ArevaEPRDCPEm Resource

From: Pederson Ronda M (AREVA NP INC) [Ronda.Pederson@areva.com]
Sent: Thursday, March 26, 2009 5:01 PM
To: Getachew Tesfaye
Cc: DELANO Karen V (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); PORTER Thomas (EXT)
Subject: Response to U.S. EPR Design Certification Application RAI No. 166, Supplement 1
Attachments: RAI 166 Supplement 1 Response US EPR DC.pdf

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for the response to the 1 question of RAI No. 166 on February 3, 2009. The attached file, "RAI 166 Supplement 1 Response US EPR DC.pdf," provides a technically correct and complete response to the question, as committed.

Appended to this file are affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the response to RAI 166 Question 16-291.

The following table indicates the respective page in the response document, "RAI 166 Supplement 1 Response US EPR DC.pdf," that contains AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 166 — 16-291	2	2

This concludes the formal AREVA NP response to RAI 166, and there are no questions from this RAI for which AREVA NP has not provided responses.

Sincerely,

Ronda Pederson
ronda.pederson@areva.com
Licensing Manager, U.S. EPR Design Certification
AREVA NP Inc.
An AREVA and Siemens company
3315 Old Forest Road
Lynchburg, VA 24506-0935
Phone: 434-832-3694
Cell: 434-841-8788

From: Pederson Ronda M (AREVA NP INC)
Sent: Tuesday, February 03, 2009 4:37 PM
To: 'Getachew Tesfaye'
Cc: BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC); PORTER Thomas (EXT)
Subject: Response to U.S. EPR Design Certification Application RAI No. 166 (1481), FSARCh. 16

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 166 Response US EPR DC.pdf" provides a schedule since a technically correct and complete response to the question is not provided.

The following table indicates the respective pages in the response document, "RAI 166 Response US EPR DC.pdf," that contain AREVA NP's schedule for response to the subject question.

Question #	Start Page	End Page
RAI 166 — 16-291	2	2

A complete answer is not provided for the question. The schedule for a technically correct and complete response to this question is provided below.

Question #	Response Date
RAI 166 — 16-291	March 27, 2009

Sincerely,

Ronda Pederson
ronda.pederson@areva.com
Licensing Manager, U.S. EPR Design Certification
AREVA NP Inc.
An AREVA and Siemens company
3315 Old Forest Road
Lynchburg, VA 24506-0935
Phone: 434-832-3694
Cell: 434-841-8788

From: Getachew Tesfaye [mailto:Getachew.Tesfaye@nrc.gov]
Sent: Friday, January 09, 2009 7:29 PM
To: ZZ-DL-A-USEPR-DL
Cc: Peter Hearn; Joseph Colaccino; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 166 (1481), FSARCh. 16

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on January 6, 2009, and on January 7, 2009, you informed us that the RAI is clear and no further clarification is needed. As a result, no change is made to the draft RAI. The schedule we have established for review of your application assumes technically correct and complete responses within 30 days of receipt of RAIs. For any RAIs that cannot be answered within 30 days, it is expected that a date for receipt of this information will be provided to the staff within the 30 day period so that the staff can assess how this information will impact the published schedule.

Thanks,
Getachew Tesfaye
Sr. Project Manager
NRO/DNRL/NARP
(301) 415-3361

Hearing Identifier: AREVA_EPR_DC_RAIs
Email Number: 338

Mail Envelope Properties (5CEC4184E98FFE49A383961FAD402D31C66334)

Subject: Response to U.S. EPR Design Certification Application RAI No. 166, Supplement 1
Sent Date: 3/26/2009 5:01:04 PM
Received Date: 3/26/2009 5:01:42 PM
From: Pederson Ronda M (AREVA NP INC)

Created By: Ronda.Pederson@areva.com

Recipients:
"DELANO Karen V (AREVA NP INC)" <Karen.Delano@areva.com>
Tracking Status: None
"BENNETT Kathy A (OFR) (AREVA NP INC)" <Kathy.Bennett@areva.com>
Tracking Status: None
"PORTER Thomas (EXT)" <Thomas.Porter.ext@areva.com>
Tracking Status: None
"Getachew Tesfaye" <Getachew.Tesfaye@nrc.gov>
Tracking Status: None

