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MFN 10-189, Revision 1

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Subject: **Revised Response to Audit Open Items from the Summary of the June 3 and 15, 2010 NRC Regulatory Audits of the ESBWR Spent Fuel Pool Required Water Inventory**

The purpose of this letter is to submit the GEH revised response to the audit open items transmitted in Reference 1. This revision reflects an increase in the total decay energy value assumed in the spent fuel pool boil-off calculation to provide design margin and replaces the response provided in Reference 2. Enclosure 1 contains the GEH response to these audit open items. Enclosure 2 contains DCD markups associated with the response.

If you have any questions or require additional information, please contact me.

Sincerely,

Richard E. Kingston

Richard E. Kingston
Vice President, ESBWR Licensing

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References:

1. MFN 10-194, ADAMS Accession No.: ML101680660, "Summary of the June 3 and 15, 2010 Regulatory Audits of the Economic Simplified Boiling Water Reactor Spent Fuel Pool Required Water Inventory at Nuclear Energy Institute Office in Rockville, Maryland," June 23, 2010.
2. MFN 10-189, Letter from Richard E. Kingston to U.S. Nuclear Regulatory Commission, Response to Audit Open Items from the Summary of the June 3 and 15, 2010 NRC Regulatory Audits of the ESBWR Spent Fuel Pool Required Water Inventory, July 8, 2010.

Enclosures:

1. Revised Response to Audit Open Items from the Summary of the June 3 and 15, 2010 NRC Regulatory Audits of the ESBWR Spent Fuel Pool Required Water Inventory
2. Revised Response to Audit Open Items from the Summary of the June 3 and 15, 2010 NRC Regulatory Audits of the ESBWR Spent Fuel Pool Required Water Inventory – DCD Markups

cc:	AE Cubbage	USNRC (with enclosures)
	JG Head	GEH/Wilmington (with enclosures)
	DH Hinds	GEH/Wilmington (with enclosures)
	TL Enfinger	GEH/Wilmington (with enclosures)
	eDRF Section	0000-0038-9392, Revision 6

Enclosure 1

MFN 10-189, Revision 1

Revised Response to Audit Open Items from the Summary of the June 3 and 15, 2010 NRC Regulatory Audits of the ESBWR Spent Fuel Pool Required Water Inventory

Audit Open Items

1. *The bounding thermal analysis evaluation has not taken into consideration the impact of a seismic event on the SFP capability to maintain the spent fuel cooled and covered with water for 72 hrs without any makeup water. The applicant's evaluation of this event should postulate the failure of all non-seismic components attached to the SFP (including but not limited to pipes, gates, and drains).*

2. *DCD Section 9.1.3 states that the SFP water level is maintained at elevation of 14.35 meters with a volume of 1690 m^3 of water above the active fuel. The latest SFP thermal analysis states that a loss of FAPCS could boil off up to 1730 m^3 of water. This inconsistency would imply that a loss of FAPCS could uncover the fuel. The DCD needs to be updated to reflect the latest minimum inventory of water required to prevent fuel uncover.*

   Also changes to DCD Section 19A discussion of spent fuel cooling and the availability control may be necessary based on the new calculations.

   The staff identified a typographical error in Table 6 of GEH Calculation 0000-0036-0326.

3. *The locations (elevation) of the anti-siphon devices are not clearly specified. These devices are needed to prevent the siphoning of SFP water inventory below the minimum inventory needed to prevent fuel uncover under worst conditions. This minimum elevation should be included in the DCD.*

4. *The staff considers that the minimum inventory of water needed in the SFP should be controlled through a TS and not an availability controls (AC), as the applicant proposed.*

5. *The thermal analysis does not specify the boil off rate from the SFP at 72 hrs. This rate needs to be lower than the SFP makeup water flow.*

6. *The applicant's DCD states that the buffer pool contains sufficient inventory of water to boil for 72 hrs without uncovering the fuel, but it is not clear that the applicant has taken into consideration the impact of a seismic event.*

7. *While reviewing the applicant's thermal analysis, the staff could not confirm that the heat loads developed for the analysis was calculated based on core thermal power that took into consideration uncertainty in core power measurements.*

8. *The staff found that the Basis of AC B 3.7.4 needed clarifications, as it relates to the required makeup water that the Fire Protection system needs to reserve for SFP makeup.*

9. *An apparent inconsistency was found between the latest thermal analysis results and the AC B 3.7.1, Emergency Make-up (1921 m^3 vs. 1151 m^3).*

10. *The applicant should clarify whether there are any non-seismic Category 1 and 2 connections that could provide potential drain paths from the spent fuel pool, the buffer pool, the lower fuel transfer pool, and cask pool. If there are potential seismic Category 1 and 2 drain paths for these pools, they should be included in DCD Tier 2, Table 3.2-1 and described in the appropriate sections of the DCD.*

11. *Section 1 of NUREG-0800, SRP 9.1.3 "Spent Fuel Pool Cooling and Cleanup System," states that:*

    "The safety function to be performed by the system in all cases remains the same; that is, the spent fuel assemblies must be cooled and must remain covered with water during all storage conditions."

    SRP 9.1.3 also states that compliance with GDC 61 requires that the fuel storage and handling shall be designed (4) with a residual heat removal capability having reliability and testability that reflects the importance to safety of decay heat and other residual heat removal, and (5) to prevent significant reduction in fuel storage coolant inventory under accident conditions.

    The ESBWR SFP is designed to permit boiling of the SFP water in order to provide cooling for the stored fuel. The applicant proposed to modify a technical specification (TS) that will ensure that the SFP has sufficient inventory of water to permit cooling of the stored fuel for 72 hrs after the loss of forced cooling, without requiring makeup water. The applicant's TS is based on the spent fuel pool water level being at the top of active fuel at 72 hours after the loss of forced cooling. This is inconsistent with the guidelines of SRP 9.1.3, as noted above. In addition, the applicant has not shown that there is sufficient residual heat removal capability with the spent fuel pool in a boiling condition and the water level at the top of active fuel. For example, the applicant has not addressed whether the thermal-hydraulics conditions in the fuel racks are sufficient to preclude fuel damage. The applicant needs to identify a water level at 72 hours that meets the requirements of GDC 61, including providing the justification for the water level, and modify the TS limit accordingly.

<u>GEH Response</u>

Subsequent to the original response submitted under MFN 10-189, GEH conducted another thermal analysis using assumed decay power versus time characteristics that would bound cases that may be more limiting than the one that was previously analyzed for 36 days into a cycle. This more conservative analysis yielded minimum required pool volumes and water levels that supersede those values that were included in the prior submittal. This revised response retains the original content but appends each section with the revised values, where applicable.

1. *The bounding thermal analysis evaluation has not taken into consideration the impact of a seismic event on the SFP capability to maintain the spent fuel cooled and covered with water for 72 hrs without any makeup water. The applicant's evaluation of this event should postulate the failure of all non-seismic components attached to the SFP (including but not limited to pipes, gates, and drains).*

GEH Response:

To provide adequate assurance against a seismic event, the following changes will be made:

- DCD Tier 2 Table 3.2-1 will be clarified to identify the SFP fuel transfer gates (System U97) as Seismic Category I. For consistency, the Reactor Building buffer pool gates (System U71) are also identified as Seismic Category I.

- The location of anti-siphon holes on piping submerged in the SFP and Buffer Pool will be redefined. Currently there is an ITAAC in Table 2.6.2-2 of Tier 1 Revision 7 that states these anti-siphon holes must be no lower than 10 ft above TAF to provide safe shielding in the event of a break at a lower elevation. The Acceptance Criteria will be modified to indicate the anti-siphon holes are no lower than 9.2 m above the top of stored fuel assemblies (TSFA) (See Item 2 below).

There are no drainage paths or any other pathways by which pool water could be reduced below the minimum required level during a seismic event. Please see markup to DCD Tier 2, Subsection 9.1.3.2.

GEH Revision 1 Response:

In the second bulleted item, the “9.2 m” value changes to “10.26 m”.

2. *DCD Section 9.1.3 states that the SFP water level is maintained at elevation of 14.35 meters with a volume of 1690 m^3 of water above the active fuel. The latest SFP thermal analysis states that a loss of FAPCS could boil off up to 1730 m^3 of water. This inconsistency would imply that a loss of FAPCS could uncover the fuel. The DCD needs to be updated to reflect the latest minimum inventory of water required to prevent fuel uncover.*

GEH Response:

There is currently an ACLCO in Chapter 19 stating that the SFP water level shall be no less than 8.5 m above top of stored fuel assemblies (TSFA). This level was based on an out-of-date calculation. The SFP thermal analysis has since been revised and now shows a bounding boil-off volume of 1760 m^3. Therefore, a Tech Spec has been added to Chapter 16 (replacing the old ACLCO) that specifies a minimum pool level of **9.2 m** above the top of fuel assemblies stored in the SFP. The minimum pool level of 9.2 m above the fuel assemblies bounds the volume of 1760 m^3 required for boil-off.

