ArevaEPRDCPEm Resource

From: WILLIFORD Dennis (AREVA) [Dennis.Williford@areva.com]
Sent: Monday, February 27, 2012 11:58 AM
To: Tesfaye, Getachew
Cc: BENNETT Kathy (AREVA); DELANO Karen (AREVA); ROMINE Judy (AREVA); RYAN Tom (AREVA); NOXON David (AREVA)
Subject: Response to U.S. EPR Design Certification Application RAI No. 460 (5153, 5302),FSAR Ch. 19, New Phase 4 RAI, Supplement 6
Attachments: RAI 460 Supplement 6 Response US EPR DC.pdf

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to the 3 questions of RAI 460 on February 7, 2011. Supplement 1 sent on June 3, 2011, Supplement 2 sent on October 18, 2011, Supplement 3 sent on November 18, 2011, Supplement 4 sent on December 13, 2011, and Supplement 5 sent on January 24, 2012 provided a revised schedule.

The attached file, "RAI 460 Supplement 6 Response US EPR DC.pdf," provides technically correct and complete final responses to 2 of the remaining 3 questions. 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 460 Question 19-348.

The following table indicates the respective pages in the response document, RAI 460 Supplement 6 Response US EPR DC.pdf," that contains AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 460 — 19-348	2	3
RAI 460 — 19-349	4	4

The schedule for a technically correct and complete response to the remaining question has been changed as provided below. This schedule was transmitted to the NRC in AREVA NP letter NRC:12:008 dated February 21, 2012.

Question #	Response Date
RAI 460 — 19-350	**August 30, 2013**

Sincerely,

Dennis Williford, P.E.
U.S. EPR Design Certification Licensing Manager
AREVA NP Inc.
7207 IBM Drive, Mail Code CLT 2B
Charlotte, NC 28262
Phone: 704-805-2223
Email: Dennis.Williford@areva.com

From: WILLIFORD Dennis (RS/NB)
Sent: Tuesday, January 24, 2012 5:18 PM
To: Getachew.Tesfaye@nrc.gov
Cc: BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB); NOXON David (RS/NB); Michael.Miernicki@nrc.gov; tanya.ford@nrc.gov

Subject: Response to U.S. EPR Design Certification Application RAI No. 460 (5153, 5302),FSAR Ch. 19, New Phase 4 RAI, Supplement 5

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to the 3 questions of RAI 460 on February 7, 2011. Supplement 1 sent on June 2, 2011, Supplement 2 sent on October 18, 2011, Supplement 3 sent on November 18, 2011, and Supplement 4 sent on December 13, 2011 provided a revised schedule.

A preliminary revised schedule for technically correct and complete responses to the remaining 3 questions is provided below. This schedule is being reevaluated and a new supplement with a revised schedule will be transmitted by February 21, 2012.

Question #	Response Date
RAI 460 — 19-348	**February 21, 2012**
RAI 460 — 19-349	**February 21, 2012**
RAI 460 — 19-350	**February 21, 2012**

Sincerely,

Dennis Williford, P.E.
U.S. EPR Design Certification Licensing Manager
AREVA NP Inc.
7207 IBM Drive, Mail Code CLT 2B
Charlotte, NC 28262
Phone: 704-805-2223
Email: Dennis.Williford@areva.com

From: WILLIFORD Dennis (RS/NB)
Sent: Tuesday, December 13, 2011 4:46 PM
To: Getachew.Tesfaye@nrc.gov
Cc: BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB); NOXON David (RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 460 (5153, 5302),FSAR Ch. 19, New Phase 4 RAI, Supplement 4

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to the 3 questions of RAI 460 on February 7, 2011. Supplement 1 sent on June 2, 2011, Supplement 2 sent on October 18, 2011, and Supplement 3 sent on November 18, 2011 provided a revised schedule.

A preliminary revised schedule for technically correct and complete responses to the remaining 3 questions is provided below. This schedule is being reevaluated and a new supplement with a revised schedule will be transmitted by January 25, 2012.

