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Subject: **Response to Portion of NRC Request for Additional Information Letter No. 340 Related to ESBWR Design Certification Application - Auxiliary Systems - RAI Number 9.1-16 S03**

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 340, dated June 9, 2009, Reference 1. The GEH response to the subject NRC RAIs is addressed in Reference 1. Enclosure 2 contains the DCD markups associated with this response.

If you have any questions about the information provided here, please contact me.

Sincerely,

Richard E. Kingston

Richard E. Kingston
Vice President, ESBWR Licensing

Reference:

1. MFN 09-397, Letter from the U.S. Nuclear Regulatory Commission to Jerald G. Head, Request for Additional Information Letter No. 340, Related To ESBWR Design Certification Application, dated June 9, 2009

Enclosures:

1. Response to Portion of NRC Request for Additional Information Letter No. 340 Related to ESBWR Design Certification Application - Auxiliary Systems - RAI Number 9.1-16 S03
2. Response to Portion of NRC Request for Additional Information Letter No. 340 Related to ESBWR Design Certification Application - Auxiliary Systems - RAI Number 9.1-16 S03 - DCD Markups

cc:

AE Cubbage	USNRC (with enclosures)
J G Head	GEH/Wilmington (with enclosures)
DH Hinds	GEH/Wilmington (with enclosures)
eDRF Section	0000-0096-5748, Revision 1

Enclosure 1

MFN 09-379

Response to Portion of NRC Request for

Additional Information Letter No. 340

Related to ESBWR Design Certification Application

Auxiliary Systems

RAI Number 9.1-16 S03

NRC RAI 9.1-16 S03

In RAI 9.1-16, the staff asked the applicant details of how the safety-related spent fuel pool (SFP) makeup water supplies and water supplies to the isolation condenser/ passive containment cooling (IC/PCC) pools would be protected from the effects of tornados and other natural phenomena. In its response by letter dated September 8, 2006, the applicant stated that the only safety-related components of the Fuel and Auxiliary Pool Cooling System (FAPCS) that exist outside of the reactor building are the emergency fill-up valves that are attached to the Reactor Building structure. The licensee stated valves are designed to seismic Category I standards as evidenced in DCD Tier 2, Table 3.2-1. The staff found this acceptable, but that it conflicted with the response to RAI 9.1-12. In RAI 9.1-16 S01 the staff asked the applicant to clarify its position. In its response dated May 3, 2007, the applicant stated it concurred, and noted that its response to RAI 9.1-12 S01 addressed this inconsistency. The staff noted in RAI 9.1-16 S02 that there were additional apparent inconsistencies in the level of protection afforded FAPCS makeup regarding tornado missiles, and the staff documented its concern about fire hydrants, standpipes, or other large lines that could be attached at some point to the dedicated portion of the fire protection system (FPS) connection to the FAPCS for makeup. In its response dated March 23, 2009, the applicant reiterated that FPS components located outside the Reactor Building that are needed for FAPCS makeup will be designed to seismic Category I standards and will be designed to withstand tornados and other natural phenomena. The applicant stated the dedicated line from the FPS to the FAPCS is not designed to National Fire Protection Association (NFPA) standards and will not fulfill a fire protection function. Fire hydrants, stand pipes, or other large lines will not be attached to the dedicated portion of the FPS designed to provide long term makeup to pools in the Reactor Building. The staff finds this acceptable, but requires that the design detail that the dedicated FPS line will never have fire hydrants, stand pipes, or other large lines attached to it be addressed directly in Tier 2 documentation.

GEH Response

GEH agrees and will address the Staff's concern that design detail needs to be provided for the dedicated FPS line for FAPCS makeup to ensure that it will never have fire hydrants, stand pipes, or other large lines attached to it since it is not designed to NFPA standards and will not fulfill a fire protection function. Additional description will be added to DCD Tier 2 clarifying that FPS components supporting FAPCS makeup are designed to seismic Category I standards and will not fulfill a fire protection function. Fire hydrants, stand pipes, or other large lines will not be attached to the dedicated portion of the FPS designed to provide long term makeup to pools in the Reactor Building.

DCD Impact

DCD Tier 2, subsection 9.5.1.1 and subsection 9.5.1.4 are updated under revision 6 in response to this RAI as reflected in attached markup.

