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Subject: **Response to Portion of NRC Request for Additional Information Letter No. 275 Related to ESBWR Design Certification Application – RAI Numbers 14.3-442, 14.3-443 and 14.3-444**

Enclosure 1 contains the GE Hitachi Nuclear Energy (GEH) response to the subject NRC RAI originally transmitted via the Reference 1 letter. Enclosure 2 contains the DCD markups for this response.

Verified DCD changes associated with these RAI responses are identified in the enclosed DCD markups, in Enclosure 2, by enclosing the text within a black box.

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

Sincerely,

Richard E. Kingston
Vice President, ESBWR Licensing

Reference:

1. MFN 08-967, Letter from the U.S. Nuclear Regulatory Commission to Robert E. Brown, Request for Additional Information Letter No. 275, Related To ESBWR Design Certification Application, dated December 11, 2008

Enclosures:

1. Response to Portion of NRC Request for Additional Information Letter No. 275, Related to ESBWR Design Certification Application – RAI Numbers 14.3-442, 14.3-443 and 14.3-444
2. Response to Portion of NRC Request for Additional Information Letter No. 275, Related to ESBWR Design Certification Application – RAI Numbers 14.3-442, 14.3-443 and 14.3-444 - DCD Markups

cc:	AE Cubbage	USNRC (with enclosures)
	RE Brown	GEH/Wilmington (with enclosures)
	DH Hinds	GEH/Wilmington (with enclosures)
	eDRF Section	0000-0097-5707

Enclosure 1

MFN 09-117

Response to Portion of NRC Request for

Additional Information Letter No. 275

Related to ESBWR Design Certification Application

RAI Numbers 14.3-442, 14.3-443 and 14.3-444

<u>NRC RAI 14.3-442</u>:

Explain why some SFP and buffer pool design features do not appear in ITAAC.

10 CFR 52.47(b)(1), which requires that a design certification application contain the proposed inspections, tests, analyses, and acceptance criteria (ITAAC) that are necessary and sufficient to provide reasonable assurance that, if the inspections, tests, and analyses are performed and the acceptance criteria met, a plant that incorporates the design certification is built and will operate in accordance with the design certification, the provisions of the Atomic Energy Act, and the NRC regulations. Important to safety functions should be described in the DCD Tier 1. Based on the review of DCD Tier 2 section 9.1, several apparent important to safety design features have been omitted from Tier 1. Please explain why the applicant did not require that the following design features be added to ITAAC or specified as Tier 1 material:

- *The spent fuel pool and buffer pool are reinforced concrete structures with a stainless steel liner.*
- *Spent fuel pool and buffer pool liner embedments are designed to meet seismic Category I requirements.*
- *The bottoms of the spent fuel pool and buffer pool gates are higher than the minimum water level required over the spent fuel storage racks to provide adequate shielding and cooling.*
- *Lines to fill and drain the spent fuel pool and buffer pool enter the pools above the safe shielding water level.*
- *Redundant anti-siphon vacuum breakers are located at the high point of the pool lines in the spent fuel pool and the buffer pool to preclude a pipe break from siphoning the water from the pools and jeopardizing the safe water level.*
- *Individual spent fuel racks are spaced less than one fuel assembly apart so that a fuel assembly cannot be inserted between racks.*
- *Materials used for construction of the spent fuel pool and buffer pool are specified in accordance with the latest issue of applicable ASTM specifications at the time of equipment order.*

<u>GEH Response</u>:

<u>Response to First Bullet</u>:

- ITAAC for these features will be added to Tier 1 Tables 2.16.5-2 and 2.16.7-2.

Response to Second Bullet:

- ITAAC for these features will be added to Tier 1 Tables 2.16.5-2 and 2.16.7-2.

Response to Third Bullet:

- This is related to concern over an uncontrolled draindown due to a failure of the pool liner. This RAI response addresses the consequences of an uncontrolled drain-down due to ruptures in adjacent pools. A statement will be added to Tier 2 Subsection 9.1.3.2 to describe the elevation of the gates and a corresponding ITAAC will be added to Tier 1 Subsection 2.16.7 to put limits on the elevation of the bottom of the transfer gates in the SFP. For the buffer pool, this commitment is not necessary because spent fuel can only be stored in the deep pit which, at a depth of 9.5 m, ensures that fuel remains covered even if the entire shallow portion of the buffer pool drains through the transfer gates.