Question #	Response Date
RAI 460 — 19-348	**January 25, 2012**
RAI 460 — 19-349	**January 25, 2012**
RAI 460 — 19-350	**January 25, 2012**

Sincerely,

Dennis Williford, P.E.
U.S. EPR Design Certification Licensing Manager
AREVA NP Inc.
7207 IBM Drive, Mail Code CLT 2B
Charlotte, NC 28262
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Email: Dennis.Williford@areva.com

From: WILLIFORD Dennis (RS/NB)
Sent: Friday, November 18, 2011 8:31 AM
To: Getachew.Tesfaye@nrc.gov
Cc: BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB); NOXON David (RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 460 (5153, 5302),FSAR Ch. 19, New Phase 4 RAI, Supplement 3

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to the 3 questions of RAI 460 on February 7, 2011. Supplement 1 sent on June 2, 2011, and Supplement 2 sent on October 18, 2011 provided a revised schedule.

A preliminary revised schedule for technically correct and complete responses to the remaining 3 questions is provided below. This schedule is being reevaluated and a new supplement with a revised schedule will be transmitted by December 14, 2011.

Question #	Response Date
RAI 460 — 19-348	**December 14, 2011**
RAI 460 — 19-349	**December 14, 2011**
RAI 460 — 19-350	**December 14, 2011**

Sincerely,

Dennis Williford, P.E.
U.S. EPR Design Certification Licensing Manager
AREVA NP Inc.
7207 IBM Drive, Mail Code CLT 2B
Charlotte, NC 28262
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Email: Dennis.Williford@areva.com

From: WILLIFORD Dennis (RS/NB)
Sent: Tuesday, October 18, 2011 5:13 PM
To: Getachew.Tesfaye@nrc.gov
Cc: BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB); NOXON David (RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 460 (5153, 5302),FSAR Ch. 19, New Phase 4 RAI, Supplement 2

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to the 3 questions of RAI 460 on February 7, 2011. Supplement 1 was sent on June 2, 2011 to provide a revised schedule.

A preliminary revised schedule for technically correct and complete responses to the remaining 3 questions is provided below. This schedule is being reevaluated and a new supplement with a revised schedule will be transmitted by November 17, 2011.

Question #	Response Date
RAI 460 — 19-348	**November 17, 2011**
RAI 460 — 19-349	**November 17, 2011**
RAI 460 — 19-350	**November 17, 2011**

Sincerely,

Dennis Williford, P.E.
U.S. EPR Design Certification Licensing Manager
AREVA NP Inc.
7207 IBM Drive, Mail Code CLT 2B
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From: RYAN Tom (RS/NB)
Sent: Thursday, June 02, 2011 4:39 PM
To: Tesfaye, Getachew
Cc: BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB); WILLIFORD Dennis (RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 460 (5153, 5302),FSAR Ch. 19, New Phase 4 RAI, Supplement 1

Getachew,

AREVA NP provided a schedule for a technically correct and complete response to RAI 460 on February 7, 2011.

The schedule for a technically correct and complete response for the remaining questions has been revised and is provided below.

Question #	Response Date
RAI 460 — 19-348	October 19, 2011
RAI 460 — 19-349	October 19, 2011
RAI 460 — 19-350	October 19, 2011

Sincerely,

Tom Ryan for
Dennis Williford, P.E.
U.S. EPR Design Certification Licensing Manager
AREVA NP Inc.
7207 IBM Drive, Mail Code CLT 2B
Charlotte, NC 28262

Phone: 704-805-2223
Email: Dennis.Williford@areva.com

From: BRYAN Martin (External RS/NB)
Sent: Monday, February 07, 2011 5:46 PM
To: 'Tesfaye, Getachew'
Cc: DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); NOXON David (RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 460 (5153, 5302),FSAR Ch. 19, New Phase 4 RAI

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 460 Response US EPR DC.pdf," provides the schedule for technically correct and complete responses to these questions.