Post Office: AUSLYNCMX02.adom.ad.corp

Files	**Size**	**Date & Time**
MESSAGE	3678	3/26/2009 5:01:42 PM
RAI 166 Supplement 1 Response US EPR DC.pdf	138379	

Options
Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

Response to

Request for Additional Information No. 166, Supplement 1

01/09/2009

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 16 - Technical Specifications
Application Section: 16 - Technical Specifications

QUESTIONS for EPR Projects Branch (NARP)

Question 16-291:

The format for the PWR Standard Technical Specifications (STS) provides separate sections for the Essential Service Water System (ESW) and the Ultimate Heat Sink (UHS). The EPR technical specification (TS) submittal combines these two sections into one section EPR TS 3.7.8, resulting in a "custom" TS section. Justify changing the PWR STS format by combining the two sections.

Response to Question 16-291:

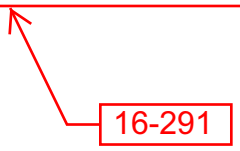
The Essential Service Water System (ESWS) and Ultimate Heat Sink (UHS) Technical Specifications will be separated into two separate Limited Conditions for Operations (LCO). The ESWS will retain the U.S. EPR FSAR Chapter 16, Technical Specification LCO 3.7.8 and the UHS will be moved to U.S. EPR FSAR Chapter 16, Technical Specification LCO 3.7.19. The Bases sections for these LCOs will be modified or added for the associated discussions.

FSAR Impact:

U.S. EPR FSAR Tier 2, Chapter 16, Technical Specifications will be revised as described in the response and indicated on the enclosed markup.

U.S. EPR Final Safety Analysis Report Markups

16-291



3.7 PLANT SYSTEMS

3.7.8 Essential Service Water (ESW)/~~Ultimate Heat Sink (UHS)~~ System~~s~~

LCO 3.7.8 Four ESW/~~UHS~~ trains shall be OPERABLE.

16-291

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

ACTIONS

----------NOTES----------

1. Enter applicable Conditions and Required Actions of LCO 3.8.1, "AC Sources - Operating," for emergency diesel generators made inoperable by ESW/~~UHS~~ System~~s~~.

2. Enter applicable Conditions and Required Actions of LCO 3.4.6, "RCS Loop - MODE 4," for residual heat removal loops made inoperable by ESW/~~UHS~~ System~~s~~.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One ESW/~~UHS~~ train inoperable.	A.1 Restore ESW/~~UHS~~ train to OPERABLE status.	120 days
B. Two ESW/~~UHS~~ trains inoperable.	B.1 Restore one ESW/~~UHS~~ train to OPERABLE status.	72 hours
C. Required Action and associated Completion Time not met.	C.1 Be in MODE 3. AND C.2 Be in MODE 5.	6 hours 36 hours

16-291

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
~~SR 3.7.8.1~~	~~Verify water level of each ESW UHS cooling tower basin is ≥ 27.2 feet.~~	~~24 hours~~
~~SR 3.7.8.2~~	~~Verify water temperature of each ESW UHS cooling tower basin is ≤ 90°F.~~	~~24 hours~~
SR 3.7.8.~~3~~1	----------NOTE---------- Isolation of ESW flow to individual components does not render the ESW System inoperable. ---------- Verify each ESW~~/UHS~~ manual, power operated, and automatic valve in the flow path servicing safety related equipment, that is not locked, sealed, or otherwise secured in position, is in the correct position.	31 days
~~SR 3.7.8.4~~	~~Operate each ESW UHS cooling tower fan for ≥ 15 minutes in all speed settings.~~	~~31 days~~
SR 3.7.8.~~5~~2	Verify each ESW~~/UHS~~ automatic valve in the flow path that is not locked, sealed, or otherwise secured in position, actuates to the correct position on an actual or simulated actuation signal.	24 months
SR 3.7.8.~~6~~3	Verify each ESW pump ~~and UHS cooling tower fan~~ starts automatically on an actual or simulated actuation signal.	24 months
~~SR 3.7.8.7~~	~~Verify the ability to supply makeup water to each ESW UHS basin at ≥ 300 gpm.~~	~~24 months~~

16-291

3.7 PLANT SYSTEMS

3.7.19 Ultimate Heat Sink (UHS)

LCO 3.7.19 Four UHS trains shall be OPERABLE.