Response to Fourth Bullet:

- ITAAC for this design feature will be added to Tier 1 Table 2.6.2-2

Response to Fifth Bullet:

- ITAAC for this design feature will be added to Tier 1 Table 2.6.2-2

Response to Sixth Bullet:

- The topic of criticality as it related to fuel rack design is not covered in Tier 1, but rather in Licensing Topical Report NEDE-33374P, “Safety Analysis Report for Fuel Storage Racks Criticality Analysis for ESBWR Plants”. This report confirms that the gaps between racks are very small and cannot accommodate a spent fuel bundle.

Response to Seventh Bullet:

- DCD Tier 1 is not intended to govern details such as material specifications at the time of order. This information can be found in DCD Tier 2, Subsection 3.8.4, which describes the design features of the reactor building and fuel building structure.

DCD Impact:

DCD Tier 2, Subsection 9.1.3.2 and Tier 1 Tables 2.6.2-2, 2.16.5-2, and 2.16.7-2 will be modified in Revision 6, as noted in the attached markups, as shown in Enclosure 2.

<u>NRC RAI 14.3-443</u>:

Explain why aspects of the FAPCS design criteria don't appear in ITAAC

10 CFR 52.47(b)(1), which requires that a design certification application contain the proposed inspections, tests, analyses, and acceptance criteria (ITAAC) that are necessary and sufficient to provide reasonable assurance that, if the inspections, tests, and analyses are performed and the acceptance criteria met, a plant that incorporates the design certification is built and will operate in accordance with the design certification, the provisions of the Atomic Energy Act, and the NRC regulations. Important to safety functions should be described in the DCD Tier 1.

Based on the review of DCD Tier 2 section 9.1, several apparent important to safety design features have been omitted from Tier 1. Please explain why the applicant did not require that the following Fuel and Auxiliary Pools Cooling System (FAPCS) design criteria be included in ITAAC or specified as Tier 1 material:

- *The FAPCS consists of two physically separated cooling and cleanup trains.*
- *FAPCS is designed to provide drywell spray and alternate shutdown cooling.*
- *In Section 9.1.3.1, "System Description," for FAPCS in DCD, Revision 5, it describes the portions of the FAPCS that are not specifically defined as safety related as being seismic Category II. This quality is not mentioned in Table 2.6.2-2, "ITAAC For The Fuel and Auxiliary Pools Cooling Cleanup System."*
- *All piping between the RWCU/SDC System and the nonsafety-related check valves (upstream of the MOVs) is designed to withstand the full reactor pressure.*
- *With the exception of the suppression pool suction line, anti-siphoning devices are used on all submerged FAPCS piping to prevent unintended drainage of the pools.*
- *The suppression pool suction line is conservatively designed to preclude a rupture between the pool and the containment isolation valves.*
- *The electrical power supplies, control and instrumentation of the two FAPCS trains and their supporting systems are electrically and physically separated.*

Piping and components completely separate from FAPCS pool cooling piping provide flow paths for post-accident makeup water transfer.

<u>GEH Response</u>:

<u>Response to First Bullet</u>:

- This design commitment is covered by the ITAAC in Tier 1 Table 3.1-1, Item 6. No additional ITAAC are necessary.

<u>Response to Second Bullet</u>:

- The functions of drywell spray and alternate shutdown cooling are not safety-related and are not credited anywhere in the ESBWR licensing basis. Therefore they do not require ITAAC in Tier 1.

<u>Response to Third Bullet</u>:

- The Seismic II classification of certain FAPCS components is a defense-in-depth measure and is not related to the RTNSS functions that the system performs. Therefore, because the seismic category is not related to safety, a description of this classification is not necessary for Table 2.6.2-2.

<u>Response to Fourth Bullet</u>:

- An ITAAC for this design feature will be added to Tier 1 Table 2.6.2-2. The ITAAC will reflect a minor configuration change in which the high-pressure portion of the LPCI line extends to the MOVs.

<u>Response to Fifth Bullet</u>:

- Please refer to RAI 14.3-442, in this letter, which contained a similar item. An ITAAC has been added as a result of that RAI.