GEH Revision 1 Response:

The two "9.2 m" values are changed to "10.26 m". The two "1760m^3" values are changed to "1962 m^3".

Also changes to DCD Section 19A discussion of spent fuel cooling and the availability control may be necessary based on the new calculations.

GEH Response:

The value of 1760 m^3, and 9.2 m have been updated accordingly in Tier 1, Chapter 9, and Chapter 16, and checked for consistency in Chapter 19.

GEH Revision 1 Response:

The "1760 m^3" value is changed to "1962 m^3" and the "9.2 m" value is changed to "10.26 m".

The staff identified a typographical error in Table 6 of GEH Calculation 0000-0036-0326.

GEH Response:

The staff's comment was reviewed, and the typo was found to be editorial, not affecting the calculation results. The calculation was performed using the correct technical basis.

3. *The locations (elevation) of the anti-siphon devices are not clearly specified. These devices are needed to prevent the siphoning of SFP water inventory below the minimum inventory needed to prevent fuel uncover under worst conditions. This minimum elevation should be included in the DCD.*

   GEH Response:

   This item is resolved as described in Item 1 above.

4. *The staff considers that the minimum inventory of water needed in the SFP should be controlled through a TS and not an availability controls (AC), as the applicant proposed.*

   GEH Response:

   The AC are converted to Tech Specs as explained in Item 2.

5. *The thermal analysis does not specify what is the boil off rate from the SFP at 72 hrs. This rate needs to be lower than the SFP makeup water flow.*

   GEH Response:

   The SFP boil-off calculation determines a bounding boil-off volume for the SFP, but it is not a bounding scenario for makeup water flow. A separate calculation has been performed to determine the minimum required makeup water flow rate at 72 hours. This calculation shows that the minimum required boil off rate (equal to makeup rate) is 159 gpm, which is bounded by the DCD value of 200 gpm.

6. *The applicant's DCD states that the buffer pool contains sufficient inventory of water to boil for 72 hrs without uncovering the fuel, but it is not clear that the applicant has taken into consideration the impact of a seismic event.*

   GEH Response:

   During a refueling outage, the water volume in the buffer pool communicates freely with the water in the reactor well, equipment pool, and upper fuel transfer pool. There are no potential drainage paths that can cause this pool volume to drain. For more information and historical background, please refer to RAI 16.2-77 and 9.1-128.

   The minimum required water inventory for the buffer pool is assured after making the adjustments related to the anti-siphon hole elevation (See Item 1).

7. *While reviewing the applicant's thermal analysis, the staff could not confirm that the heat loads developed for the analysis was calculated based on core thermal power that took into consideration uncertainty in core power measurements.*

GEH Response:

The calculation for SFP boil-off, as well as make-up rate and make-up volume have been revised to consider 102% core power.

8. *The staff found that the Basis of AC B 3.7.4 needed clarifications, as it relates to the required makeup water that the Fire Protection system needs to reserve for SFP makeup.*

GEH Response:

AC B3.7.4 has been deleted (incorporated into TS LCO 3.7.5). The Basis of AC 3.7.1 has been clarified as it relates to makeup water. Please see DCD markups.

9. *An apparent inconsistency was found between the latest thermal analysis results and the AC B 3.7.1, Emergency Make-up (1921 m^3 vs. 1151 m^3).*

GEH Response:

This inconsistency has been addressed. The value was determined to be unnecessary detail and was removed from AC B.3.7.1. Please see DCD markups.

10. *The applicant should clarify whether there are any non-seismic Category 1 and 2 connections that could provide potential drain paths from the spent fuel pool, the buffer pool, the lower fuel transfer pool, and cask pool. If there are potential seismic Category 1 and 2 drain paths for these pools, they should be included in DCD Tier 2, Table 3.2-1 and described in the appropriate sections of the DCD.*

GEH Response:

DCD Tier 2 Table 3.2-1 will be clarified to identify the SFP fuel transfer gates (System U97) as Seismic Category I. In addition, the Reactor Building buffer pool gates (System U71) are identified as Seismic Category I.

Pipes that could potentially drain pool inventory during a seismic event have been equipped with anti-siphon holes to preserve the minimum level as described in Item 1. Therefore, there are no pathways by which SFP or buffer pool water could be reduced below the minimum required level during a seismic event.

11. *Section 1 of NUREG-0800, SRP 9.1.3 "Spent Fuel Pool Cooling and Cleanup System," states that:*

"The safety function to be performed by the system in all cases remains the same; that is, the spent fuel assemblies must be cooled and must remain covered with water during all storage conditions."

SRP 9.1.3 also states that compliance with GDC 61 requires that the fuel storage and handling shall be designed (4) with a residual heat removal capability having reliability and testability that reflects the importance to safety of decay heat and other residual heat removal, and (5) to prevent significant reduction in fuel storage coolant inventory under accident conditions.

The ESBWR SFP is designed to permit boiling of the SFP water in order to provide cooling for the stored fuel. The applicant proposed to modify a technical specification (TS) that will ensure that the SFP has sufficient inventory of water to permit cooling of the stored fuel for 72 hrs after the loss of forced cooling, without requiring makeup water. The applicant's TS is based on the spent fuel pool water level being at the top of active fuel at 72 hours after the loss of forced cooling. This is inconsistent with the guidelines of SRP 9.1.3, as noted above. In addition, the applicant has not shown that there is sufficient residual heat removal capability with the spent fuel pool in a boiling condition and the water level at the top of active fuel. For example, the applicant has not addressed whether the thermal-hydraulics conditions in the fuel racks are sufficient to preclude fuel damage. The applicant needs to identify a water level at 72 hours that meets the requirements of 61, including providing the justification for the water level, and modify the TS limit accordingly.

GEH Response:

The proposed TS for SFP water level requires a minimum water level of 9.20 m above the top of the stored fuel bundles. The supporting calculation shows that during a loss of cooling event in which the SFP contains the highest possible heat load, the pool level is reduced by no more than 9.20 m. Therefore, the spent fuel assemblies are shown to remain covered with water up to the TSFA, for 72 hours under the bounding case.

The calculation supporting the TS value of 9.20 m above TSFA was audited by the NRC on Tuesday June 15th, 2010. This calculation considered the bounding heat load, which is a SFP that has recently received a full core offload in addition to an accumulated 20 years of spent fuel. The calculation demonstrates, by a very conservative methodology, that the SFP level could be reduced by no more than 9.20 m under the bounding heat load.

The TS limit of 9.20 m contains safety margin by virtue of the considerable margin built into the SFP boil-off calculation. Some of the margin is explicitly stated (no heat transfer through the pool structure or to the atmosphere), but the most significant margin is implicitly built into the calculation methodology. For example, the residual water in the SFP is not credited with absorbing any heat; whereas in a realistic event, the entire pool (including residual water) would heat to saturation before any water boils. The assumption that this energy is not absorbed by the residual water results in a conservative overestimation of the volume of water that is vaporized. For an initial water level of 9.20 m above TSFA, there would be significant margin after 72 hours. Therefore, the tech spec limit of 9.20 m is sufficient to meet the guidelines of SRP 9.1.3.

The following circumstances were also considered when developing the modifications to the SFP TS:

- The normal operating level for the SFP is 14.35 m above the pool floor, (10.3 m above TSFA).

- The SFP and buffer pool have no mechanism by which they can be drained below 9.20 m above TSFA. The FAPCS discharges water into the pool, which then overflows into a surge tank. If a discharge line were to break, the anti-siphon holes would preserve the minimum 9.20 m coverage.

- If the pool level were to drop below the normal operating level, alarms are provided to alert the control room of a low level.

- The event for which a minimum initial level of 9.20 m above TSFA is required is extraordinarily improbable. The event consists of a refueling outage with a full core offload and an accumulated 20 years of spent fuel, concurrent with a seismic event at the precise moment the last fuel bundle is placed in the SFP. For the heat loads associated with a normal refueling outage (i.e., no full core offload) and with less than 20 years of accumulated spent fuel, the heat loads in the SFP are much smaller and a lower initial level would be sufficient to provide cooling for 72 hours.

- Pool level instrumentation measures collapsed water level (see markup to DCD Tier 2, Subsection 9.1.3.5), thereby conservatively avoiding false readings due to steam vapors above the actual water level.

In summary, the proposed TS limit of 9.20 m provides adequate assurance that the fuel will remain covered for 72 hours after a loss of pool cooling, thereby meeting the guidelines of SRP 9.1.3 and the requirements of GDC 61.

GEH Revision 1 Response:

In this section of the response, any reference to "9.20 m" is changed to "10.26 m". The calculation the NRC audited on Tuesday, June 15, 2010, used a decay power versus time input that resulted in a required minimum level of "9.20 m" above TSFA to ensure water coverage. The current analysis that specifies a minimum of 10.26 m of coverage applies the same methodology as the calculation that was audited, but inputs a proportionally higher decay power versus time input to bound any non-conservative variations over core life. Both the beginning-of-cycle plus 36 days, and the end-of-cycle as-analyzed cases, fall within the bounding analysis.