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

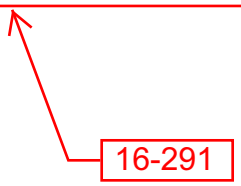
ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One UHS cooling tower inoperable.	A.1 Restore UHS cooling tower to OPERABLE status.	120 days
B. Two UHS cooling towers inoperable.	B.1 Restore one UHS cooling tower to OPERABLE status.	72 hours
C. Required Action and associated Completion Time not met.	C.1 Be in MODE 3. AND C.2 Be in MODE 5.	6 hours 36 hours

16-291

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.19.1	Verify water level of each UHS cooling tower basin is ≥ 27.2 feet.	24 hours
SR 3.7.19.2	Verify water temperature of each UHS cooling tower basin is ≤ 90°F.	24 hours
SR 3.7.19.3	Operate each UHS cooling tower fan for ≥ 15 minutes in all speed settings.	31 days
SR 3.7.19.4	Verify each UHS cooling tower fan starts automatically on an actual or simulated actuation signal.	24 months
SR 3.7.19.5	Verify the ability to supply makeup water to each UHS basin at ≥ 300 gpm.	24 months



B 3.7 PLANT SYSTEMS

B 3.7.8 Essential Service Water (ESW)~~/Ultimate Heat Sink (UHS)~~ System~~s~~

BASES

BACKGROUND

The ESW/~~UHS~~ System~~s~~ provides a heat sink for the removal of process and operating heat from safety related components during an anticipated operational occurrence (AOO) or postulated accident. During normal operation, and a normal shutdown, the ESW/~~UHS~~ System~~s~~ also provides this function for the associated safety related and nonsafety related systems. The safety related function is covered by this LCO.

The ESW/~~UHS~~ System~~s~~ consists of four separate safety related, cooling water trains. Each train consists of a~~one mechanical draft cooling tower, associated basin,~~ pump, piping, valving, instrumentation, and mechanical filtration. ~~Each safety related 2-cell seismic Category I mechanical draft cooling tower rejects energy from the ESW fluid to the ambient and returns the cooled fluid to the ESW UHS cooling tower basin, from which the ESW pumps take suction. Each ESW UHS cooling tower basin is sized for 3 days of post loss of coolant accident (LOCA) operation and ensures adequate volume for the required net positive suction head (NPSH) for the associated ESW pump. Post LOCA evaporative losses are replenished by a safety related seismic Category I source of makeup water. The train associated safety related make-up source delivers water to each basin at ≥ 300 gpm to maintain the NPSH for the ESW pump for up to 30 days following a LOCA.~~ The system pumps and valves are remote and manually aligned, except in the unlikely event of a LOCA or loss of offsite power. The pumps aligned to the critical loops are automatically started upon receipt of a safety injection signal, and all essential valves are aligned to their post accident positions.

~~The mechanical draft cooling towers and basins are safety related, seismic Category I structures sized to provide heat dissipation for safe shutdown following an accident. The cooling tower is protected from tornado missiles.~~

~~[The seismic Category 1 makeup necessary to support 30 days of post accident mitigation is site specific and details are to be provided by the Combined License applicant].~~

Additional information about the design and operation of the ESW/~~UHS~~ System~~s~~, along with a list of the components served, is presented in FSAR Section 9.2.1 (Ref. 1)~~ and FSAR Section 9.2.5 (Ref. 5)~~. The principal safety related functions of the ESW/~~UHS~~ System~~s~~ is ~~-~~the removal of decay heat from the reactor and reactor coolant pump thermal barrier cooling via the Component Cooling Water (CCW) System and removal of operational heat from the emergency diesel generator (EDG).

16-291

BASES

APPLICABLE SAFETY ANALYSES

The design basis of the ESW/~~/UHS~~ System~~s~~ is for two ESW/~~/UHS~~ trains, in conjunction with the CCW System, to remove core decay heat and support containment cooling following a design basis LOCA as discussed in FSAR Section 6.2 (Ref. 2). This maintains the In-containment Water Storage Tank fluid within acceptable limits following a LOCA as it is supplied to the Reactor Coolant System by the Emergency Core Cooling System pumps. The ESW/~~/UHS~~ System~~s~~ also provides cooling to the train EDG during an anticipated operational occurrence (AOO) or postulated accident.