<u>Response to Sixth Bullet</u>:

- This issue will be addressed in the response to RAI 9.1-97 (MFN 09-163).

<u>Response to Seventh Bullet</u>:

- The electrical separation for FAPCS and its supporting systems is provided by interrupting devices, which are used to isolate faulted equipment or circuitry such that a failure in one area cannot propagate. An ITAAC to this effect will be added to Tier 1 Subsection 2.13.1.

These piping and components are shown in Figure 2.6.2-1 to be completely separate from the FAPCS pool cooling piping. Therefore, this design feature is covered by Item 1 of Table 2.6.2-2.

DCD Impact:

DCD Tier 1, Sections 2.6.2 and 2.13.1 will be revised as noted in the attached markup, as shown in Enclosure 2.

NRC RAI 14.3-444:

Clarify the ITAAC for FAPCS seismic Category I piping in Tier 1.

In Section 9.1.3.1, "System Description," for the Fuel and Auxiliary Pools Cooling System (FAPCS) in DCD, Revision 5, it describes FAPCS as being a nonsafety-related system with the exception of the piping and components required for containment isolation, refilling the IC/PCC pools and spent fuel pool, and interface with the Reactor Water Cleanup/Shutdown Cooling system. Seismic Category I piping is shown on DCD Tier 1, Figure 2.6.2-1 but it is not listed in DCD Tier 1, Table 2.6.2-1. DCD Tier 1 Table 2.6.2 design commitments 2, 3, and 4 provide ITAAC for Seismic Category 1 piping identified in DCD Tier 1, Table 2.6.2-1, but no piping is so identified. Revise DCD Tier 1 Section 2.6.2 ITAAC for Seismic Category 1 piping to reference Figure 2.6.2-1 or modify Table 2.6.2-1.

GEH Response:

The FAPCS piping described as safety-related has been added to Table 2.6.2-1. Also, for consistency with Tier 2 Table 9.1-3, the GDCS interconnecting pipes have been added to Tier 1.

DCD Impact:

DCD Tier 2, Section 9.1.3 and DCD Tier 1, Table 2.6.2-1 will be revised as noted in the attached markup, as shown in Enclosure 2.

Enclosure 2

MFN 09-117

Response to Portion of NRC Request for

Additional Information Letter No. 275

Related to ESBWR Design Certification Application

RAI Numbers 14.3-442, 14.3-443 and 14.3-444

DCD Markups

Verified DCD changes associated with this RAI response are identified in the enclosed DCD markups by enclosing the text within a black box.

(5) The Seismic Category I equipment, including components and associated piping identified in Table 2.6.2-1, can withstand sSeismic design basisCategory loads without loss of safety-related function.

(6) The containment isolation portions of the FAPCS are addressed in Tier 1, Subsection 2.15.1.(Deleted)

(7) The FAPCS performs the following nonsafety-related functions:

α.• Suppression pool cooling mode

β.• Low-pressure coolant injection mode.

χ.• External connection for emergency water to IC/PCC pool and Spent Fuel Pool.

(8) FAPCS minimum inventory of alarms, displays, and status indications in the main control room (MCR) are addressed in Section 3.3.(Deleted)

(9) Level instruments with adequate operating ranges are provided for the Spent Fuel Pool and IC/PCC pools.

(10) Equipment qualification for the FAPCS is addressed in Tier 1 Section 3.8.(Deleted)

(11) Following a loss of active cooling without makeup that persists for 72 hours, the water level in the Spent Fuel Pool remains above the top of active fuel.

(12) Following a loss of active cooling without makeup that persists for 72 hours, the water level in the Buffer Pool remains above the top of active fuel.

(13) a. Valves on lines attached to the RPV that require maintenance valves installed such that freeze seals will not be required.

b. The as-built location of valves on lines attached to the RPV in the CRD FAPCS that require maintenance shall be reconciled to design requirements

(14) Lines that are submerged in the spent fuel pool or buffer pool are equipped with redundant anti-siphon holes that will preserve the water inventory above TAF in the event of a break at a lower elevation.