Enclosure 2

MFN 09-379

Response to Portion of NRC Request for

Additional Information Letter No. 340

Related to ESBWR Design Certification Application

Auxiliary Systems

RAI Number 9.1-16 S03

DCD Markup

- To provide a post-accident source of makeup water for IC/PCCS pools and Spent Fuel Pool through piping connections to the Fuel and Auxiliary Pools Cooling System (FAPCS). FPS components located outside the Reactor Building supporting FAPCS makeup are designed to seismic Category I standards and will not fulfill a fire protection function. Fire hydrants, stand pipes, or other large lines will not be attached to the dedicated portion of the FPS designed to provide long term makeup to pools in the Reactor Building.
- To provide makeup water for reactor coolant inventory; and
- To have a useful life of 60 years with normal maintenance and replacement of parts/components subject to normal wear and deterioration.

Codes, Standards, and Regulatory Guidance

Table 9.5-1 lists the codes, standards, and guidelines used in the fire protection program and FPS design.

9.5.1.2 System Description

Figure 9.5-1 shows the FPS simplified system diagram for the ESBWR standard plant facilities. Table 9.5-2 lists the Component Design Characteristics.

The FPS is the integrated complex of equipment and components that provides early fire detection and suppression to limit the spread of fires. The FPS is part of the overall fire protection program including the plant design and layout to prevent or mitigate fires and includes administrative controls and procedures.

The type of fire suppression is based on the combustible loading and the extent of safety-related ~~shutdown~~ equipment within a fire area. Fixed automatic fire suppression systems are installed in areas identified as having a high fire hazard rating by the Fire Hazards Analysis (FHA) (Appendix 9A). Building standpipes and hose stations are provided in major buildings. Portable fire extinguishers are strategically located throughout the plant in accordance with NFPA 10, except in highly radioactive areas.

An automatic fire detection, alarm, supervisory control, and indication system is also provided in selected areas of the plant, as required by the fire hazards analysis for personnel safety and fire brigade notification.

A main fire alarm panel (MFAP), located in the Main Control Room (MCR), monitors and receives system actuation, supervisory, and trouble alarm signals from the individual local panels.

9.5.1.3 Facility Features for Fire Protection

Consistent with applicable safety-related requirements, structures, systems, and components are designed and located to minimize the probability and effect of fires. To the maximum extent practical, noncombustible and fire-resistant materials minimize the combustible loading and thereby reduce the expected duration, severity, and intensity of fires.

Within the ~~safety-related~~ structures containing safety-related equipment, interior walls, partitions, structural components, materials for insulation, and radiation shielding are either

noncombustible or have low ratings for contribution. The flame spread and smoke development rating of these materials is 25 or less. Materials having a flame spread and smoke development rating of 50 or more are considered to be combustible when analyzing fire hazards.

Exposed structural steel protecting areas containing safety-related ~~shutdown~~ equipment is fireproofed with material with a fire rating of up to 3 hours as determined from the FHA..

Access stairwells are enclosed in minimum 2-hour rated firewalls and equipped with self-closing fire-rated doors. Openings in fire barriers or firewalls are equipped with fire doors, frames, and hardware rated the same as the barriers they penetrate.

Seismically supported raceway containing safety-related circuits and circuit routing comply with Branch Technical Position (BTP) SPLB 9.5-1 except that separation by fire barriers rather than distance is used outside the MCR or containment. Exceptions to this requirement are analyzed and justified as acceptable on an individual basis. The acceptance criterion is that a single fire cannot degrade the performance of more than one division of safe shutdown equipment controlled from the main control room. However, if alternate means of control or indication are provided or available that remain unaffected by the same fire, then exception to the BTP SPLB 9.5-1 requirements for circuit routing and separation may be taken. The alternate means of control or indication are not required to be safety-related. All electrical cables (safety-related and nonsafety-related) conform to IEEE-1202 flame test criteria.

The intent is to avoid the use of electrical raceway fire barrier systems (ERFBS) for ESBWR, relying instead on divisional separation by fire area and structural fire barriers.

9.5.1.4 Fire Protection Water Supply System

Figure 9.5-1 provides a simplified diagram of the primary firewater supply piping and supply piping for ESBWR Standard Plant facilities supported by the secondary firewater supply piping yard loop.