The ESW/~~/UHS~~ System, in conjunction with the CCW System, also cools the unit from residual heat removal (RHR), as discussed in FSAR Section 5.4.7 (Ref. 3), entry conditions to MODE 5 during normal and post accident operations. The time required for this evolution is a function of the number of CCW and RHR loops that are operating. Two ESW/~~/UHS~~ trains are sufficient to remove decay heat during subsequent operations in MODES 5 and 6. This assumes a maximum ESW/~~/UHS~~ System~~s~~ temperature of 95°F occurring simultaneously with maximum heat loads on the system.

~~Each ESW UHS basin is sized for 3 days of post LOCA operation without requiring makeup. ESW UHS basin makeup is required to maintain NPSH for the ESW pumps beyond 3 days. This volume of water is assumed to be at ≤ 90°F during normal plant operation to prevent exceeding the maximum ESW temperature during a LOCA.~~

~~The operating limits are based on conservative heat transfer analyses for the worst case LOCA. Reference 1 provides the details of the assumptions used in the analysis, which include worst expected meteorological conditions, conservative uncertainties when calculating decay heat, and worst case single active failure. The ESW UHS cooling tower and basin is designed in accordance with Regulatory Guide 1.27 (Ref. 4), which requires a 30 day supply of cooling water in the ESW UHS basin, or equivalent make-up.~~

The ESW/~~/UHS~~ System~~s~~ satisfies ~~satisfy~~ Criterion 2 and 3 of 10 CFR 50.36(~~d~~c)(2)(ii).

LCO

The ESW/~~/UHS~~ System~~s~~ consists of four trains. Four ESW/~~/UHS~~ trains are required to be OPERABLE to provide the required redundancy to ensure that the system functions to remove post accident heat loads.

An ESW/~~/UHS~~ train is considered OPERABLE when the~~two cooling tower fans,~~ pump, associated piping, valves, and instrumentation and controls required to perform the safety related function are OPERABLE~~. and the ESW UHS basin contains ≥ 27.2 feet of water at ≤ 90°F with capability from makeup from source. [COL applicant to provide definition of OPERABLE makeup source.]~~

16-291

BASES

APPLICABILITY

In MODES 1, 2, 3, and 4, the ESW/~~/UHS~~ System~~s~~ is a normally operating system~~s~~ that is required to support the OPERABILITY of the equipment serviced by the ESW/~~/UHS~~ System~~s~~ and required to be OPERABLE in these MODES.

In MODES 5 and 6, the OPERABILITY requirements of the ESW/~~/UHS~~ System~~s~~ are determined by the systems it ~~they~~ supports.

ACTIONS

~~The actions have two Notes added. The first Note indicates that the applicable Conditions and Required Actions of LCO 3.8.1, "AC Sources - Operating," should be entered if an inoperable ESW/UHS train results in an inoperable EDG. The second Note indicates that the applicable Conditions and Required Actions of LCO 3.4.6, "RCS Loops - MODE 4," should be entered if an inoperable ESW/UHS train results in an inoperable decay heat removal train. This is an exception to LCO 3.0.6 and ensures the proper actions are taken for these components.~~

A.1

If one ESW/~~/UHS~~ train is inoperable, action must be taken to restore OPERABLE status within 120 days. In this condition, the remaining OPERABLE ESW/~~/UHS~~ trains are adequate to perform the heat removal function.

The 120 day Completion Time to restore an ESW/~~/UHS~~ train to OPERABLE is reasonable since its operation is not assumed in the safety analysis to mitigate the consequences of postulated accidents or AOOs, it provides a reasonable time for repairs, and the low probability of a postulated accident or AOO occurring during this period.

B.1

If two ESW/~~/UHS~~ trains are inoperable, action must be taken to restore one to OPERABLE status within 72 hours. In this condition, the two remaining OPERABLE ESW/~~/UHS~~ train~~s~~ are adequate to perform the heat removal function. However, the overall reliability is reduced because a single failure in one of the OPERABLE ESW/~~/UHS~~ trains could result in loss of ESW/~~/UHS~~ System function.