(15) All low-pressure coolant injection piping and components between the RWCU/SDC System and the FAPCS, including the check valves and motor operated valves are designed to withstand the full reactor pressure.

Inspections, Tests, Analyses and Acceptance Criteria

Table 2.6.2-2 provides a definition of the inspections, tests and/or analyses, together with associated acceptance criteria for the FAPCS.

Table 2.6.2-2

ITAAC For The Fuel and Auxiliary Pools Cooling ~~Cleanup~~ System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
12. Following a loss of active cooling without makeup that persists for 72 hours, the water level in the Buffer Pool remains above the top of active fuel.	Inspection of the Buffer Pool as-built dimensions will be performed to determine the elevation of the pool weir relative to the bottom of the pool and the free volume between the top of the active fuel and the weir elevation.	A report or analysis exists and concludes that the elevation of the Buffer Pool weir relative to the bottom of the pool is at least 6.7 m and that there is at least 288 m^3 of free volume above the top of the active fuel that can be filled with water.
13a. Valves on lines attached to the RPV that require maintenance valves installed such that freeze seals will not be required.	Inspections of piping design isometric drawings will be conducted.	Report(s) exist and conclude that, based on a review of piping design isometric drawings, maintenance can be performed on valves without the use of freeze seals
13b. The as-built location of valves on lines attached to the RPV in the FAPCS that require maintenance shall be reconciled to design requirements.	A reconciliation evaluation of valves on lines attached to the RPV that require maintenance using as-designed and as-built information will be performed	Report(s) exist and conclude that a design reconciliation has been completed for the as-built location of valves relative to the design requirements. The report documents the results of the reconciliation evaluation.
14. Lines that are submerged in the spent fuel pool or buffer pool are equipped with redundant anti-siphon holes that will preserve the water inventory above TAF in the event of a break at a lower elevation.	Inspection of as-built submerged piping in the spent fuel pool and buffer pool will be performed to confirm the presence of redundant anti-siphon holes.	Inspection report(s) exist and conclude that redundant anti-siphon holes are present on all submerged piping in the spent fuel pool and buffer pool to preserve the water inventory above TAF in the event of a break at a lower elevation..

- Waterproofing of below flood and groundwater levels external surfaces;
- Water seals in external walls at pipe penetrations below flood and groundwater levels; and
- Roofs designed to prevent pooling of large amounts of water in excess of the structural capacity of the roof for design loads.

(7) Protective features used to mitigate or eliminate the consequences of internal flooding are:

- Structural enclosures or barriers;
- Curbs and sills;
- Leakage detection components; and
- Drainage systems.

(8) The internal flooding protection features prevent flood water in one division from propagating to other division(s) and ensure equipment necessary for safe shutdown is located above the maximum flood level for that location or is qualified for flood conditions by:

- Divisional walls
- Sills
- Watertight doors.

(9) The RB is protected against pressurization effects associated with postulated rupture of pipes containing high-energy fluid that occur in subcompartments of the RB.

(10) The Reactor Building minimum passive mixing volume meets design assumptions for the mixing of fission products following a LOCA.

(11) RTNSS equipment in the RB is located above the maximum flood level for that location or is qualified for flood conditions.

(12) The buffer pool is a reinforced concrete structure with a stainless steel liner that is equipped with embedments designed to Seismic Category I requirements.

Inspections, Tests, Analyses and Acceptance Criteria

Table 2.16.5-2 provides a definition of the inspections, tests and/or analyses, together with associated acceptance criteria for the RB.

Table 2.16.5-2

ITAAC For The Reactor Building

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
9. The RB is protected against pressurization effects associated with postulated rupture of pipes containing high-energy fluid that occur in subcompartments of the RB.	Inspections of the RB subcompartments that rely on overpressure protection devices will be conducted.	Reports document that as-built RB subcompartments which rely on overpressure protection devices are equipped with over pressure protection devices specified in the Design Description 2.16.5.
10. The Reactor Building minimum passive mixing volume meets design assumptions for the mixing of fission products following a LOCA.	Inspections of the as-built dimensions of the areas in the RB credited in the design basis mixing analysis will be performed. The results will be compared to the calculation of the total mixing volume to verify that the results match the assumptions.	A report documents that the as-built RB ensures a passive mixing volume.
11. RTNSS equipment in the RB is located above the maximum flood level for that location or is qualified for flood conditions.	Inspections of the as-built RTNSS equipment in the RB will be conducted.	Inspection report(s) exist and conclude that as-built RTNSS equipment in the RB is located above the maximum flood level for that location or is qualified for flood conditions
12. The buffer pool is a reinforced concrete structure with a stainless steel liner that is equipped with embedments designed to Seismic Category I requirements.	Inspection or analysis of the as-built buffer pool will be performed.	Report(s) exist and conclude that the as-built buffer pool is a reinforced concrete structure with a stainless steel liner that is equipped with embedments and can withstand seismic dynamic loads without loss of structural integrity.