In addition, the "10.3 m" value in the first bulleted item is changed to "10.36 m" to more precisely and accurately report the relative distance between the normal operating level and the TSFA.

DCD Impact

The following DCD sections and tables will be revised as shown in the attached markups:

- DCD Tier 1, Subsection 2.6.2
- DCD Tier 1, Table 2.6.2-2*
- DCD Tier 1, Subsection 2.16.7
- DCD Tier 1, Table 2.16.7-2
- DCD Tier 2, Table 3.2-1
- DCD Tier 2, Subsection 9.1.2.4*
- DCD Tier 2, Subsection 9.1.2.7
- DCD Tier 2, Subsection 9.1.3.2*
- DCD Tier 2, Subsection 9.1.3.5
- DCD Tier 2, Chapter 16, LCO 3.7.5*
- DCD Tier 2, Chapter 16B, LCO 3.0.3 Bases
- DCD Tier 2, Chapter 16B, LCO 3.7.5 Bases*
- DCD Tier 2, Appendix 19A, Table 19A-2
- DCD Tier 2, Chapter 19 ACM, AC B 3.7.1*
- DCD Tier 2, Chapter 19 ACM, AC 3.7.4 (deleted)
- DCD Tier 2, Chapter 19 ACM, AC 3.7.5 (renumbered to AC 3.7.4)
- DCD Tier 2, Chapter 19 ACM, AC 3.7.6 (renumbered to AC 3.7.5)

*DCD sections marked with asterisks are impacted by revision 1 of this response (this letter). Changes from the original markup (MFN 10-189) are enclosed within boxes.

Enclosure 2

MFN 10-189, Revision 1

Revised Response to Audit Open Items from the Summary of the June 3 and 15, 2010 NRC Regulatory Audits of the ESBWR Spent Fuel Pool Required Water Inventory

DCD Markups

(7) a. The FAPCS performs the nonsafety-related suppression pool cooling functions.

b. The FAPCS performs the nonsafety-related low-pressure coolant injection function.

c. The FAPCS provides the nonsafety-related external connection for emergency water to IC/PCCS pool and Spent Fuel Pool functions.

(8) (Deleted)

(9) Safety-related level instruments with adequate operating ranges are provided for the Spent Fuel Pool, buffer pool, and IC/PCCS pools.

(10) (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 the irradiated fuel assemblies~~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 the irradiated fuel assemblies~~active fuel~~.

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

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

(14) Lines that are submerged in the spent fuel pool or buffer pool enter the pools above the normal water level and are equipped with redundant anti-siphon holes that will preserve a water inventory above the irradiated fuel assemblies~~TAF sufficient for safe shielding~~ in the event of a break at a lower elevation.

(15) For all low-pressure coolant injection piping and components between the RWCU/SDC System and the FAPCS, including the check valves and motor operated valves, the ultimate rupture strength can withstand the full reactor pressure.

(16) The nonsafety-related control cables, instrument cables and power cables for equipment in the FAPCS trains A and B are electrically independent.

(17) The nonsafety-related control cables, instrument cables and power cables for equipment in the FAPCS trains A and B are physically separated.

(18) a. The electrical equipment supporting the two FAPCS trains is routed to the Reactor Building and Fuel Building through separate areas that do not contain installed equipment for lifting heavy loads.

b. Heavy loads that are being transported in the Reactor Building or the Fuel Building (where the majority of FAPCS equipment is located) that have the potential to simultaneously compromise both FAPCS trains would be handled by single failure-proof cranes.

Inspections, Tests, Analyses, and Acceptance Criteria

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

Table 2.6.2-2

ITAAC For The Fuel and Auxiliary Pools Cooling System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
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 the irradiated fuel assemblies~~active fuel~~.	Inspection of the Spent Fuel 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 irradiated fuel assemblies~~active fuel~~ and the weir elevation.	The elevation of the Spent Fuel Pool weir relative to the bottom of the pool is at least 14.35 m (47 ft) and that there is at least 1962~~90~~ m^3 (~~59681~~69300 ft^3) of free volume above the top of the irradiated fuel assemblies~~active fuel~~ that can be filled with water.
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 the irradiated fuel assemblies~~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 irradiated fuel assemblies~~active fuel~~ and the weir elevation.	The elevation of the Buffer Pool weir relative to the bottom of the pool is at least 6.7 m (22 ft) and that there is at least 288 m^3 (10,~~1~~200 ft^3) of free volume above the top of the irradiated fuel assemblies (stored in the deep pit)~~active fuel~~ that can be filled with water.
13a. Valves on lines attached to the RPV that require maintenance have maintenance valves such that freeze seals will not be required.	Inspections of piping design isometric drawings will be conducted. {{Design Acceptance Criteria}}	A review of piping design isometric drawings confirms that maintenance valves are included such that freeze seals will not be required. {{Design Acceptance Criteria}}
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	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.

Table 2.6.2-2

ITAAC For The Fuel and Auxiliary Pools Cooling System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
14. Lines that are submerged in the spent fuel pool or buffer pool enter the pools above the normal water level are equipped with redundant anti-siphon holes that will preserve a water inventory above the top of the irradiated fuel assemblies~~TAF sufficient for safe shielding~~ 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.	Redundant anti-siphon holes are present on all submerged piping in the Spent Fuel Pool and Buffer Pool and the piping enters the pools above the normal water level to preserve the water inventory to a minimum of ~~3~~10.~~0~~26~~5~~ m (~~1~~33~~0~~.~~0~~7 ft) above the top of the irradiated fuel assemblies~~TAF~~ in the event of a break at a lower elevation.
15. For all low-pressure coolant injection piping and components between the RWCU/SDC System and the FAPCS, including the check valves and motor operated valves, the ultimate rupture strength can withstand the full reactor pressure.	Inspection and analysis to verify the ultimate rupture strength of the as-built low-pressure coolant injection piping between the RWCU/SDC System and the nonsafety-related motor operated valves will be performed.	For 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, the ultimate rupture strength can withstand the full reactor pressure.
16. The nonsafety-related control cables, instrument cables and power cables for equipment in the FAPCS trains A and B are electrically independent.	Tests of the nonsafety-related control cables, instrument cables and power cables for equipment in the FAPCS trains A and B will be performed to show electrical independence.	The nonsafety-related control cables, instrument cables and power cables for equipment in the FAPCS trains A and B are electrically independent.
17. The nonsafety-related control cables, instrument cables and power cables for equipment in the FAPCS trains A and B are physically separated	Inspections of the nonsafety-related control cables, instrument cables and power cables for equipment in the FAPCS trains A and B will be performed to show physical separation.	The nonsafety-related control cables, instrument cables and power cables for equipment in the FAPCS trains A and B are physically separated as defined by IEEE-384.

2.16.7 Fuel Building

Design Description

The Fuel Building (FB) contains the spent fuel pool, cask loading area, fuel handling systems and storage areas, lower connection to the Fuel Transfer System, overhead crane, and other plant systems and equipment. The FB is a Seismic Category I structure except for the penthouse that houses HVAC equipment. The penthouse is a Seismic Category II structure. The FB is a rectangular reinforced concrete box type shear wall structure consisting of walls and slabs and is supported on a foundation mat. The FB is integrated with the RB, sharing a common wall between the RB and FB as well as a large common foundation mat. The building is partially below grade.

There is no safety-related component in the FB that could be affected by internal flooding in this structure. Flooding in the FB could not affect the RB because the connection points in the lower elevation are watertight. To protect the FB against external flooding, penetrations in the external walls below flood level are provided with watertight seals.

The key characteristics of the FB are as follows:

(1) The FB is designed and constructed to accommodate the dynamic, static, and thermal loading conditions associated with the various loads and load combinations, which form the structural design basis. The loads are those associated with:

- Natural phenomena—wind, floods, tornadoes (including tornado missiles), earthquakes, rain and snow;
- Internal events—floods;
- Normal plant operation—live loads, dead loads and temperature effects; and
- Loads from spent fuel storage racks.

(2) The functional arrangement of the FB is as described in the Design Description of this Subsection 2.16.7 and is as shown in Figures 2.16.7-1 through 2.16.7-6.

(3) The critical dimensions and acceptable tolerances for the FB are as described in Table 2.16.7-1.

(4) The walls forming the boundaries of the FB and penetrations through these walls have three-hour fire ratings.

(5) The FB external flooding protection features are:

- Exterior access openings are sealed in external walls below flood and groundwater levels;
- Wall thickness below flood level designed to withstand hydrostatic loads;
- Water seals at pipe and electrical penetrations are installed in external walls below flood and groundwater levels;
- Water stops in all expansion and construction joints below design basis maximum 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.

(6) Internal flooding analysis of the FB is performed using ANSI/ANS 56.11-1988 guidelines to ensure protection of RTNSS equipment.

