF) initiators during Modes 5 and 6.

GEH proposes to provide an Availability Control within the Regulatory Treatment of Non-Safety Systems (RTNSS) Controls to be included in DCD, Tier 2, Chapter 19, imposing a limiting condition that will assure the ability to immediately close the lower drywell hatches during operation in Modes 5 and 6 during OPDRVs. The equipment hatch for removal of equipment during maintenance and an air lock for entry of personnel provided in the lower drywell are sealed under normal plant operation but may be opened when the plant is shut down. This Availability Control will also provide for surveillance requirements to monitor this condition and appropriate compensatory actions and restoration timeframes for operation with the lower drywell hatches not available for closure.

For the ESBWR Fuel Handling Accident (FHA), as stated in the response to RAI 15.4-1, provided in MFN 07-017, dated February 16, 2007, dose consequences are not dependent on containment closure. Therefore, operability of containment isolation valves and the associated instrumentation is not required during handling of irradiated fuel.

Requirements related to Reactor Water Cleanup/Shutdown Cooling (RWCU/SDC) isolation in Modes 5 and 6 were incorporated in DCD Revision 3, Chapter 16, Technical Specification (TS) 3.3.6.3, "Isolation Instrumentation," and TS 3.3.6.4, "Isolation Actuation." These changes implement the intent of the response to NRC RAI 16.2-45. This departure in location of the added Technical Specification requirements was highlighted in the list of Chapter 16 changes from Revision 2 to Revision 3 (i.e., line item numbers 40, 47, 49, 52, 53, and 67, provided in MFN 07-108, dated February 22, 2007)

#### **DCD Impact**

An Availability Control for the lower drywell equipment hatch and personnel airlock will be included in an Appendix to DCD, Tier 2, Chapter 19, as shown below.

Lower Drywell Hatches  
AC 3.6.2

ACM 3.6 CONTAINMENT SYSTEMS

AC 3.6.2 Lower Drywell Hatches

ACLCO 3.6.2      The lower drywell personnel air lock and lower drywell equipment hatch shall be AVAILABLE for closure.

APPLICABILITY:      MODES 5 and 6, during operations with a potential for draining the reactor vessel (OPDRVs).

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Required Drywell equipment hatch not AVAILABLE for closure.	A.1      Initiate action to suspend OPDRVs.	Immediately
B. Required Action and associated Completion Time not met.	B.1      Enter ACLCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
ACSR 3.6.2.1	Verify lower drywell hatch administrative closure plan is in place.	12 hours
ACSR 3.6.2.2	Verify lower drywell equipment hatch can be secured closed.	30 days
ACSR 3.6.2.3	Verify lower drywell personnel airlock can be secured closed.	30 days

Lower Drywell Hatches  
AC B 3.6.2

ACM B 3.6 CONTAINMENT SYSTEMS

AC B 3.6.2 Lower Drywell Hatches

BASES

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An equipment hatch for removal of equipment during maintenance and an air lock for entry of personnel are provided in the lower drywell. These access openings are sealed under normal plant operation but may be opened when the plant is shut down. Closure of both hatches is required for the shutdown Loss-of-Coolant Accident (LOCA) below top of active fuel (TAF) initiators during MODES 5 and 6. These LOCAs involve breaks in the RWCU/SDC drain lines and instrument lines and CRD housing/maintenance activities. Once the event has been detected, personnel must correctly diagnose the situation, make the decision to close the hatches, and manually close the equipment hatch and the personnel air lock. Administrative controls assure trained personnel will be continuously located in the area of the doors and appropriate administrative controls are in place to communicate awareness of potential breaches and effect decisions to secure the hatches.

The lower drywell hatch closure function is a nonsafety-related function that satisfies the significance criteria for Regulatory Treatment of Non-Safety Systems, and therefore requires regulatory oversight. The short-term availability controls for this function, which are specified as Completion Times, are acceptable to ensure that the availability of this function is consistent with the functional unavailability in the ESBWR PRA. The surveillance requirements also provide an adequate level of support to ensure that component performance is consistent with the functional reliability in the ESBWR PRA.

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