The following table indicates the respective pages in the response document, "RAI 460 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 460 — 19-348	2	2
RAI 460 — 19-349	3	3
RAI 460 — 19-350	4	4

The schedule for technically correct and complete response to the questions is provided below.

Question #	Response Date
RAI 460 — 19-348	June 2, 2011
RAI 460 — 19-349	June 2, 2011
RAI 460 — 19-350	June 2, 2011

Sincerely,

Martin (Marty) C. Bryan
U.S. EPR Design Certification Licensing Manager
AREVA NP Inc.
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From: Tesfaye, Getachew [mailto:Getachew.Tesfaye@nrc.gov]
Sent: Thursday, January 06, 2011 9:48 PM
To: ZZ-DL-A-USEPR-DL
Cc: Pohida, Marie; Fuller, Edward; Phan, Hanh; Mrowca, Lynn; Ford, Tanya; Colaccino, Joseph; AreveEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 460 (5153, 5302),FSAR Ch. 19, New Phase 4 RAI

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on December 8, 2010, and on January 6, 2011, 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: 3799

Mail Envelope Properties (2FBE1051AEB2E748A0F98DF9EEE5A5D4B2AADD)

Subject: Response to U.S. EPR Design Certification Application RAI No. 460 (5153, 5302),FSAR Ch. 19, New Phase 4 RAI, Supplement 6
Sent Date: 2/27/2012 11:57:53 AM
Received Date: 2/27/2012 11:57:16 AM
From: WILLIFORD Dennis (AREVA)

Created By: Dennis.Williford@areva.com

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MESSAGE	10863	2/27/2012 11:57:16 AM
RAI 460 Supplement 6 Response US EPR DC.pdf	183672	

Options
Priority: Standard
Return Notification: No
Reply Requested: No
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Response to

Request for Additional Information No. 460 (5153, 5302), Revision 0, Supplement 6
Questions 19.1-234 and 19.1-349

1/6/2011

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 19 - Probabilistic Risk Assessment and Severe Accident Evaluation
Application Section: 19

QUESTIONS for PRA Licensing, Operations Support and Maintenance Branch 1
(AP1000/EPR Projects) (SPLA)

Question 19-348:

Follow-up to RAI 257, Question 19-316(y)

The staff reviewed EPR's response to RAI 19-316(y). In this response, the applicant stated that the equipment hatch may not be closed in POS D. Therefore, EPR provided a sensitivity analysis of LERF in Function of Hatch Status in POS D, Table 316y. Hatch closure was assumed to be possible before boiling in case of a loss of the residual heat removal function with power available. The human error probability (HEP) was assumed to be .3. The staff also noted that with the hatch initially open in POS D, the resulting increase in total (at power and shutdown) LRF is 21%. Based on Table 316y, the shutdown and total LRF is sensitive to operator failure to close the equipment hatch and other open containment penetrations. In addition, the staff noted that in the EPR FSAR, Revision 2, Section 19.1.6.3.1.4, Equipment Hatch Closure (1) the initial closure actions are performed inside containment and (2) closure actions are credited up to when the local temperature is no higher than 122F. Since these assumptions contradict the staff guidance in Generic Letter 88-17 and industry guidance in NUMARC 91-06 the staff has the following questions and concerns:

a. Please document in Table 19.1-108 of the FSAR that the staff expeditious actions defined in Generic Letter 88-17 will be implemented prior to operating in a reduced inventory condition which provides the basis for the proposed shutdown rule as described in SECY 97-168 not being implemented.

b. In GL 88-17, It states, “…completion of containment closure may be delayed … This may be done on the basis of reliable temperature information obtained during a transient events provided the containment is closed prior to reaching an RCS temperature of 200F” as displayed by the larger of two valid indications of temperature at the top of the core or immediately above the core”. Given this guidance, the staff does not accept credit for operators closing containment in containment harsh conditions that include: steam ejection from RCS openings, noise, fog, and elevated containment temperatures. The staff is requesting AREVA to reevaluate the shutdown level two analysis assuming hatch closure must be accomplished before RCS temperatures reach 200F.