(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 gates that connect the SFP to adjacent pools are are designed to Seismic Category I requirements, and are designed so that the bottom of the gate is at least 3.05 m (10.0 ft) above TAF.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.16.7-2 provides a definition of the inspections, test and 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
7. RTNSS equipment in the FB is located above the maximum flood level for that location or is qualified for flood conditions.	Inspection of the as-built RTNSS equipment in the FB will be conducted.	The as-built RTNSS equipment in the FB is located above the maximum flood level for that location or is qualified for flood condition.
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.	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 gates that connect the SFP to adjacent pools are are designed to Seismic Category I requirements, and are designed so that the bottom of the gate is at least 3.05 m (10.0 ft) above TAF.	Inspection of the as-built spent fuel pool will be performed.	The gates that connect the SFP to adjacent pools can withstand seismic dynamic loads without loss of structural integrity, and are built so that the bottom of the gate is at least 3.05 m (10.0 ft) above TAF.

Table 3.2-1

Classification Summary

Principal Components[1]	Safety Class.[2]	Location[3]	Quality Group[4]	Safety-Related Classification[5]	Seismic Category[6]	Notes
U68 Ancillary Diesel Building Structure	N	ADB	—	S	II	(5) c, (5) h
U69 Ancillary Diesel Building HVAC System	N	ADB	—	S	II	(5) c, (5) h
U71 Reactor Building Structure						
1. Main building	3	RB	—	Q	I	
2. Stair towers, equipment removal access shaft and elevator shafts	N	RB	—	S	II	(5) c
3. Equipment storage pool, reactor well and buffer pool liners, and pool gates	3	RB	—	Q	I	
~~**U72 Turbine Building Structure**~~	N	TB	—	S	II	(5) c
U73 Control Building Structure						
1. Main building	3	CB	—	Q	I	
2. Stair towers and elevator shaft	N	CB	—	S	II	(5) c
U74 Radwaste Building Structure	N	RW	—	S	NS	(5) d
U75 Service Building Structure	N	SB	—	S	II	(5) c
U77 Control Building HVAC						
1. Ducts, valves, and dampers (including supports) supporting safety-related areas	3	CB	—	Q	I	
2. Other ducts, valves and dampers (including supports)	N	CB	—	N	NS	
3. Electrical modules and cable with safety-related function	3	CB	—	Q	I	

Table 3.2-1

Classification Summary

Principal Components[1]	Safety Class.[2]	Location[3]	Quality Group[4]	Safety-Related Classification[5]	Seismic Category[6]	Notes
4. Control Room air handling units and the air conditioning for their coils	N	CB	—	S	II	(5) c, (5) h
5. Other Nonsafety-Related equipment	N	CB	—	N	NS	
6. Emergency Filter Unit	3	CB	—	Q	I	
7. Safety-Related DCIS (Q-DCIS) room coolers	N	CB	—	S	II	(5) c, (5) h
U78 Cold Machine Shop	N	OO	—	N	NS	
U80 Electrical Building Structure	N	EB	—	N	NS	
U81 Seismic Monitoring System	N	ALL	—	N	NS	
U84 Service Water Building Structure	N	SF	—	N	NS	
U85 Service Water Building HVAC	N	SF	—	N	NS	
U91 Administration Building Structure	N	OL	—	N	NS	
U93 Training Center	N	OL	—	N	NS	
U95 Hot Machine Shop	N	OO	—	N	NS	
U97 Fuel Building Structure						
1. Main building	3	FB	—	Q	I	
2. HVAC penthouse, stair towers and elevator shaft	N	FB	—	S	II	(5) c
3. Spent fuel pool liner and pool gates	3	FB	—	Q	I	
U98 Fuel Building HVAC						
1. Building isolation dampers	3	FB	—	Q	I	
2. Ducting penetrating fuel building boundary	3	FB	—	Q	I	

concrete structure in accordance with Table 3.8-15, except that load factors for all cases are equal to 1.0, and the acceptance criteria follow ASME Section III, Division 2, CC-3700. Pool liners are evaluated to ensure structural integrity under fuel handling accidents. The bottoms of the pool gates are at least 3.05 m (10.0 ft) above TAF to provide adequate shielding and cooling. Pool fill lines enter the pool above the safe shielding water level and overflow weirs are located above normal water level. Redundant anti-siphoning provisions are included on pool circulation lines to preclude a pipe break from siphoning the water from the pool and jeopardizing the safe water level of 310.0526m (1033.07 ft) above the top of the irradiated fuel assemblies which ensures adequate inventory for loss of active fuel pool cooling and shieldingTAF.

The racks are described in Reference 9.1-1. The weight of the fuel assembly or bundle is supported axially by the rack . There are no unanalyzed locations within a fuel rack or array of fuel racks. Individual racks are spaced less than one fuel assembly apart so that a fuel assembly cannot be inserted between racks. In the event that a fuel assembly is lowered adjacent to an exterior rack, this configuration is analyzed.

Materials used for construction are specified in accordance with the latest issue of applicable ASTM specifications at the time of equipment order. The racks are constructed in accordance with the QA requirements of 10 CFR 50, Appendix B.

The structural integrity of the rack is demonstrated for the loads and load combinations described below using linear elastic design methods.

The applied loads to the rack are as follows:

- *Dead loads - weight of rack and fuel assemblies plus the hydrostatic loads;*
- *Live loads - effect of lifting an empty rack during installation;*
- *Thermal loads - effects caused by pool temperature changes occurring as a result of normal operating or abnormal conditions, as applicable;*
- *Dynamic loads (Square Root of the Sum of the Squares [SRSS] combination of Seismic, Loss-of-Coolant-Accident [LOCA],Safety Relief Valve [SRV] loads);*
- *Fuel drop load - effect of an accidental drop of the heaviest fuel assembly or bundle from the maximum possible height; and*
- *Stuck fuel load - upward force on the rack caused by a postulated stuck fuel assembly.*

The load combinations considered in the rack design are as follows:

- *Dead plus live loads;*
- *Dead plus live plus thermal loads;*
- *Dead plus live plus thermal plus stuck fuel loads;*
- *Dead plus live plus thermal plus dynamic loads; and*
- *Dead plus live plus fuel drop loads.*

Stress analyses are performed by classical methods based upon shears and moments developed by the dynamic method. Using the given loads, load conditions and analytical methods, stresses are calculated at critical sections of the rack and compared to acceptance criteria referenced in *design of the spent fuel storage racks and associated support structures meet the requirements of Appendix D to the Standard Review Plan (SRP) 3.8.4. See Reference 9.1-1 for the results of the stress analysis for the spent fuel racks.*]*

Text sections that are bracketed and italicized with an asterisk following the brackets are designated as Tier 2. Prior NRC approval is required to change.

9.1.2.5 Thermal-Hydraulic Design

During normal operation the fuel storage racks are designed to provide sufficient natural convection coolant flow through the rack and fuel to remove decay heat without reaching excessive water temperatures (121°C; 250°F). Stress properties of the materials used in rack fabrication are considered at this temperature, therefore, the temperature of coolant exiting the racks shall not exceed 121°C (250°F).

In the spent fuel storage pool, the bundle decay heat is removed by FAPCS recirculation flow to maintain the pool temperature below 48.9°C (120°F) during normal conditions.

A thermal-hydraulic analysis to evaluate the rate of naturally circulated flow and the maximum rack exit temperature is performed. See Reference 9.1-1 for the thermal-hydraulic analysis results.

In the event of loss of FAPCS cooling trains, boiling can occur (See Subsection 9.1.3.2). The structural acceptance criterion for the fuel storage racks is that the storage rack design not exceed the allowable stress levels given in the ASME B&PV Code, Section III, Subsection NF during boiling.

9.1.2.6 Material Considerations

Material used in the fabrication of the spent fuel storage racks is limited to the use of stainless steel in accordance with the latest issue of the applicable ASTM specifications at the time of equipment order. The spent fuel rack ends are fabricated from Type 304L stainless steel, which conforms to ASTM A240/A240M. The appropriate weld wire for the Type 304L components (E308L or ER308L) is utilized in the fabrication process. The interlocking panels that form the fuel element storage matrix are fabricated from Type 304B7 borated stainless steel, which conforms to ASTM A887-89 (Unified Numbering System (UNS) Designation S30467, Grade B, 1.75-2.25% boron inclusion). There is no welding of borated stainless steel. Fuel rack feet are fabricated from Type 630 (17-4PH) age-hardened stainless steel, which conforms to ASTM A564/A564M. Materials are chosen for their corrosion resistance and their ability to be formed and welded with consistent quality.

The storage tube material is permanently marked with identification traceable to the material certifications. The fuel storage tube assembly is compatible with the environment of treated water and provides a design life of 60 years.

9.1.2.7 Facilities Description (Spent Fuel Storage)

There are two separate areas for storage of spent fuel assemblies. These are in a separate deep pit area in the buffer pool in the RB and in the Spent Fuel Pool in the FB.