Water Source

Water for the Fire Protection System is supplied from a minimum of two sources:(i) at least one "primary" source to the suctions of primary fire pumps and corresponding jockey fire pump and (ii) at least one "secondary" source to suctions of secondary fire pumps and corresponding jockey fire pump. The primary source is two dedicated, Seismic Category I, firewater storage tanks. Each primary firewater storage tank has sufficient capacity to meet the maximum firewater demand of the system for a period of 120 minutes. The secondary source is an additional firewater storage tank, a cooling tower water basin, or a large body of water, with the minimum capacity to meet the total water demand for a period of at least 120 minutes, but not less than 2082 m^3 (550,000 gallons), per NFPA 804. Water sources that are used for multiple purposes ensure that the required quantity of firewater is dedicated for fire protection use only. The COL applicant will provide the capacity of the secondary firewater source (COL 9.5.1-1-A).

Fire department connections on all major buildings allow a fire department pumper truck to pump water into the FPS as an additional fire protection water supply source.

The primary, Seismic Category I, firewater storage tanks and Seismic Category I diesel pump and fire protection piping provide post-accident makeup water to the IC/PCCS pools and Spent Fuel Pool using FAPCS piping. FPS components located outside the Reactor Building

supporting FAPCS makeup will not fulfill a fire protection function. Fire hydrants, stand pipes, or other large lines will not be attached to the dedicated portion of the FPS designed to provide long term makeup to pools in the Reactor Building. Post-accident reactor inventory makeup is provided via a dedicated FAPCS pump located in the Fire Pump Enclosure. This portion of the FPS is RTNSS rather than safety-related because the pools have sufficient capacity, such that, makeup is not required until after 72 hours. The primary firewater storage tanks have sufficient capacity to meet the total demand from 72 hours up to 7 days. After 7 days, onsite or offsite makeup sources can be used. A deviation from acceptance criterion II.1.a of SRP 9.1.3 (which requires Quality Group C for Spent Fuel Pool make up components) is provided in Table 1.9-9. This deviation is acceptable because this function is not required until after 72 hours. RTNSS requirements on the components performing the nonsafety-related makeup water function assure reliability which also justifies the change from Quality Group C to D.

Freeze protection is provided for the primary, Seismic Category I, firewater storage tanks and exposed piping.

Fire Pumps

Two primary fire pumps each provide 100% of the firewater demand to the worst-case fire within the Reactor Building, Fuel Building, Ancillary Diesel Building and Control Building and 50% of the firewater demand to the worst-case fire within the Turbine Building (TB). Two secondary fire pumps each provide 50% of the firewater demand for the worst-case fire in the TB and 100% of the firewater demand for the worst-case fire in the remainder of the balance of plant (BOP). All fire pumps are capable of delivering the flow and pressure required to the location that is the most hydraulically remote from the firewater supply source. The two primary fire pumps are located near the Control Building in a fire pump enclosure (FPE). The two secondary fire pumps are located remote from the other two pumps to avoid any common-location failures. The COL applicant shall provide documentation that the secondary fire protection pump circuit design will supply a minimum of 484 m^3/hr (2130 gpm) with sufficient discharge pressure to develop a minimum of 107 psig line pressure at the Turbine Building / yard interface boundary (COL 9.5.1-2-A). For the two primary fire pumps, the lead fire pump is Seismic Category II motor-driven and the backup is a Seismic Category I diesel driven fire pump. The backup diesel-driven fire pump provides firewater in the event of failure of the motor-driven fire pump or loss of preferred power (LOPP).

For the two non-seismic secondary fire pumps, the lead fire pump is motor-driven and the backup fire pump is diesel-driven. The secondary diesel-driven fire pump provides firewater in the event of failure of the motor-driven fire pump or LOPP.

Two motor-driven jockey pumps, one (1) dedicated for the primary fire protection circuit and one (1) dedicated for the secondary fire protection circuit, are provided to prevent initiation of the primary and secondary motor-driven fire pumps due to minor pressure losses. The motor-driven jockey pumps maintain the system pressure at a minimum of 34.4 kPa (5psi) above the highest start pressure setpoint of the fire pumps.

Booster pumps, where required, maintain minimum standpipe pressure in accordance with NPFA 14. Redundant booster pumps are separated by a 3-hour fire-rated wall. The ESBWR design does not require the use of booster pumps to maintain minimum standpipe pressure for the post-SSE requirements for hose station protection. Booster pump installation will be limited