c. Given the staff guidance in GL 88-17, the staff is requesting AREVA to remove the wording of Section 19.1.6.3.1.4 of the FSAR indicating that hatch closure is credited until local temperatures reach 122F. The staff is requesting that this section of the FSAR is modified to be consistent with GL 88-17 and NUMARC 91-06 (e.g., to state that hatch closure was credited until RCS temperature reaches 212F).

d. In the FSAR, the staff is requesting AREVA to document the time to boiling in POS D, the time for hatch closure, and the justification for the human error probability that was used.

e. In the FSAR, the staff is requesting AREVA to describe what type of equipment is needed to perform hatch closure. The staff is requesting AREVA to document in the risk insights table (Table 19.1-108 in the US EPR FSAR) that the total LRF is sensitive to the operator's ability to close the containment equipment hatches and penetrations during Mode 5 and 6 before steaming inside containment."

Response to Question 19-348:

The U.S. EPR Containment Penetrations Technical Specification, that is typical in the current operating fleet Technical Specification, was not included in the U.S. EPR Technical Specifications since the dose analysis for a fuel handling accident inside containment did not assume a closed containment.

After further review of the need for prompt action following an assumed loss of decay heat removal event, a Containment Penetration Technical Specification (Technical Specification 3.9.7 and the associated Bases) will be added to U.S. EPR FSAR Tier 2, Chapter 16 Technical Specifications, to require containment closure with the unit in MODE 5 with the reactor coolant system (RCS) in reduced inventory operation, and in MODE 6 with the refueling cavity with less than 23 feet of water. U.S. EPR FSAR Tier 2, Chapter 16, Technical Specification 3.9.5 will also be revised to maintain consistency.

The U.S. EPR Probable Risk Assessment (PRA) and U.S. EPR FSAR Tier 2, Chapter 19 will incorporate the revised assumptions on hatch closure as part of the PRA update being performed in response to RAI 289, Question 19-239. U.S. EPR FSAR Tier 2, Chapter 19 will be revised to reflect the new assumptions, and will be included with the Response to RAI 289, Question 19-239.

With the hatch closed during reduced inventory conditions, no further analysis of hatch closure or time to boil are warranted.

FSAR Impact:

U.S. EPR FSAR Tier 2, Chapter 16, Technical Specification 3.9.7 and associated Bases will be added as described in the response and indicated on the enclosed markup.

U.S. EPR FSAR Tier 2, Chapter 16, Technical Specification 3.9.5 and associated Bases will be revised as described in the response and indicated on the enclosed markup.

Question 19-349:

Follow-up to RAI 257, Question 19- 317

The staff has reviewed the applicant's response to 19-317. In this response, the applicant states that there are no other RCS penetrations assumed to be open during POS CBD, other than the pressurizer degas valve lines and the nitrogen supply connection valves. Therefore, the RCS re-pressurization rate related to the timing of steaming inside containment and hatch closure are valid. The staff recognizes these assumptions are key risk insights that impact the total LRF results. Therefore, the staff is requesting the applicant to document in Table 19.1-108 of the US EPR FSAR that the EPR total LRF results are based on the pressurizer manway and other RCS penetrations being closed during POS CBD except for the pressurizer degas line valves and the nitrogen supply connection valves. This change represents a departure from how many operating PWR plants achieve reduced inventory operation.

Response to Question 19-349:

As described in the Response to Question 19-348, with the hatch closed during reduced inventory conditions, no further analysis of hatch closure or time to boil are warranted. With the new technical specification for containment closure during MODE 5, the hatch will be closed prior to reactor coolant system (RCS) drain-down and RCS venting. The RCS penetrations assumed to be open during POS CBD are important to large release frequency (LRF) in terms of the time to boil estimate and the time available for hatch closure. With the hatch closed during RCS venting conditions the U.S EPR total LRF results are not sensitive to the assumptions on RCS penetrations being open during POS CBD.