Spent fuel storage racks in the buffer pool area provide storage in the RB for spent fuel received from the reactor vessel during the refueling operation. These racks can store a maximum of 154 spent fuel assemblies. The deep pit for the storage of spent fuel in the rack is designed such that the depth of the cavity allows the fuel to be placed in the rack with sufficient margin below the rack for natural convection cooling to occur and that the top of the active fuel remains below the top of the cavity. The spent fuel storage racks are top entry racks designed to preclude the possibility of criticality under normal and abnormal conditions.

Together, the spent fuel storage racks in the Spent Fuel Pool and the buffer pool deep pit provide storage for spent fuel received from the reactor vessel resulting from ten calendar years of operation plus one full-core offload. The cavity for the storage of spent fuel in the rack is designed such that the depth of the cavity allows the fuel to be placed in the rack with sufficient margin below the rack for natural convection cooling to occur and that the top of the active fuel remains below the top of the cavity. The spent fuel storage racks are top entry racks designed to preclude the possibility of criticality under normal and abnormal conditions.

On a complete loss of the FAPCS active cooling capability and under the condition of maximum heat load associated with 20 years of fuel storage and a full-core offload, sufficient quantity of water is available in the Spent Fuel Pool above the top of ~~active fuel (TAF) level~~the irradiated fuel assembly to allow boiling for 72 hours and still have the top of active fuel (TAF) submerged under water.

9.1.2.8 Safety Evaluation

Criticality Control

The spent fuel storage racks are designed to assure that the fully loaded array is subcritical by at least 5% Δk.

Monte Carlo techniques are employed in the calculations performed to assure that k_{eff} does not exceed 0.95 under all normal and abnormal conditions.

The biases between the calculated results, experimental results, and the uncertainty in the calculation, are taken into account as part of the calculative procedure to assure that the specific k_{eff} limit is met. Spent fuel storage racks criticality control meets the requirements of 10 CFR Part 50.68(b). Criticality analysis is documented in Reference 9.1-2.

Structural Design and Material Compatibility Requirements:

The racks are described in References 9.1-1 and 9.1-2.

- The support structure allows sufficient pool water flow for natural convection cooling of the stored fuel and allows the rack material temperatures to stay within limits.
- The racks are fabricated from materials specified in accordance with the latest issue of applicable ASTM specifications at the time of equipment order.
- The racks are designed to withstand the impact force generated by the vertical free-fall drop of a fuel assembly and its handling tool from the maximum height expected during normal fuel handling (See Reference 9.1-1 for analysis).
- The rack is designed to withstand a pull-up force in the event a fuel assembly is stuck.
- 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.

taken to avoid water hammer and gas binding in pumps per the requirements in Subsection 13.5.2.

The primary design function of FAPCS is to cool and clean pools located in the containment, RB and FB (refer to Table 9.1-1) during normal plant operation. FAPCS provides flow paths for filling and makeup of these pools during normal plant operation and during post-accident conditions, as necessary.

FAPCS is also designed to provide the following accident recovery functions in addition to the Spent Fuel Pool cooling function:

- Suppression pool cooling (SPC);
- Drywell spray;
- Low pressure coolant injection (LPCI) of suppression pool water into the Reactor Pressure Vessel (RPV); and
- Alternate Shutdown Cooling.

In addition to its accident recovery function, the SPC mode is also designed to automatically initiate during normal operation in response to a high temperature signal from the suppression pool.

A crosstie to the Reactor Water Cleanup/Shut Down Cooling (RWCU/SDC) System is provided in the suppression pool suction and discharge headers such that this system may be used as an alternative for post-accident decay heat removal. For details regarding the crosstie, refer to Subsection 5.4.8.

Redundancy and physical separation are provided in accordance with SECY-93-087 for active components in lines dedicated to LPCI and SPC modes.

During normal plant operation, at least one FAPCS cooling and cleanup train is available for continuous operation to cool and clean the water of the Spent Fuel Pool, while the other train can be placed in standby or other mode for cooling the GDCS pools and suppression pool. If necessary during a refueling outage, both trains may be used to provide maximum capacity for cooling the Spent Fuel Pool. The water treatment units can be bypassed when necessary, and will be bypassed automatically on a high temperature signal downstream of the heat exchangers.

Each FAPCS cooling and cleanup train has sufficient flow and cooling capacity to maintain Spent Fuel Pool bulk water temperature below 48.9°C (120°F) under normal Spent Fuel Pool heat load conditions (normal heat load condition is defined as irradiated fuel in the Spent Fuel Pool resulting from 20 years of plant operations). During the maximum Spent Fuel Pool heat load conditions of a full core offload plus irradiated fuel in the Spent Fuel Pool resulting from 20 years of plant operations, both FAPCS cooling and cleanup trains are needed to maintain the bulk temperature below 60°C (140°F).

During a loss of the FAPCS cooling trains, cooling of the Spent Fuel Pool, buffer pool and IC/PCCS pools is accomplished by allowing the water to heat and boil. The Reactor Building (RB) and Fuel Building (FB) are equipped with safety-related normally closed pressure relief devices that open passively to relieve excessive positive pressure generated by steam buildup during pool boiling. The pressure set point is equivalent to the full tornado pressure drop described in Section 3.3.2.2. The Spent Fuel Pool ~~is maintained at a water level of at least~~normal water level is 14.35 m (47 ft). ~~and a~~A minimum free volume ~~above the TAF~~ of ~~at least~~ ~~169~~1962~~0~~ m^3 (~~597~~69300 ft^3)~~.~~ is required above the top of the irradiated fuel assemblies to accommodate a loss of FAPCS cooling for 72 hours. This minimum volume corresponds to a minimum water level of 10.26 m (33.7 ft) above the top of the assemblies. The buffer pool ~~is maintained at a~~normal water level is~~of at least~~ 6.7 m (22.0 ft), however spent fuel is stored in a deep pit that provides an additional 9.5 m (31.2 ft) of submergence. In the buffer pool,~~and~~ a minimum free volume ~~above TAF~~ of ~~at least~~ 288 m^3 (10200~~169~~ ft^3) is required above the top of the irradiated fuel assemblies to accommodate a loss of FAPCS cooling for 72 hours. ~~For both pools, the water levels and free volumes are sufficient to ensure that following a loss of active cooling without makeup that persists for 72 hours, the water levels in the pools remain above TAF.~~ This minimum volume corresponds to a minimum water level of 7.3 m (24.0 ft) above the top of the assemblies.

After 72 hours, post-accident makeup water can be provided through safety-related connections to the Fire Protection System (FPS) or another onsite or offsite water source.

All operating modes (refer to Table 9.1-2) are manually initiated and controlled from the Main Control Room (MCR), except the SPC mode, which is initiated either manually, or automatically on high suppression pool water temperature signal. Instruments are made for indication of operating conditions to aid the operator during the initiation and control of system operation. Provisions are provided to prevent inadvertent draining of the pools during FAPCS operation by including anti-siphon holes on all FAPCS piping that is normally submerged.

The FAPCS is designed to provide for the collection, monitoring, and drainage of pool liner leaks from the spent fuel pools, auxiliary pools, and IC/PCCS pools (refer to Table 9.1-1) to the Liquid Waste Management System.

Containment isolation valves are provided on the lines that penetrate the primary containment and are powered from independent safety-related sources.

The containment isolation valves are automatically closed upon receipt of a containment isolation signal from the Leakage Detection and Isolation System (LD&IS), with the exception of the containment isolation valves needed for post-accident recovery modes, which do not receive an isolation signal.

The FAPCS is a nonsafety-related system with the exception of piping and components required for:

- Containment isolation;
- Refilling of the IC/PCCS pools or the Spent Fuel Pool with post-accident water supplies from the Fire Protection System or another onsite or offsite source~~; and~~
- The high-pressure interface with the Reactor Water Cleanup/Shutdown Cooling system used for low pressure coolant injection;~~.~~ and
- Interconnection with GDCS.

The piping and components needed for the following functions are classified as Regulatory Treatment of Non-Safety Systems (RTNSS):

valves such that the flow path branches to include two parallel flow paths, each with a motor-operated gate valve (refer to Figure 9.1-1). This line branches again downstream of the shutoff valves to include a pair of safety-related testable check valves which isolate the FAPCS from the safety-related RWCU/SDC System piping downstream. A secondary flow path draws water from the Fire Protection Storage Tank using an Adjustable Speed Drive (ASD) equipped motor-driven pump located in the fire pump enclosure. This secondary flow path injects its water into the primary flow path upstream of the motor-operated shutoff valves. All piping between the RWCU/SDC System and the motor-operated shutoff valves are designed to withstand the full reactor pressure. The motor-operated shutoff valves fail as-is, are normally closed, and are prevented from opening by a high reactor pressure signal from the Nuclear Boiler System to protect the low pressure portion of FAPCS piping and components. A pressure relief valve is located upstream of the motor-operated shutoff valves. Any leakage of high-pressure coolant through the safety-related check valves and motor-operated shutoff valves is discharged through the pressure relief valve and measured before being sent to the Liquid Waste Management System. Redundant valves are contained in separate fire zones for improved reliability.