The 72 hour Completion Time is based on the redundant capabilities afforded by the two OPERABLE trains, and the low probability of a postulated accident occurring during this time period.

16-291

BASES

ACTIONS (continued)

C.1 and C.2

If an ESW/~~UHS~~ train cannot be restored to OPERABLE status within the associated Completion Time, the unit must be placed in a MODE in which the LCO does not apply. To achieve this status, the unit must be placed in at least MODE 3 within 6 hours and in MODE 5 within 36 hours.

The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power.

SURVEILLANCE REQUIREMENTS

~~SR 3.7.8.1~~

~~This SR verifies that adequate short term (3 day) cooling can be maintained. The specified level also ensures that sufficient NPSH is available to operate the ESW pumps during the first 3 days post LOCA. The 24 hour Frequency is based on operating experience related to trending of the parameter variations during the applicable MODES. This SR verifies that the ESW UHS basin water level is ≥ 27.2 feet from the bottom of the basin.~~

~~SR 3.7.8.2~~

~~This SR verifies that the ESW/UHS Systems is are available to cool the CCW System and EDG to at least its maximum design temperature with the maximum accident or normal design heat loads for 30 days following a postulated accident. With water temperature of the ESW UHS basin ≤ [90]°F, the design basis assumption associated with initial ESW UHS temperature are bounded. With the water temperature of the ESW UHS basin > 90°F, long term cooling capability of the Emergency Core Cooling System (ECCS) loads and Diesel Generators (DGs) may be affected. The 24 hour Frequency is based on operating experience related to trending of the parameter variations during the applicable MODES.~~

SR 3.7.8.~~3~~1

This SR is modified by a Note indicating that the isolation of the ESW/~~UHS~~ components or systems may render those components inoperable, but does not affect the OPERABILITY of the ESW System.

16-291

BASES

SURVEILLANCE REQUIREMENTS (continued)

Verifying the correct alignment for manual, power operated, and automatic valves in the ESW/~~/UHS~~ flow path provides assurance that the proper flow paths exist for ESW/~~/UHS~~ System operation. This SR does not apply to valves that are locked, sealed, or otherwise secured in position, since they are verified to be in the correct position prior to being locked, sealed, or secured. This SR does not require any testing or valve manipulation; rather, it involves verification that those valves capable of being mispositioned are in the correct position. This SR does not apply to valves that cannot be inadvertently misaligned, such as check valves.

The 31 day Frequency is based on engineering judgment, is consistent with the procedural controls governing valve operation, and ensures correct valve positions.

~~SR 3.7.8.4~~

~~Operating each cooling tower fan for ≥ 15 minutes in all speed settings verifies that all fans are OPERABLE and that all associated controls are functioning properly. It also ensures that fan or motor failure, or excessive vibration, can be detected for corrective action. The 31 day Frequency is based on operating experience, the known reliability of the fan units, the redundancy available, and the low probability of significant degradation of the ESW UHS cooling tower fans occurring between surveillances.~~

SR 3.7.8.~~5~~2

This SR verifies proper automatic operation of the ESW/~~/UHS~~ valves on an actual or simulated actuation signal. The ESW/~~/UHS~~ System~~s~~ is ~~are~~ a normally operating system~~s~~ that cannot be fully actuated as part of normal testing. This Surveillance is not required for valves that are locked, sealed, or otherwise secured in the required position under administrative controls. The 24 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a unit outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the Surveillance when performed at the 24 month Frequency. Therefore, the Frequency is acceptable from a reliability standpoint.

16-291

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.7.8.~~6~~3

This SR verifies proper automatic operation of the ESW pumps and ~~UHS~~ cooling tower fans on an actual or simulated actuation signal. The ESW/~~/UHS~~ System~~s~~ is a~~are~~ normally operating system~~s~~ that cannot be fully actuated as part of normal testing during normal operation. The 24 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a unit outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the Surveillance when performed at the 24 month Frequency. Therefore, the Frequency is acceptable from a reliability standpoint.