(7) RTNSS equipment in the FB is located above the maximum flood level for that location or is qualified for flood conditions.

(8) The spent fuel pool is a reinforced concrete structure with a stainless steel liner that is equipped with embedments designed to Seismic Category I requirements.

(9) The transfer gates that connect the SFP to adjacent pools are designed so that the bottom of the gate is located no lower than the bail handle of a stored spent fuel bundle.

Inspections, Tests, Analyses and Acceptance Criteria

Table 2.16.7-2 provides a definition of the inspections, test and/or analyses, together with associated acceptance criteria for the Fuel Building.

Table 2.16.7-2

ITAAC For The Fuel Building

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
8. The spent fuel pool is a reinforced concrete structure with a stainless steel liner that is equipped with embedments designed to Seismic Category I requirements.	Inspection or analysis of the as-built spent fuel pool will be performed.	Report(s) exist and conclude that the as-built spent fuel pool is a reinforced concrete structure with a stainless steel liner that is equipped with embedments and can withstand seismic dynamic loads without loss of structural integrity.
9. The transfer gates that connect the SFP to adjacent pools are designed so that the bottom of the gate is located no lower than the bail handle of a stored spent fuel bundle.	Inspection of the as-built spent fuel pool will be performed.	Report(s) exist and conclude that the transfer gates that connect the SFP to adjacent pools are built so that the bottom of the gate is located no lower than the bail handle of a stored spent fuel bundle.

as-is upon loss of its electric power or pneumatic (air or nitrogen) supply. All other containment isolation valves are designed to fail closed.

The transfer gates that connect the SFP to adjacent pools is designed so that the bottom of the gate is located no lower than the bail handle of a stored spent fuel bundle.

Provisions are provided to protect FAPCS components from fire, missile generating event, plant internal flooding, or seismic event of intensity up to and including a Safe Shutdown Earthquake (SSE) so that sufficient capability is retained for the fuel pool cooling function.

The FAPCS is designed to permit surveillance testing and in-service inspection of the safety-related components in accordance with ASME Section XI. Additionally, the FAPCS is designed to permit leak rate testing of its components required to perform containment isolation function, in accordance with 10 CFR 50 Appendix J.

Piping and components completely separate from FAPCS pool cooling piping provide flow paths for post-accident make-up water transfer from offsite water supply sources to the IC/PCCS pool and spent fuel pool. Active FAPCS valves located inside the Reactor Building are not required to operate to accomplish this makeup. This piping and components are designed to meet Quality Group C and Seismic Category I requirements.

The equipment storage pool and reactor well contains valves that, when opened, create a connection between the two IC/PCCS expansion pools through the equipment storage pool. These valves are designed to open on receiving a low level signal from either of the IC/PCCS expansion pools, and allow makeup water supplied to one of the IC/PCCS expansion pools to communicate with the other expansion pool.

Branch connections are provided on the suppression pool suction line and return line, which serve as attachments for portable external cooling equipment that bypasses the FAPCS C/C trains.

FAPCS piping and components, relied upon for containment integrity, are designed to Quality Group B and Seismic Category I requirements.

System Operation

FAPCS C/C trains operate continuously to cool and clean the water in the Spent Fuel Pool during normal plant operation and refueling outage. Operation of only one FAPCS C/C train is sufficient to handle the cooling requirements under the normal heat load condition in the Spent Fuel Pool. Operation with up to two FAPCS C/C trains is sufficient to handle the cooling requirement under the maximum heat load condition. At least one FAPCS C/C train is available for cooling the Spent Fuel Pool, except for a short period as long as the water temperature in the pool remains below the maximum temperature limit for normal operation.