A drywell spray discharge line and a ring header with spray nozzles mounted on the header are provided for spraying water inside the drywell to reduce the drywell pressure 72 hours following a LOCA to assist in post-accident recovery. In order to prevent excessive negative differential pressure on the containment liner the drywell spray flow rate must be less than 127 m^3/hr (560 gpm). The drywell spray flow rate is maintained below this value by a sized, flow-restricting orifice located in the drywell spray discharge line. The ring header equipped with spray nozzles is located in the drywell.

A separate cooling and cleanup subsystem completely independent of FAPCS cooling and cleanup trains and their piping loop is provided for cooling and cleanup of the IC/Passive Containment Cooling System (PCCS) pools to prevent radioactive contamination of these pools. The subsystem consists of one pump, one heat exchanger, and one water treatment unit .

FAPCS contains two containment isolation valves on the lines that penetrate the primary containment.

For details related to FAPCS containment isolation, refer to Subsection 6.2.4.3.2.

Pipes equipped with normally closed manual valves are provided for establishing flow paths from onsite or offsite post-accident water supplies or the Fire Protection System to refill the IC/PCCS pools and Spent Fuel Pool following a design basis loss-of-coolant accident.

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 redundant anti-siphoning holes for all FAPCS discharge lines are located at the elevation that will preserve a ~~safe shielding~~ level of at least ~~3~~10.26~~05~~ m (~~10~~ 33.7 ft) above the top of the ~~active fuel in a~~ stored fuel bundles in the event of a line break at a lower elevation which ensures adequate inventory for loss of active fuel pool cooling and shielding. There are no other drainage paths by which the level in the SFP or buffer pool could be reduced. The anti-siphoning holes in the suction piping of the GDCS Pools and IC/PCCS cooling and cleanup subsystem are located at the elevation of minimum water level to prevent significant draining of the pool in case of a suction line break at a lower elevation. The post-accident makeup lines to the Spent Fuel Pool and IC/PCCS Pools are not submerged below the normal water level. Analysis will be performed on the suppression

Safety-related level instrumentation is provided in the spent fuel pool, buffer pool, and IC/PCCS pools to detect a low water level that would indicate a loss of decay heat removal ability in accordance with GDC 63.

9.1.3.4 Testing and Inspection Requirements

The FAPCS is designed to permit surveillance test and in-service inspection of its safety-related components and components required to perform the post-accident recovery functions, in accordance with GDC 45 and ASME BPVC Section XI. 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.

9.1.3.5 Instrumentation and Control

System Instrumentation

Water Levels - The skimmer surge tank level is monitored by a level transmitter. The skimmer surge tank level is displayed in the MCR. In addition to level indication, this signal is used to initiate low and high water-level alarms and to operate the Condensate Storage and Transfer System makeup water control valve for the skimmer surge tank.

The IC/PCCS pool has four safety-related level transmitters in each inner expansion pool. All transmitter signals are indicated on the safety-related displays and sent through the gateways for nonsafety-related display and alarms. All signals are validated and used to control the valve in the makeup water supply line to the IC/PCCS pool. A low level signal from these transmitters is sent to the Isolation Condenser System to open the pool cross-connect valves to the equipment storage pool. Each expansion pool also contains four nonsafety-related level transmitters that provide a backup to the safety-related transmitters.

The Spent Fuel Pool and buffer pool each have ~~two wide-range safety-related level transmitters~~ that transmit signals to the MCR. These signals are used for collapsed water level indication and to initiate high/low-level alarms, both locally an~~d in the MCR. At a minimum, alarm set points~~ are included at the top of the active fuel, an adequate shielding level (3.05 m [10 ft]above TAF), and an elevation just below normal water level to give operators advanced notice of a loss of inventory but with sufficient margin to allow for 72 hours of pool boiling.

The SFP and IC/PCCS pools contain backup nonsafety-related level indicators that can be operated using portable onsite power supplies to indicate when the pools have been replenished to their normal water level.

All other pools (upper transfer pool, lower fuel transfer pool, cask pool, reactor well, dryer and separator storage pool) have local, nonsafety-related, panel-mounted level transmitters to provide signals for high/low-level alarms in the MCR.

Level instruments for the suppression pool and GDCS pools are provided by other systems.

Water Temperatures – Water temperatures are monitored in the Fuel and Auxiliary pools (listed in Table 9.1-1) with temperature transmitters that send signals to the MCR for water temperature indication and high-temperature alarms. In the IC/PCCS pool, each condenser subcompartment also has temperature transmitters that send signals to the MCR for water temperature indication and high-temperature alarms. The upstream and downstream piping of

3.7 PLANT SYSTEMS

3.7.5 Fuel Pool Water Level and Temperature

LCO 3.7.5 The fuel pool water level and temperature shall be within limits~~shall be ≥ 7.01 m (23.0 ft) over the top of irradiated fuel assemblies seated in the spent fuel storage racks in the Reactor Building and Fuel Building~~.

APPLICABILITY: During movement of irradiated fuel assemblies in the associated fuel storage pool,~~.~~
When irradiated fuel assemblies are stored in the associated fuel storage pool.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Fuel pool water level or temperature not within limit.	----------------- - NOTE - LCO 3.0.3 is not applicable. -----------------	
	A.1 Suspend movement of irradiated fuel assemblies in the associated fuel storage pool(s).	Immediately
	AND	
	A.2 Initiate action to restore water level and temperature to within limit.	1 hour

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.5.1	Verify the fuel pool water level is ≥ ~~7.01~~10.26 m (~~23.0~~33.7 ft) over the top of irradiated fuel assemblies seated in the storage racks.	7 days

SURVEILLANCE		FREQUENCY
SR 3.7.5.2	Verify the fuel pool average water temperature is ≤ 60 °C (140 °F)	7 days

BASES

LCO 3.0.3

LCO 3.0.3 establishes the actions that must be implemented when an LCO is not met and

a. An associated Required Action and Completion Time is not met and no other Condition applies; or

b. The condition of the unit is not specifically addressed by the associated ACTIONS. This means that no combination of Conditions stated in the ACTIONS can be made that exactly corresponds to the actual condition of the unit. Sometimes, possible combinations of Conditions are such that entering LCO 3.0.3 is warranted; in such cases, the ACTIONS specifically state a Condition corresponding to such combinations and also that LCO 3.0.3 be entered immediately.

This Specification delineates the time limits for placing the unit in a safe MODE or other specified condition when operation cannot be maintained within the limits for safe operation as defined by the LCO and its ACTIONS. It is not intended to be used as an operational convenience that permits routine voluntary removal of redundant systems or components from service in lieu of other alternatives that would not result in redundant systems or components being inoperable.

Upon entering LCO 3.0.3, 1 hour is allowed to prepare for an orderly shutdown before initiating a change in unit operation. This includes time to permit the operator to coordinate the reduction in electrical generation with the load dispatcher to ensure the stability and availability of the electrical grid. The time limits specified to reach lower MODES of operation permit the shutdown to proceed in a controlled and orderly manner that is well within the specified maximum cooldown rate and within the capabilities of the unit, assuming that only the minimum required equipment is OPERABLE. This reduces thermal stresses on components of the Reactor Coolant System and the potential for a plant upset that could challenge safety systems under conditions to which this Specification applies. The use and interpretation of specified times to complete the actions of LCO 3.0.3 are consistent with the discussion of Section 1.3, "Completion Times."

A unit shutdown required in accordance with LCO 3.0.3 may be terminated and LCO 3.0.3 exited if any of the following occurs:

a. The LCO is now met;

b. A Condition exists for which the Required Actions have now been performed; or

BASES

LCO 3.0.3 (continued)

c. ACTIONS exist that do not have expired Completion Times. These Completion Times are applicable from the point in time that the Condition is initially entered and not from the time LCO 3.0.3 is exited.

The time limits of LCO 3.0.3 allow 37 hours for the unit to be in MODE 5 when a shutdown is required during MODE 1 operation. If the unit is in a lower MODE of operation when a shutdown is required, the time limit for reaching the next lower MODE applies. If a lower MODE is reached in less time than allowed, however, the total allowable time to reach MODE 5, or other applicable MODE, is not reduced. For example, if MODE 2 is reached in 2 hours, then the time allowed for reaching MODE 3 is the next 11 hours, because the total time for reaching MODE 3 is not reduced from the allowable limit of 13 hours. Therefore, if remedial measures are completed that would permit a return to MODE 1, a penalty is not incurred by having to reach a lower MODE of operation in less than the total time allowed.

In MODES 1, 2, 3, and 4, LCO 3.0.3 provides actions for Conditions not covered in other Specifications. The requirements of LCO 3.0.3 do not apply in MODES 5 and 6 because the unit is already in the most restrictive Condition required by LCO 3.0.3. The requirements of LCO 3.0.3 do not apply in other specified conditions of the Applicability (unless in MODE 1, 2, 3, or 4) because the ACTIONS of individual Specifications sufficiently define the remedial measures to be taken.