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

U.S. EPR Final Safety Analysis Report Markups

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. No RHR loop in operation.	B.1	Initiate action to restore required RHR loop to operation.	Immediately
	AND		
	B.2	~~Close and secure~~Verify the equipment hatch is closed and secured.	4 hours
	AND		
	B.3	~~Close~~ Verify one door in each air lock is closed.	4 hours
	AND		
	B.4	Verify each penetration providing direct access from the containment atmosphere to the outside atmosphere is either closed with a manual or automatic isolation valve, blind flange, or equivalent, or is capable of being closed by an OPERABLE Containment Ventilation System.	4 hours

19-348

3.9 REFUELING OPERATIONS

3.9.7 Containment Penetrations

LCO 3.9.7 The containment penetrations shall be in the following status:

a. The containment equipment hatch is closed:

b. One door in each containment air lock is closed; and

c. Each penetration providing direct access from the containment atmosphere to the outside atmosphere is either:

1. Closed by a containment isolation valve, blind flange, or equivalent, or

2. Capable of being closed by a containment isolation valve from the Main Control Room.

APPLICABILITY: MODE 5 with RCS loops not filled, and
MODE 6 with the refueling cavity water level < 23 ft above the top of the reactor vessel flange.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more containment penetrations not in required status.	A.1 Initiate action to place containment penetration(s) in required status.	Immediately
	OR	
	A.2 Initiate action to be in MODE 5 with the RCS pressure boundary intact and ≥ 25% pressurizer level.	Immediately
	OR	
	A.3 Initiate action to achieve refueling cavity water level ≥ 23 feet above top of the reactor vessel flange.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.9.7.1	Verify each required containment penetration is in the required status.	7 days
SR 3.9.7.2	----------NOTE---------- Not required to be met for containment purge and exhaust valve(s) in penetrations closed to comply with LCO 3.9.7.c.1. ----------	
	Verify each required containment purge and exhaust valve actuates to the isolation position on an actual or simulated actuation signal.	24 months

BASES

LCO (continued)

An OPERABLE RHR loop consists of an LHSI pump, an LHSI heat exchanger, valves, piping, instruments and controls to ensure an OPERABLE flow path and to determine the low end temperature. The flow path starts in one of the RCS hot legs and is returned to the RCS cold legs.

APPLICABILITY

Two RHR loops are required to be OPERABLE, and one RHR loop must be in operation in MODE 6, with the water level < 23 ft above the top of the reactor vessel flange, to provide decay heat removal. Requirements for the RHR System in other MODES are covered by LCOs in Section 3.4, ~~Reactor Coolant System (~~RCS~~)~~. RHR loop requirements in MODE 6 with the water level ≥ 23 ft are located in LCO 3.9.4, "Residual Heat Removal (RHR) Loops - High Water Level."

ACTIONS

A.1 and A.2

If less than the required number of RHR loops are OPERABLE, action shall be immediately initiated and continued until the RHR loop is restored to OPERABLE status and to operation or until ≥ 23 ft of water level is established above the reactor vessel flange. When the water level is ≥ 23 ft above the reactor vessel flange, the Applicability changes to that of LCO 3.9.4, "Residual Heat Removal (RHR) Loops – High Water Level," and only one RHR loop is required to be OPERABLE and in operation. An immediate Completion Time is necessary for an operator to initiate corrective actions.

B.1

If no RHR loop is in operation, actions shall be initiated immediately, and continued, to restore one RHR loop to operation. Since the unit is in Conditions A and B concurrently, the restoration of two OPERABLE RHR loops and one operating RHR loop should be accomplished expeditiously.