During a refueling outage, FAPCS can be operated in the Fuel and Auxiliary Pool Cooling and Cleanup mode with both C/C trains under the maximum heat load condition in the Spent Fuel Pool.

If necessary the FAPCS can operate in a dual mode using two separated FAPCS C/C trains with separate suction and discharge piping loops. However, dual mode operation using a single train is prohibited, because it could result in redistribution of water between pools containing contaminated water and pools containing clean water.

(5) The Seismic Category I equipment, including components and associated piping identified in Table 2.6.2-1, can withstand sSeismic design basisCategory loads without loss of safety-related function.

(6) The containment isolation portions of the FAPCS are addressed in Tier 1, Subsection 2.15.1.(Deleted)

(7) The FAPCS performs the following nonsafety-related functions:

- α. Suppression pool cooling mode
- β. Low-pressure coolant injection mode.
- χ. External connection for emergency water to IC/PCC pool and Spent Fuel Pool.

(8) FAPCS minimum inventory of alarms, displays, and status indications in the main control room (MCR) are addressed in Section 3.3.(Deleted)

(9) Level instruments with adequate operating ranges are provided for the Spent Fuel Pool and IC/PCC pools.

(10) Equipment qualification for the FAPCS is addressed in Tier 1 Section 3.8.(Deleted)

(11) Following a loss of active cooling without makeup that persists for 72 hours, the water level in the Spent Fuel Pool remains above the top of active fuel.

(12) Following a loss of active cooling without makeup that persists for 72 hours, the water level in the Buffer Pool remains above the top of active fuel.

(13) a. Valves on lines attached to the RPV that require maintenance valves installed such that freeze seals will not be required.

b. The as-built location of valves on lines attached to the RPV in the CRD FAPCS that require maintenance shall be reconciled to design requirements

(14) Lines that are submerged in the spent fuel pool or buffer pool are equipped with redundant anti-siphon holes that will preserve the water inventory above TAF in the event of a break at a lower elevation.

(15) All low-pressure coolant injection piping and components between the RWCU/SDC System and the FAPCS, including the check valves and motor operated valves are designed to withstand the full reactor pressure.

Inspections, Tests, Analyses and Acceptance Criteria

Table 2.6.2-2 provides a definition of the inspections, tests and/or analyses, together with associated acceptance criteria for the FAPCS.

Table 2.6.2-2

ITAAC For The Fuel and Auxiliary Pools Cooling ~~Cleanup~~ System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
15. All low-pressure coolant injection piping and components between the RWCU/SDC System and the FAPCS, including the check valves and motor operated valves are designed to withstand the full reactor pressure.	Inspection of the as-built low-pressure coolant injection piping between the RWCU/SDC System and the nonsafety-related motor operated valves will be performed.	Report(s) exist and conclude that the as-built low-pressure coolant injection piping and components between the RWCU/SDC System and the FAPCS, including the check valves and motor operated valves are designed to withstand the full reactor pressure.

(9) Equipment within the onsite portion of the Preferred Power Supply (PPS) is rated to supply necessary load requirements, including power, voltage, and frequency, during design basis operating modes.

(10) Equipment within the onsite portion of the PPS is rated to interrupt analyzed fault currents, including the fault current contribution from the offsite portion of the PPS.

(11) a. The onsite portions of the normal preferred power supply circuits are physically separate from the onsite portions of the alternate preferred power supply circuits from the UAT and RAT to the PIP bus incoming line breakers.

b. The onsite portions of the normal preferred power supply circuits are electrically independent from the onsite portions of the alternate preferred power supply circuits from the UAT and RAT to the PIP bus incoming line breakers.

c. The onsite portions of the normal preferred power supply circuit breaker control power, instrumentation, and control circuits are electrically independent from the alternate preferred power supply circuit breaker control power, instrumentation, and control circuits from the UAT and RAT to the PIP bus incoming line breakers.

d. The onsite portions of the normal preferred power supply circuit breaker control power, instrumentation, and control circuits are physically separated from the alternate preferred power supply circuit breaker control power, instrumentation, and control circuits from the UAT and RAT to the PIP bus incoming line breakers.

