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Subject: **Response to Portion of NRC Request for Additional Information Letter No. 331 Related to ESBWR Design Certification Application – Technical Specifications – RAI Number 16.2-188**

Enclosures 1 and 2 contain the GE Hitachi Nuclear Energy (GEH) response to the subject NRC RAI transmitted via the Reference 1 letter.

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

Sincerely,

Lee F. Dougherty for

Richard E. Kingston
Vice President, ESBWR Licensing

Reference:

1. MFN 09-278, Letter from U.S. Nuclear Regulatory Commission to Jerald G. Head, *Request for Additional Information Letter No. 331 Related to ESBWR Design Certification Application,* April 20, 2009

Enclosures:

1. MFN 09-357 – Response to Portion of NRC Request for Additional Information Letter No. 331 Related to ESBWR Design Certification Application – Technical Specifications – RAI Number 16.2-188
2. MFN 09-357 – DCD Markups for RAI Number 16.2-188

cc:	AE Cubbage	USNRC (with enclosures)
	JG Head	GEH (with enclosures)
	DH Hinds	GEH (with enclosures)
	eDRF	102-5514

Enclosure 1

MFN 09-357

Response to Portion of NRC Request for

Additional Information Letter No. 331

Related to ESBWR Design Certification Application

- Technical Specifications -

RAI Number 16.2-188

NRC RAI 16.2-188

{{ NOTE: RAI Enclosure 2, Example ACTIONS for ESBWR Generic TS 3.5.5, is not repeated here. }}

The staff requests GEH to revise ACTION A of ESBWR generic TS 3.5.5 with enhanced remedial actions to provide greater assurance that in the event of a loss of offsite power with no OPERABLE ICS trains, a non-safety decay heat removal method will be available. This will reduce the probability that the GDCS (as required by LCO 3.5.3) and the ADS system (as required by SR 3.5.3.1) will be challenged to provide a means of decay heat removal. The suggested remedial actions reflect consideration of the ACTIONS of BWR/6 STS 3.4.10, "RHR Shutdown Cooling System – Cold Shutdown," and ABWR generic TS 3.4.8, "RHR Shutdown Cooling System – Cold Shutdown." The staff suggests that the ACTIONS and ACTION A be revised as shown in Enclosure 2; suitable changes should also be made to the bases. Note that "verify' is preferable to "ensure" in stating required actions.

The bases for ESBWR generic TS should state that two acceptable methods of decay heat removal include the following combinations, in order of preference, with each method supported by a separate available onsite AC electrical power source:

1. *Two RWCU/SDC subsystems (each subsystem supported by its own RCCWS and PSWS subsystems, i.e., having same onsite AC power source) in SDC mode (MODE 5 flow path for each subsystem: either or both suction locations from RPV, bypass RHX, through NRHX, through either pump, bypass demineralizer, bypass RHX, feedwater loop "A" or "B" for subsystem "B" or "A", respectively, and return to RPV via feedwater sparger. In MODE 4, flow may need to go through the RHX to ensure acceptable temperature for pump operation.)*
2. *RWCU/SDC subsystem "A" in SDC mode, and FAPCS subsystem "B" (each subsystem supported by its own RCCWS and PSWS subsystems, i.e., having same onsite AC power source). In this combination, both feedwater loops would be utilized. RWCU/SDC subsystem "A" would use feedwater loop "B" and FAPCS subsystem "B" would use feedwater loop "A". The FAPCS subsystem "B" is aligned to operate in the Alternate Shutdown Cooling (ASDC) mode (as described on DCD Tier 2 Section 9.1.3.2, on page 9.1-16): Water is drawn from the suppression pool, cooled and then discharged back to the reactor vessel via the LPCI injection flow path (via RWCU/SDC loop "B" and then Feedwater loop "A"). The warmer water in the reactor vessel rises and then overflows into the suppression pool via two opened safety-relief valves on the main steam lines, completing a closed loop for this mode operation. The FAPCS ASDC mode may also be used in MODE 4 provided suppression pool temperature remains acceptable for pump operation.*
3. *RWCU/SDC subsystem "B" in SDC mode and FAPCS subsystem "A" in ASDC mode – same as combination 2, but only feedwater loop "A" would be used.*
4. *Two FAPCS subsystems (each subsystem supported by its own RCCWS and PSWS subsystems, i.e., having same onsite AC power source) aligned to operate in the Alternate Shutdown Cooling (ASDC) mode – in this combination, only feedwater loop "A" would be used.*

Other combinations of non-safety systems with independent onsite AC electrical power sources that can perform the decay heat removal function may also be listed. However, if Required Action A.1 or A.2 cannot be met, then Condition B would be entered, which would ensure closure of the reactor building or OPERABILITY of the reactor building isolation function as a precaution to mitigate a total loss of active non-safety-system methods of decay heat removal in MODE 4 or 5, while no ICS trains are OPERABLE.

GEH Response

GTS 3.5.5, Isolation Condenser System (ICS) – Shutdown, will be revised as shown in Enclosure 2. The addition of Required Action A.1 eliminates the potential that the ICS could be intentionally removed from service. These revisions address the staff's concerns by providing enhanced remedial actions to provide greater assurance that a safety-related decay heat removal method will be available.

With these changes, the requested detail regarding alternate decay heat removal methods described in items (1) through (4) of this RAI is deemed unnecessary for inclusion in the GTS 3.5.5 Bases. The level of detail provided in the GTS 3.5.5 Bases is consistent with that contained in NUREG-1434, Standard Technical Specifications General Electric Plants, BWR/6, Revision 3.1.

DCD Impact

DCD Tier 2, Chapter 16, Sections 3.5.5 and B 3.5.5 will be revised as shown in Enclosure 2.