Exceptions to LCO 3.0.3 are provided in instances where requiring a unit shutdown, in accordance with LCO 3.0.3, would not provide appropriate remedial measures for the associated condition of the unit. An example of this is in LCO 3.7.5, "Fuel Pool Water Level and Temperature." LCO 3.7.5 has an Applicability of "During movement of irradiated fuel assemblies in the associated fuel storage pool" and "When irradiated fuel assemblies are stored in the associated fuel storage pool." Therefore, this LCO can be applicable in any or all MODES. If the LCO and the Required Actions of LCO 3.7.5 are not met while in MODE 1, 2, 3, or 4, there is no safety benefit to be gained by placing the unit in a shutdown condition. The Required Actions of LCO 3.7.5 of "Suspend movement of irradiated fuel assemblies in the associated fuel storage pool(s)" and "Initiate action to restore water level and temperature to within limit" ~~is~~are the appropriate Required Actions to complete in lieu of the actions of LCO 3.0.3. These exceptions are addressed in the individual Specifications.

B 3.7 PLANT SYSTEMS

B 3.7.5 Fuel Pool Water Level and Temperature

BASES

BACKGROUND	The minimum water level in the deep pit area of the reactor building buffer pool and in the fuel building spent fuel storage pool boundsmeets the assumptions of iodine decontamination factors following a fuel handling accident. The water in these pools also provides a large capacity heat sink in the event the Fuel and Auxiliary Pools Cooling System (FAPCS) is unavailable. The minimum water level and assumed initial pool temperature for a postulated loss of FAPCS are found in Reference 5. A general description of the reactor building buffer pool and fuel building spent fuel storage pool design is found in Section 9.1.2 (Ref. 1). The assumptions of the fuel handling accident are found in Section 15.4.1 (Ref. 2).
APPLICABLE SAFETY ANALYSES	The water level above the irradiated fuel assemblies is an explicit assumption of the fuel handling accident. A fuel handling accident is evaluated to ensure the radiological consequences (whole-body dose or its equivalent to any part of the body calculated at the exclusion area and low population zone boundaries) are < 0.063 Sv (6.3 rem) total effective dose equivalent (TEDE) and < 0.05 Sv (5.0 rem) TEDE in the control room as required by 10 CFR 52.47(a)(2)(iv) (Ref. 3) and Regulatory Guide 1.183 (Ref. 4) acceptance criteria. A fuel handling accident is assumed to damage all of the fuel rods in two (2) fuel assemblies as discussed in References 2 and 4. The fuel handling accident is evaluated for the dropping of an irradiated fuel assembly onto the reactor core which bounds the consequences of dropping an irradiated fuel assembly onto stored fuel bundles. The justification for the bounding analysis used, initial assumptions of the analysis, and consequences of a fuel handling accident inside the reactor building are documented in Reference 2. The water level above the irradiated fuel assemblies provides for absorption of water-soluble fission-product gases and transport delays of soluble and insoluble gases that must pass through the water before being released to the reactor building or fuel building atmosphere. This absorption and transport delay reduces the potential radioactivity of the release during a fuel handling accident.

BASES

APPLICABLE SAFETY ANALYSES (continued)

In addition to mitigating the effects of a fuel handling accident, the required minimum water level and maximum water temperature in the spent fuel storage pool and buffer pool provide a large capacity heat sink in the event FAPCS is unavailable. For both pools, the water levels and free volumes are sufficient to ensure that following a loss of active cooling without makeup that persists for 72 hours, the water levels in the pools remain above the top of the irradiated fuel assemblies. The minimum water level required for the buffer pool is less than that required for the spent fuel pool, however the bounding value of 10.26 m is utilized for this LCO.

The fuel pool water level and temperature satisfy~~ies~~ Criterion 2 of 10 CFR 50.36(c)(2)(ii).

LCO

The ~~specified~~ water level limit preserves the assumption of the fuel handling accident analysis (Ref. 2) and loss of FAPCS (Ref. 5). The water temperature limit preserves the assumption of loss of FAPCS (Ref. 5). ~~As such, it is the minimum required for fuel movement within the spent fuel storage pool.~~

APPLICABILITY

This LCO applies whenever ~~movement of~~ irradiated fuel assemblies ~~occurs~~are being moved or stored in the associated fuel storage racks since the potential for a release of fission-products exists.

ACTIONS

A.1

When the initial conditions for an accident cannot be met, steps should be taken to preclude the accident from occurring. With either fuel pool level less than required, the movement of irradiated fuel assemblies in the associated storage pool is immediately suspended. Suspension of this activity shall not preclude completion of movement of an irradiated fuel assembly to a safe position. This effectively precludes a spent fuel handling accident from occurring.

This action is also appropriate when fuel pool average water temperature is not within limit since adding heat load to a pool with reduced capacity as a heat sink should not be performed.

BASES

ACTIONS (continued)

A.2

If the water level in the spent fuel storage pool or buffer pool is < 10.26 m (33.7 ft) above the top of the irradiated fuel assemblies, or if the average water temperature is > 60°C (140°F), the heat capacity of the pool may be less than that assumed in the event of a loss of FAPCS. In this case, action must be initiated within 1 hour to restore the water level and temperature to within limit. Action must continue until the parameter is restored to within the applicable limit.

The Completion Time of 1 hour ensures prompt action will be taken to compensate for a degraded condition.

Required Actions A.1 and A.2 ~~has~~have been modified by a Note indicating that LCO 3.0.3 does not apply. If moving irradiated fuel assemblies while in MODE 1, 2, 3, or 4, the fuel movement is independent of reactor operations. Fuel pool cooling requirements are also independent of reactor operations. Therefore, inability to suspend movement of irradiated fuel assemblies or to initiate restoration of fuel pool water level and temperature to within limit is not a sufficient reason to require a reactor shutdown.

SURVEILLANCE REQUIREMENTS

SR 3.7.5.1

This SR verifies sufficient water is available to mitigate the consequences of a fuel handling accident or a loss of cooling in the spent fuel storage pool or buffer pool. The water level in the spent fuel storage pool and buffer pool must be checked periodically. The 7-day Frequency is acceptable, based on operating experience, considering that the water volume in the pool is normally stable and water level changes are controlled by unit procedures.

During refueling operations, the level above the top of the RPV flange is verified every 24 hours in accordance with SR 3.9.6.1.

SR 3.7.5.2

This SR verifies that the average water temperature in the spent fuel storage pool and buffer pool is low enough to mitigate the consequences of a loss of cooling. The temperature in the spent fuel storage pool and buffer pool must be checked periodically. The 7-day Frequency is

BASES

REFERENCES

1. Section 9.1.2.
2. Section 15.4.1.
3. 10 CFR 52.47(a)(2)(iv).
4. Regulatory Guide 1.183, July 2000.
5. Section 9.1.3.2.

Table 19A-2
RTNSS Functions

RTNSS Function	Description	Availability Controls
Reactor Building HVAC Accident Exhaust Filters	E – Adverse System Interactions	ACLCO 3.7.~~5~~4
Lower Drywell Hatches	E – Adverse System Interactions	ACLCO 3.6.1
FPS Water Tank	B - Supports core cooling for refill of pools	ACLCO 3.7.1
FPS Diesel Fuel Oil Tank	B - Supports Diesel Driven FPS pump	ACLCO 3.7.1
Ancillary Diesel Generators	B - Supports FPS Motor Driven Pump, PCCS Vent Fans, CRHAVS AHUs, Emergency Lighting, Q-DCIS	ACLCO 3.8.3
Ancillary AC Power Buses	B - AC power distribution from Ancillary Diesel Generators to plant loads.	Maintenance Rule
Ancillary DG Fuel Oil Tank	B - Supports Ancillary Diesel Generators	Maintenance Rule
Ancillary DG Fuel Oil Transfer Pump	B - Supports Ancillary Diesel Generators	Maintenance Rule
Ancillary Diesel Building HVAC	B – Supports Ancillary Diesel Generators	Maintenance Rule
N-DCIS	C - The portions that support DPS, FAPCS and supporting equipment	Maintenance Rule
Standby Diesel Generators	C - Supports FAPCS operation	ACLCO 3.8.1, ACLCO 3.8.2
6.9 kV PIP Buses	C - AC power distribution from Standby Diesel Generators to plant loads associated with FAPCS	Maintenance Rule
Standby DG Auxiliaries	C - Supports Standby DG	Maintenance Rule
RCCWS	C - Supports Standby Diesel Generators and Nuclear Island Chilled Water Subsystem (NICWS)	Maintenance Rule
Nuclear Island Chilled Water	C – Building HVAC	Maintenance Rule
PSWS	C - Supports RCCWS	Maintenance Rule
Electrical Building HVAC Area Cooling	C - Supports PIP Buses, N-DCIS for FAPCS	Maintenance Rule
Fuel Building HVAC Local Cooling	C - Supports FAPCS, N-DCIS for FAPCS	Maintenance Rule
Reactor Building HVAC Local Cooling	C - Supports N-DCIS for FAPCS	Maintenance Rule
Turbine Building HVAC Local Cooling	C – Supports FAPCS	Maintenance Rule

Table 19A-2
RTNSS Functions

RTNSS Function	Description	Availability Controls
CRHAVS Air Handling Units	B - Long-term control room habitability	ACLCO 3.7.~~6~~5
CRHAVS Air Handling Unit auxiliary heaters and coolers	B - Cooling for post-accident monitoring heat loads	ACLCO 3.7.~~6~~5

Note: All RTNSS functions have Maintenance Rule availability controls.