(12) a. The normal power supply circuits are physically separate from the alternate power supply circuits from the PIP buses to the IPC bus incoming line breakers.

b. The normal power supply circuits are electrically independent from the alternate power supply circuits from the PIP buses to the IPC bus incoming line breakers.

c. The normal power supply circuit breaker control power, instrumentation, and control circuits are electrically independent from the alternate power supply circuit breaker control power, instrumentation, and control circuits from the PIP buses to the IPC bus incoming line breakers.

d. The onsite portions of the normal power supply circuit breaker control power, instrumentation, and control circuits are physically separated from the alternate power supply circuit breaker control power, instrumentation, and control circuits from the PIP buses to the IPC bus incoming line breakers.

(13) Interrupting devices for the Electric Power Distribution Preferred Power System are coordinated so as to isolate faulted equipment and/or circuits of the Plant Investment Protection Buses from the Preferred Power System, prevent damage to equipment, protect personnel, minimize system disturbances, and maintain continuity of the Preferred Power Supply System from the PIP buses to all safety-related loads and designated RTNSS B and C loads.

Inspections, Tests, Analyses and Acceptance Criteria

Table 2.13.1-2 provides a definition of the inspections, tests, and/or analyses, together with associated acceptance criteria for the Electrical Power Distribution System.

Table 2.13.1-2

ITAAC For ~~The Onsite AC~~ The Electric Power Distribution System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
12d. The onsite portions of the normal power supply circuit breaker control power, instrumentation, and control circuits are physically separated from the alternate power supply circuit breaker control power, instrumentation, and control circuits from the PIP buses to the IPC bus incoming line breakers.	Inspections of the as-built normal and alternate power supply circuit breaker control power, instrumentation, and control circuits will be performed.	Report(s) exist and conclude that the as-built normal power supply circuit breaker control power, instrumentation, and control circuits are physically separated from the alternate power supply circuit breaker control power, instrumentation, and control circuits by distance or physical barriers so as to minimize to the extent practical the likelihood of their simultaneous failure under design basis conditions.
13. Interrupting devices for the Electric Power Distribution Preferred Power System are coordinated so as to isolate faulted equipment and/or circuits of the Plant Investment Protection Buses from the Preferred Power System, prevent damage to equipment, protect personnel, minimize system disturbances, and maintain continuity of the Preferred Power Supply System from the PIP buses to all safety-related loads and designated RTNSS B and C loads.	Analysis will be performed for all voltage levels to ensure that interrupting devices are properly coordinated.	Analyses exist and conclude that interrupting devices at all voltage levels are properly coordinated and the interrupter closest to a fault opens before other devices and isolate only the faulted equipment and or circuit.

(5) The Seismic Category I equipment, including components and associated piping identified in Table 2.6.2-1, can withstand sSeismic design basisCategory loads without loss of safety-related function.

(6) The containment isolation portions of the FAPCS are addressed in Tier 1, Subsection 2.15.1.(Deleted)

(7) The FAPCS performs the following nonsafety-related functions:

α.• Suppression pool cooling mode

β.• Low-pressure coolant injection mode.

χ.• External connection for emergency water to IC/PCC pool and Spent Fuel Pool.

(8) FAPCS minimum inventory of alarms, displays, and status indications in the main control room (MCR) are addressed in Section 3.3.(Deleted)

(9) Level instruments with adequate operating ranges are provided for the Spent Fuel Pool and IC/PCC pools.

(10) Equipment qualification for the FAPCS is addressed in Tier 1 Section 3.8.(Deleted)

(11) Following a loss of active cooling without makeup that persists for 72 hours, the water level in the Spent Fuel Pool remains above the top of active fuel.

(12) Following a loss of active cooling without makeup that persists for 72 hours, the water level in the Buffer Pool remains above the top of active fuel.

(13) a. Valves on lines attached to the RPV that require maintenance valves installed such that freeze seals will not be required.

b. The as-built location of valves on lines attached to the RPV in the CRD FAPCS that require maintenance shall be reconciled to design requirements

(14) Lines that are submerged in the spent fuel pool or buffer pool are equipped with redundant anti-siphon holes that will preserve the water inventory above TAF in the event of a break at a lower elevation.