~~SR 3.7.8.7~~

~~This SR verifies that adequate long term (30 day) cooling can be maintained. The specified makeup flowrate ensures that sufficient NPSH can be maintained to operate the ESW pumps following the first 3 days post LOCA. The 24 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a unit outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the Surveillance when performed at the 24 month Frequency. Therefore, the Frequency is acceptable from a reliability standpoint. This SR verifies that the ESW UHS makeup flowrate is ≥ 300 gpm.~~

REFERENCES

1. FSAR Section 9.2.1.
2. FSAR Section 6.2.
3. FSAR Section 5.4.7.
4. Regulatory Guide 1.27.

~~5.FSAR Section 9.2.5.~~

16-291

B 3.7 PLANT SYSTEMS

B 3.7.19 Ultimate Heat Sink (UHS)

BASES

BACKGROUND

The UHS provides a heat sink for the removal of process and operating heat from safety related components during an anticipated operational occurrence (AOO) or postulated accident. During normal operation, and a normal shutdown, the UHS also provides this function for the associated safety related and non safety related systems. The safety related function is covered by this LCO.

The UHS consists of four separate safety related, cooling water trains. Each train consists of one mechanical draft cooling tower, associated basin, piping, valving, and instrumentation. Each safety related 2-cell seismic Category I mechanical draft cooling tower rejects energy from the essential service water (ESW) fluid to ambient and returns the cooled fluid to the UHS cooling tower basin, from which the ESW pumps take suction. Each UHS cooling tower basin is sized for 3 days of post loss of coolant accident (LOCA) operation and ensures adequate volume for the required net positive suction head (NPSH) for the associated ESW pump. Post LOCA evaporative losses are replenished by a safety related seismic Category I source of makeup water. The train associated safety related make-up source delivers water to each basin at ≥ 300 gpm to maintain the NPSH for the ESW pump for up to 30 days following a LOCA.

The mechanical draft cooling towers and basins are safety related, seismic Category I structures sized to provide heat dissipation for safe shutdown following an accident. The cooling tower is protected from tornado missiles.

[The seismic Category 1 makeup necessary to support 30 days of post accident mitigation is site specific and details are to be provided by the Combined License applicant].

Additional information about the design and operation of the UHS is presented in FSAR Section 9.2.5 (Ref. 1).

16-291

BASES

APPLICABLE SAFETY ANALYSES

The design basis of the UHS is for two UHS trains, in conjunction with the ESW and CCW Systems, to dissipate core decay heat and support containment cooling following a design basis LOCA as discussed in FSAR Section 6.2 (Ref. 2). This maintains the In-containment Water Storage Tank fluid within acceptable limits following a LOCA as it is supplied to the Reactor Coolant System by the Emergency Core Cooling System pumps. The UHS also provides cooling to the train EDG during an anticipated operational occurrence (AOO) or postulated accident.

The UHS, in conjunction with the ESW and CCW Systems, also cools the unit from residual heat removal (RHR), as discussed in FSAR Section 5.4.7 (Ref. 3), entry conditions to MODE 5 during normal and post accident operations. The time required for this evolution is a function of the number of ESW, CCW and RHR loops that are operating. Two UHS trains are sufficient to remove decay heat during subsequent operations in MODES 5 and 6. This assumes a maximum UHS temperature of 95°F occurring simultaneously with maximum heat loads on the system.

Each UHS basin is sized for 3 days of post LOCA operation without requiring makeup. UHS basin makeup is required to maintain NPSH for the ESW pumps beyond 3 days. This volume of water is assumed to be at ≤ 90°F during normal plant operation to prevent exceeding the maximum ESW temperature during a LOCA.

The operating limits are based on conservative heat transfer analyses for the worst case LOCA. Reference 1 provides the details of the assumptions used in the analysis, which include worst expected meteorological conditions, conservative uncertainties when calculating decay heat, and worst case single active failure. The UHS cooling tower and basin is designed in accordance with Regulatory Guide 1.27 (Ref. 4), which requires a 30 day supply of cooling water in the UHS basin, or equivalent make-up.

The UHS satisfies Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

The UHS consists of four trains. Four UHS trains are required to be OPERABLE to provide the required redundancy to ensure that the system functions to remove post accident heat loads.