ACM B 3.7 PLANT SYSTEMS

AC B 3.7.1 Emergency Makeup Water

BASES

The Fire Protection Water Supply System can function in a backup capacity to provide additional water during the post-accident recovery period to provide makeup to the Isolation Condenser / Passive Containment Cooling System(IC/PCCS) pools to extend the safe shutdown state from 72 hours through 7 days. Post 72-hour inventory makeup is provided via safety-related connections to the Fire Protection System (FPS) and to offsite water sources. The required volume from 72 hours through 7 days is approximately 3,900 m^3 (138,000 ft^3), and the required delivery rate is approximately 46 m^3/hr (200 gpm).

During a loss of the Fuel and Auxiliary Pools Cooling System (FAPCS) cooling trains, the cooling to the Spent Fuel Pool (SFP) is accomplished by allowing the water to heat and boil off. Sufficient pool capacity exists for pool boiling to continue for at least 72 hours post-accident, at which point emergency makeup water can be provided through safety-related connections to the Fire Protection System. The required volume from 72 hours through 7 days is approximately 1921 m^3 (67,840 ft^3).

In conjunction with the diesel-driven and motor-driven pump, the dedicated connections for FPS makeup include the Fire Pump Enclosure (FPE), the water supply, the suction pipe from the water supply to the pump, one of the supply pipes from the FPE to the Reactor Building, and the connections to the Fuel and Auxiliary Pools Cooling System (FAPCS). Water is pumped from the firewater storage tanks by the diesel-driven or motor-driven firewater pump in the FPE to the desired flow path. The two firewater storage tanks are required to contain a total volume of $\geq$ 3900 m^3 (1.03x10^6 gallons) of water to ensure a sufficient quantity of emergency makeup is available.

The maximum volume of water that would be required for makeup to the IC/PCCS pools and the SFP from 72 hours through 7 days is approximately 3900 m^3 (1.03 x 10^6 gallons) and the required delivery rate is approximately 46 m^3/hr (200 gpm). The calculations performed to determine these values consider the maximum combined decay heat of the reactor at 102% rated power and the SFP. These conditions are considered to be bounding in terms of the combined decay heat of the RPV and SFP, and the combined evaporation from the IC/PCCS pools and the SFP.

The emergency makeup water functions are nonsafety-related functions that satisfy the significance criteria for Regulatory Treatment of Non-Safety Systems, and therefore require regulatory oversight. The short-term availability controls for these functions, which are specified as Completion Times, are acceptable to ensure that the availability of these functions is consistent with the functional unavailability in the ESBWR PRA. The surveillance requirements

ACM 3.7 PLANT SYSTEMS

AC 3.7.4 Spent Fuel Pool (SFP) Water Level

ACLCO 3.7.4 The SFP water level shall be ≥ 8.59 m (279.92 ft) over the top of irradiated fuel assemblies seated in the spent fuel storage pool.

APPLICABILITY: When spent fuel assemblies are stored in the SFP.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. SFP water level not within limit.	A.1 Restore SFP water level to within limit.	24 hours
B. Required Action and associated Completion Time not met.	B.1 Enter ACLCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
ACSR 3.7.4.1 Verify SFP water level within limits.	31 days

ACM B 3.7 PLANT SYSTEMS

AC B 3.7.4 Spent Fuel Pool (SFP) Water Level

BASES

The SFP is designed to dissipate fuel decay heat through heat up and boiling of the pool water during a loss of the Fuel and Auxiliary Pools Cooling System (FAPCS) trains. Steam generated by boiling of the SFP is released to the atmosphere through a relief panel in the Fuel Building. Water inventory in the SFP is adequate to keep the fuel covered through 72 hours, thereby avoiding heat up of the fuel and the potential for fission product release.

Sufficient reserve capacity is maintained on-site to extend the safe shutdown state from 72 hours through 7 days. Post 72-hour inventory makeup is provided via safety-related connections to the Fire Protection System and to offsite water sources.

This function is a nonsafety-related function that provides a significant passive heat sink in the loss of SFP cooling analysis satisfying 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.

ACM 3.7 PLANT SYSTEMS

AC 3.7.~~5~~4 Reactor Building HVAC Accident Exhaust Filtration

ACLCO 3.7.~~5~~4 Two Reactor Building Heating, Ventilation and Air Conditioning (HVAC) Accident Exhaust Filtration trains shall be AVAILABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One Reactor Building HVAC Accident Exhaust Filtration train unavailable.	A.1	Restore Reactor Building HVAC Accident Exhaust Filtration train to AVAILABLE status.	14 days
B. Two Reactor Building HVAC Accident Exhaust Filtration trains unavailable.	B.1	Restore one Reactor Building HVAC Accident Exhaust Filtration train to AVAILABLE status.	24 hours
C. Required Action and associated Completion Time not met.	C.1	Enter ACLCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
ACSR 3.7.54.1	Verify each required Reactor Building HVAC Accident Exhaust Filtration train starts on a manual signal and operates for ≥ 15 continuous minutes.	31 days
ACSR 3.7.54.2	Perform Reactor Building HVAC Accident Exhaust Filtration unit testing in accordance with Subsection 9.4.6.4.	In accordance with Subsection 9.4.6.4

ACM B 3.7 PLANT SYSTEMS

AC B 3.7.~~5~~4 Reactor Building HVAC Accident Exhaust Filtration

BASES

Contaminated Area HVAC Subsystem (CONAVS) includes redundant Reactor Building HVAC Accident and Online Purge Exhaust Filtration units and exhaust fans (i.e., trains). During radiological events, exhaust air from contaminated areas may be manually diverted through the Reactor Building HVAC Accident or Online Purge Exhaust Filtration units. The Reactor Building Accident and Online Purge Exhaust Filtration units are equipped with pre-filters, high efficiency particulate air (HEPA) filters, high efficiency filters and carbon filters for mitigating and controlling particulate and gaseous effluents from the Reactor Building. After LOCA, one Reactor Building HVAC Accident Exhaust Filtration Unit (the redundant one is in standby) can be energized to exhaust the space air in the CONAVS area.

This accident function is a nonsafety-related function that provides building negative pressure control and exhaust filtering efficiency to ensure that theoretical control room doses are not exceeded for certain beyond design basis LOCAs. Failure to provide adequate filtration is considered to be an adverse system interaction satisfying the criteria for Regulatory Treatment of Non-Safety Systems, and therefore enhanced regulatory oversight is provided. 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.

ACM 3.7 PLANT SYSTEMS

AC 3.7.~~6~~5 Control Room Heating and Ventilation System (CRHAVS) Post 72-Hour Long-Term Cooling

ACLCO 3.7.~~6~~5 Two trains of CRHAVS Post 72-Hour Long-Term Cooling shall be AVAILABLE.

APPLICABILITY: MODES 1, 2, 3, and 4

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One CRHAVS Post 72-Hour Long-Term Cooling train not available	A.1	Restore CRHAVS Post 72-Hour Long-Term Cooling train to AVAILABLE status.	14 days
B. Required Action and associated Completion Time not met. OR Two CRHAVS Post 72-Hour Long-Term Cooling trains not AVAILABLE	B.1	Enter ACLCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
ACSR 3.7.65.1	Verify each required CRHAVS Post 72-Hour Long-Term Cooling train starts on a manual signal and operates for ≥ 15 minutes.	31 days
ACSR 3.7.65.2	Verify that each CRHAVS Post 72-Hour Long-Term Cooling train has the capability to remove the required heat load.	24 months

ACM B 3.7 PLANT SYSTEMS

AC B 3.7.65 Control Room Heating and Ventilation System (CRHAVS) Post 72-Hour Long-Term Cooling

BASES

The CRHAVS Post 72-Hour Long-Term Cooling trains ensure that, after 72 hours, main control room, temperature is maintained at an acceptable level for personnel and post-accident monitoring equipment. Each CRHAVS Post 72-Hour Long-Term Cooling train consists of one recirculation air-handling unit (AHU) and one associated auxiliary cooling unit. During a loss of normal AC power, the power for either recirculation AHU fan with associated auxiliary cooling unit can be provided from the available ancillary diesel generator.

The CRHAVS Post 72-Hour Long-Term Cooling function is performed by nonsafety-related components that satisfy 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.