B.2, B.3, and B.4

If no RHR loop is in operation, the following actions must be taken:

19-348

a. ~~The~~ Verify that the equipment hatch ~~must be~~is closed and secured;

b. ~~One~~ Verify that one door in each air lock ~~must be~~is closed; and

B 3.9 REFUELING OPERATIONS

B 3.9.7 Containment Penetrations

BASES

BACKGROUND

Containment closure capability provides an added level of defense during reduced inventory conditions with fuel in the reactor vessel in the unlikely event of loss of core cooling. In MODES 5 and 6, the potential for containment pressurization as a result of an accident is not likely; therefore, requirements to isolate the containment from the outside atmosphere can be less stringent. The LCO requirements are referred to as "containment closure" rather than "containment OPERABILITY." Containment closure means that all potential escape paths are closed or capable of being closed. Since there is no requirement for containment leak tightness, the 10 CFR 50 Appendix J leakage criteria and tests are not required.

In MODES 5 and 6, the water inventory in the reactor vessel is controlled at varying levels. For installation and removal of steam generator nozzle dams, the RCS is vented and the reactor vessel level is reduced to approximately mid-loop of the hot legs. For reactor vessel head removal or installation, the reactor vessel level would be just below the reactor vessel flange. Prior to commencement of fuel handling operations, the level in the refueling cavity is maintained in accordance with LCO 3.9.6, “Refueling Cavity Water Level.”

As discussed in NRC Generic Letter 88-17 (Reference 1) and in FSAR Section 19.1.6 (Reference 2), a loss of residual heat removal cooling can potentially lead to steam and radioactive material release from the RCS. As discussed in FSAR Section 5.4.7.2.1 (Reference 3), design features that support improved safety during shutdown and mid-loop operation include:

- During mid-loop operation, the RCS loop level is controlled by the CVCS low pressure reducing valve to ensure there is sufficient RCS water inventory for operation of the Low Head Safety Injection System (LHSI) pumps in residual heat removal (RHR) mode.
- Redundant hot leg level sensors that initiate RCS make-up when the RCS hot leg loop level has reached low level.
- Safety injection via Medium Head Safety Injection System (MHSI) with reduced discharge head during low loop level ensures availability of the LHSI pumps for RHR function.

BASES

BACKGROUND (continued)

– Automatic stop of the LHSI pumps in RHR mode in the event of a low loop level, or low delta-P_{sat} (difference between the RCS hot leg temperature and the RCS hot leg saturation temperature).

– The reactor vessel water level is continually monitored during a refueling outage with a level sensor.

– Temperature sensors, located at the RCS hot legs, allow temperature measurement of each hot leg when in a reduced inventory condition.

Even with these added safety features, the PRA analysis for loss of RHR event recognized that containment closure was a necessary measure in the mitigation of this event. Since the time needed to plan and accomplish containment closure was expected to exceed the time available prior to the onset of boiling in the reactor vessel for a range of operating conditions, containment closure is necessary prior to venting the RCS and placing the unit in a reduced inventory configuration.

The containment equipment hatch, which is part of the containment pressure boundary, provides a means for moving large equipment and components into and out of containment. During reduced inventory conditions with fuel in the reactor vessel, the equipment hatch must be closed.

The containment air locks, which are also part of the containment pressure boundary, provide a means for personnel access during MODES 1, 2, 3, and 4 in accordance with LCO 3.6.2, "Containment Air Locks." Each air lock has a door at both ends. The doors are normally interlocked to prevent simultaneous opening when containment OPERABILITY is required. During periods of unit shutdown when containment closure is not required, the door interlock mechanism may be disabled, allowing both doors of an air lock to remain open for extended periods when frequent containment entry is necessary. During reduced inventory conditions with fuel in the reactor vessel, containment closure is required; therefore, the door interlock mechanism may remain disabled, but one air lock door must always remain closed.

The requirements for containment closure ensure that a release of fission product radioactivity within containment will be restricted to within regulatory limits.