A UHS train is considered OPERABLE when two cooling tower fans, associated piping, valves, and instrumentation and controls required to perform the safety related function are OPERABLE and the UHS basin contains ≥ 27.2 feet of water at ≤ 90°F with capability from makeup from OPERABLE source. [COL applicant to provide definition of OPERABLE makeup source.]

16-291

BASES

APPLICABILITY

In MODES 1, 2, 3, and 4, the UHS is a normally operating system that is required to support the OPERABILITY of the equipment serviced by the UHS and required to be OPERABLE in these MODES.

In MODES 5 and 6, the OPERABILITY requirements of the UHS is determined by the systems it supports.

ACTIONS

A.1

If one UHS train is inoperable, action must be taken to restore OPERABLE status within 120 days. In this condition, the remaining OPERABLE UHS trains are adequate to perform the heat removal function.

The 120 day Completion Time to restore a UHS train to OPERABLE is reasonable since its operation is not assumed in the safety analysis to mitigate the consequences of postulated accidents or AOOs, it provides a reasonable time for repairs, and the low probability of a postulated accident or AOO occurring during this period.

B.1

If two UHS trains are inoperable, action must be taken to restore one to OPERABLE status within 72 hours. In this condition, the two remaining OPERABLE UHS trains are adequate to perform the heat removal function. However, the overall reliability is reduced because a single failure in one of the OPERABLE UHS trains could result in loss of UHS function.

The 72 hour Completion Time is based on the redundant capabilities afforded by the two OPERABLE trains, and the low probability of a postulated accident occurring during this time period.

C.1 and C.2

If a UHS train cannot be restored to OPERABLE status within the associated Completion Time, the unit must be placed in a MODE in which the LCO does not apply. To achieve this status, the unit must be placed in at least MODE 3 within 6 hours and in MODE 5 within 36 hours.

The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power.

16-291

BASES

SURVEILLANCE REQUIREMENTS

SR 3.7.19.1

This SR verifies that adequate short term (3 day) cooling can be maintained. The specified level also ensures that sufficient NPSH is available to operate the ESW pumps during the first 3 days post LOCA. The 24 hour Frequency is based on operating experience related to trending of the parameter variations during the applicable MODES. This SR verifies that the UHS basin water level is ≥ 27.2 feet from the bottom of the basin.

SR 3.7.19.2

This SR verifies that the UHS is available to cool the CCW System and EDG to at least its maximum design temperature with the maximum accident or normal design heat loads for 30 days following a postulated accident. With water temperature of the UHS basin ≤ 90°F, the design basis assumptions associated with initial UHS temperature are bounded. With the water temperature of the UHS basin > 90°F, long term cooling capability of the Emergency Core Cooling System (ECCS) loads and Emergency Diesel Generators (EDG) may be affected. The 24 hour Frequency is based on operating experience related to trending of the parameter variations during the applicable MODES.

SR 3.7.19.3

Operating each cooling tower fan for ≥ 15 minutes in all speed settings verifies that all fans are OPERABLE and that all associated controls are functioning properly. It also ensures that fan or motor failure, or excessive vibration, can be detected for corrective action. The 31 day Frequency is based on operating experience, the known reliability of the fan units, the redundancy available, and the low probability of significant degradation of the UHS cooling tower fans occurring between surveillances.

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BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.7.19.4

This SR verifies proper automatic operation of the UHS cooling tower fans on an actual or simulated actuation signal. The UHS is a normally operating system that cannot be fully actuated as part of normal testing during normal operation. The 24 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a unit outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the Surveillance when performed at the 24 month Frequency. Therefore, the Frequency is acceptable from a reliability standpoint.

SR 3.7.19.5

This SR verifies that adequate long term (30 day) cooling can be maintained. The specified makeup flowrate ensures that sufficient NPSH can be maintained to operate the ESW pumps following the first 3 days post LOCA. The 24 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a unit outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the Surveillance when performed at the 24 month Frequency. Therefore, the Frequency is acceptable from a reliability standpoint. This SR verifies that the UHS makeup flowrate is ≥ 300 gpm.

REFERENCES

1. FSAR Section 9.2.5.
2. FSAR Section 6.2.
3. FSAR Section 5.4.7.
5. Regulatory Guide 1.27.

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