Enclosure 2

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DCD Markups for

RAI Number 16.2-188

3.5 Emergency Core Cooling Systems (ECCS)

3.5.5 Isolation Condenser System (ICS) - Shutdown

LCO 3.5.5 Two ICS trains shall be OPERABLE.

APPLICABILITY: MODES 3 and 4 when ≥ 2 hours since reactor was critical, MODE 5.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required ICS trains inoperable.	A.1 Initiate action to restore required ICS trains to OPERABLE status.	Immediately
	AND	
	A.2 Verify an alternate method of decay heat removal is available for each inoperable required ICS train.~~Ensure two methods of decay heat removal are available.~~	1 hour AND Once per 24 hours thereafter~~4 hours from discovery of each inoperable ICS train~~
	AND	
	A.3 Verify at least one method of decay heat removal is in operation.	1 hour AND Once per 12 hours thereafter
	AND	
	A.4 Monitor reactor coolant temperature and pressure.	Once per hour

BASES

LCO

This LCO requires that two trains of ICS be OPERABLE when shutdown to provide a backup method for decay heat removal. OPERABILITY of each condensate return valve and each of the two lower header vent valves requires OPERABILITY of two safety-related ~~actuator~~initiators associated with electrical divisions required by LCO 3.8.6. The condensate return bypass valve and lower head vent bypass valves are not required for ICS OPERABILITY.

With the RPV water level above the ICS steam supply line, OPERABILITY of the ICS function is not impacted (Ref. 2).

When in MODE 5, required IC loops require functionality of associated IC/PCC expansion pools as heat sink for the ICS condensers.

APPLICABILITY

This LCO requires that two trains of ICS be OPERABLE in MODES 3 and 4 when ≥ 2 hours since reactor was critical, and in MODE 5.

ACTIONS

A.1, A.2, A.3, and A.4

If one or more of the required ICS trains are not available, the plant may not have a reliable and passive alternative to RWCU/SDC for decay heat removal. Therefore, action must be taken immediately to restore the required ICS train(s) to operable status. ~~to ensure that a minimum of two methods capable of decay heat removal is available. The Completion Time is based on engineering judgment recognizing the need to maintain redundant decay heat removal capability.~~

With one of the two required ICS trains inoperable, the remaining train is capable of providing the required decay heat removal. However, the overall reliability is reduced. Therefore, an alternate method of decay heat removal must be provided. With both ICS trains subsystems inoperable, an alternate method of decay heat removal must be provided in addition to that provided for the initial ICS train inoperability. The 1-hour Completion Time is based on the decay heat removal function and the probability of a loss of the available decay heat removal capabilities. Furthermore, verification of the functional availability of these alternate method(s) must be reconfirmed every 24 hours thereafter. This will provide assurance of continued decay heat removal capability.

The required cooling capacity of the alternate method should be ensured by verifying (by calculation or demonstration) its capability to maintain or reduce temperature. Decay heat removal by ambient losses can be

BASES

ACTIONS (continued)

considered as, or contributing to, the alternate method capability. Alternate methods that can be used include (but are not limited to) the RWCU/SDC System and the Fuel and Auxiliary Pools Cooling System.

With one or more required ICS train(s) inoperable, at least one method of decay heat removal is verified to be in operation. The 1-hour Completion Time is based on engineering judgment recognizing the need to provide decay heat removal. Furthermore, verification must be reconfirmed every 12 hours thereafter. This will provide assurance of continued decay heat removal capability.

During the period when the required ICS train(s) is inoperable, the reactor coolant temperature and pressure must be periodically monitored to ensure proper function of the alternate method. The once per hour Completion Time is deemed appropriate.

B.1 and B.2

This Condition applies when the Required Actions and associated Completion Times are not met. In this Condition, action must be initiated immediately to establish reactor building refueling and pool area HVAC subsystem (REPAVS) and contaminated area HVAC subsystem (CONAVS) area isolation boundary. This can be accomplished by isolating the REPAVS and CONAVS dampers or verifying the automatic capability of the respective exhaust high radiation function. This action is needed to establish appropriate compensatory measures for a loss of decay heat removal.

SURVEILLANCE REQUIREMENTS

SR 3.5.5.1

This SR requires verification every 31 days that each ICS manual, power operated, and automatic valve in the flow path, that is not locked, sealed, or otherwise secured in position, is in the correct position. This SR is intended to ensure proper valve alignment in any flow path required for proper operation of the ICS. This SR does not apply to valves that are locked, sealed, or otherwise secured in correct, since these were verified to be in the correct position upon locking, sealing, or securing.

This SR does not require any testing or valve manipulation. Rather, it involves verification, through a system walkdown, that those valves outside containment and capable of being mispositioned are in the correct position.

BASES

pool and the ICS subcompartments are locked open and maintained in their correct position under administrative controls.

SURVEILLANCE REQUIREMENTS (continued)

SR 3.5.5.5

This SR requires verification every 24 months that the ICS actuates on an actual or simulated automatic initiation signal. The ICS is required to actuate automatically to perform its design function. This Surveillance test verifies that the automatic initiation logic will cause the ICS to operate as designed when a system initiation signal (actual or simulated) is received. The LOGIC SYSTEM FUNCTIONAL TEST performed in LCO 3.3.5.4 overlaps this Surveillance to provide complete testing of the assumed ICS function.

The 24 month Frequency for performing this SR is acceptable based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the SR were performed with the reactor at power.

REFERENCES

1. ~~Chapter~~ Section 5.4.6.

2. NEDO-33201, "ESBWR Design Certification Probabilistic Risk Assessment," Section 16.4.1.