(15) All low-pressure coolant injection piping and components between the RWCU/SDC System and the FAPCS, including the check valves and motor operated valves are designed to withstand the full reactor pressure.

Inspections, Tests, Analyses and Acceptance Criteria

Table 2.6.2-2 provides a definition of the inspections, tests and/or analyses, together with associated acceptance criteria for the FAPCS.

Table 2.6.2-2

ITAAC For The Fuel and Auxiliary Pools Cooling ~~Cleanup~~ System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
15. All low-pressure coolant injection piping and components between the RWCU/SDC System and the FAPCS, including the check valves and motor operated valves are designed to withstand the full reactor pressure.	Inspection of the as-built low-pressure coolant injection piping between the RWCU/SDC System and the nonsafety-related motor operated valves will be performed.	Report(s) exist and conclude that the as-built low-pressure coolant injection piping and components between the RWCU/SDC System and the FAPCS, including the check valves and motor operated valves are designed to withstand the full reactor pressure.

Table 2.6.2-1

FAPCS Mechanical Equipment

Equipment Name (Description)	Equipment Identifier See Figure 2.6.2-1	ASME Code Section III	Seismic Cat. I	RCPB Component	Containment Isolation Valve.	Remotely Operated	Loss of Motive Power Position
External Water Makeup Check Valve to IC/PCCS Pool	V-28	Yes	Yes	No	No	N/A	N/A
LPCI Testable Check Valve	V-29	Yes	Yes	No	No	N/A	N/A
LPCI Testable Check Valve	V-30	Yes	Yes	No	No	N/A	N/A
Piping required emergency refill of SFP and IC/PCCS Pool	-	Yes	Yes	No	N/A	N/A	N/A
Piping associated with containment penetrations	-	Yes	Yes	No	N/A	N/A	N/A
Piping to interconnect GDCS pools	-	Yes	Yes	No	N/A	N/A	N/A
Piping associated with low pressure injection interface with RWCU/SDC System	-	Yes	Yes	No	N/A	N/A	N/A

- The fuel storage pools have adequate water shielding for the stored spent fuel. See Subsection 9.1.3 relative to the control of water level in these pools.

NRC Regulatory Guide 1.13 is applicable to spent fuel storage facilities. The Reactor Building, which contains the fuel storage facilities, including the storage racks and pool, is designed to protect the fuel from damage caused by:

- Natural events such as earthquake, high winds and flooding; and
- Mechanical damage caused by dropping of fuel assemblies, bundles, or other objects onto stored fuel.

Summary of Radiological Considerations

By adequate design and careful operational procedures, the design bases of the spent fuel storage arrangement are satisfied. Thus, the exposure of plant personnel to radiation is maintained well below regulatory limits and in accordance with ALARA principles. Further details of radiological considerations, including those for the spent fuel storage arrangement, are presented in Chapter 12.

9.1.3 Fuel and Auxiliary Pools Cooling System

9.1.3.1 Design Bases

Safety Design Basis

Fuel and Auxiliary Pools Cooling System (FAPCS) is a nonsafety-related system, except for the following safety-related items:

- Containment isolation valves,
- High-pressure interface with the Reactor Water Cleanup / Shutdown Cooling System, ~~and~~
- Emergency water supply flow paths to the spent fuel pool and IC/PCC pools~~.~~; and
- GDCS interconnecting pipes.

Power Generation Design Basis

FAPCS provides continuous cooling and cleaning of the spent fuel storage pool during normal plant operation. It also provides occasional cooling and cleaning of various pools located inside the containment during normal plant operation and refueling outage.

9.1.3.2 System Description

System Description Summary

The FAPCS consists of two physically separated cooling and cleanup (C/C) trains, each with 100% capacity during normal operation. Each train contains a pump, a heat exchanger and a water treatment unit for cooling and cleanup of various cooling and storage pools except for the Isolation Condenser and Passive Containment Cooling (IC/PCC) pools (refer to Figure 9.1-1). A separate subsystem with its own pump, heat exchanger and water treatment unit is dedicated for cooling and cleaning of the IC/PCC pools independent of the FAPCS C/C train operation during normal plant operation (refer to Figure 9.1-1).