BASES

BACKGROUND (continued)

The Containment Building Ventilation System (CBVS) includes two subsystems, the full flow purge subsystem and the low flow purge subsystem. During MODES 1, 2, 3, and 4, the valves in the full flow purge subsystem penetrations are secured in the closed position. The valves in the low flow purge subsystem can be opened intermittently, but are closed automatically by the Distributed Control System (DCS). Neither of the subsystems is subject to an LCO in MODE 5.

In MODE 6, large air exchanges are necessary to conduct refueling operations. The full flow purge subsystem is used for this purpose and the valves are closed by manual initiation or a high radiation signal.

The low flow purge subsystem remains operational in MODE 6, and all four valves are also closed by manual initiation or a high radiation signal.

The other containment penetrations that provide direct access from containment atmosphere to outside atmosphere must be isolated on at least one side. Isolation may be achieved by an OPERABLE automatic isolation valve, or by a manual isolation valve, blind flange, or equivalent. Equivalent isolation methods must be approved and may include use of a material that can provide a temporary, atmospheric pressure, ventilation barrier for the other containment penetrations during reduced inventory conditions with fuel in the reactor vessel.

APPLICABLE SAFETY ANALYSES

For postulated events in MODES 5 and 6, decay heat removal is provided by the LHSI in RHR mode. RCS inventory makeup is provided by the MHSI and the In-containment Refueling Water Storage Tank. Containment closure in required prior to venting the RCS and entering a reduced inventory configuration in order to limit the release of steam and radioactive material from containment in the event of a loss of RHR event.

Containment penetrations satisfy Criterion 4 of 10 CFR 50.36(c)(2)(ii).

LCO

This LCO limits the consequences of postulated loss of residual heat removal event during reduced inventory conditions with fuel in the reactor vessel by limiting the potential escape paths for steam and radioactive material released within containment. The LCO requires any penetration providing direct access from the containment atmosphere to the outside atmosphere to be closed except for penetrations capable of being closed by an OPERABLE CBVS. The OPERABILITY requirements for this LCO ensure that these penetrations are isolable by the CBVS. The OPERABILITY requirements for this LCO ensure that the automatic CBVS valve closure times specified in the FSAR can be achieved and, therefore, meet the assumptions used in the PRA analysis.

BASES

APPLICABILITY

The containment penetration requirements are applicable in MODES 5 and 6 during reduced inventory conditions. In MODES 1, 2, 3, and 4, containment penetration requirements are addressed by LCO 3.6.1, "Containment."

ACTIONS

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

If the containment equipment hatch, air locks, or any containment penetration that provides direct access from the containment atmosphere to the outside atmosphere is not in the required status, action must be initiated to place the containment penetrations in their required status, place the unit in MODE 5 with the RCS pressure boundary intact and ≥ 25% pressurizer level, or to increase the RCS water inventory by raising the reactor cavity water level to ≥ 23 feet above the top of the reactor vessel flange.

SURVEILLANCE REQUIREMENTS

SR 3.9.7.1

This Surveillance demonstrates that each of the containment penetrations required to be in its closed position is in that position. The Surveillance on the open valves will demonstrate that the valves are not blocked from closing. Also, the Surveillance will demonstrate that each valve operator has motive power, which will ensure that each valve is capable of being closed from the Main Control Room.

The Surveillance is performed every 7 days with the unit in reduced inventory conditions. The Surveillance interval is selected to ensure that the required penetration status is maintained during reduced inventory conditions.

SR 3.9.7.2

This Surveillance demonstrates that each CBVS valve actuates to its isolation position on manual initiation. The 24 month Frequency maintains consistency with other similar DCS instrumentation and valve testing requirements.

The SR is modified by a Note stating that this Surveillance is not required to be met for valves in closed penetrations. The LCO provides the option to close penetrations in lieu of requiring remote actuation capability.

BASES

REFERENCES

1. NRC Generic Letter 88-17, Loss of Decay Heat Removal, October 17, 1988.

2. FSAR Section 19.1.6.

3. FSAR Section 5.4.7.2.1.