AревaEPRDCPEm Resource

From: BRYAN Martin (EXTERNAL AREVA) [Martin.Bryan.ext@areva.com]
Sent: Friday, July 16, 2010 3:01 PM
To: Tesfaye, Getachew
Cc: DELANO Karen (AREVA); ROMINE Judy (AREVA); BENNETT Kathy (AREVA); KOWALSKI David (AREVA)
Subject: Response to U.S. EPR Design Certification Application RAI No.406, FSAR Ch. 9
Attachments: RAI 406 Response US EPR DC.pdf

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 406 Response US EPR DC.pdf" provides a technically correct and complete response to two of the eight questions and a technically correct and partial response to one question.

Appended to this file are affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which supports the response to RAI 406 Questions 09.02.02-111, 09.02.02-113 (Part d) and 09.05.01-77.

The following table indicates the respective pages in the response document, "RAI 406 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 406 — 09.02.02-109	2	4
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A complete answer is not provided for six of the questions. The schedule for technically correct and complete responses to these questions is provided below.

Question #	Response Date
RAI 406 — 09.02.02-109	August 31, 2010
RAI 406 — 09.02.02-110	August 31, 2010
RAI 406 — 09.02.02-112	August 31, 2010
RAI 406 — 09.02.02-113 (Part a)	August 31, 2010
RAI 406 — 09.02.02-114	August 31, 2010
RAI 406 — 09.04.01-2	August 31, 2010

SincerelyMartin (Marty) C. Bryan
U.S. EPR Design Certification Licensing Manager
AREVA NP Inc.
Tel: (434) 832-3016
702 561-3528 cell
Martin.Bryan.ext@areva.com

From: Tesfaye, Getachew [mailto:Getachew.Tesfaye@nrc.gov]
Sent: Wednesday, June 16, 2010 8:27 AM
To: ZZ-DL-A-USEPR-DL
Cc: Wheeler, Larry; Segala, John; Lee, Samuel; Peng, Shie-Jeng; McKirgan, John; McCann, Edward; Dreisbach, Jason; Hearn, Peter; Colaccino, Joseph; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No.406(4683,4664,4707), FSAR Ch. 9

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on May 14, 2010, and discussed with your staff on June 15, 2010. Drat RAI Question 09.04.01-2 was modified as a result of that discussion. 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
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From: BRYAN Martin (EXTERNAL AREVA)

Created By: Martin.Bryan.ext@areva.com

Recipients:
"DELANO Karen (AREVA)" <Karen.Delano@areva.com>
Tracking Status: None
"ROMINE Judy (AREVA)" <Judy.Romine@areva.com>
Tracking Status: None
"BENNETT Kathy (AREVA)" <Kathy.Bennett@areva.com>
Tracking Status: None
"KOWALSKI David (AREVA)" <David.Kowalski@areva.com>
Tracking Status: None
"Tesfaye, Getachew" <Getachew.Tesfaye@nrc.gov>
Tracking Status: None

Post Office: AUSLYNCMX02.adom.ad.corp

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Response to

Request for Additional Information No. 406(4683, 4664, 4707), Revision 0

6/16/2010

U.S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 09.02.02 - Reactor Auxiliary Cooling Water Systems
SRP Section: 09.04.01 - Control Room Area Ventilation System
SRP Section: 09.05.01 - Fire Protection Program

Application Section: FSAR Chapter 9

QUESTIONS for Balance of Plant Branch 1 (AP1000/EPR Projects) (SBPA)
QUESTIONS for Containment and Ventilation Branch 1 (AP1000/EPR Projects) (SPCV)
QUESTIONS for Balance of Plant Branch 1 (SBPA)

Question 09.02.02-109:

Follow-up to RAI 334, Question 9.2.2-61 and RAI 174, Question 9.2.2-12

In RAI 9.2.2-61 the staff identified a group of follow-up items in regard to CCWS design information that was found to be missing, inconsistent or inaccurate. Staff review of the applicant's response to 9.2.2-61 provided in RAI 334, Supplement 1, identified the follow-up Questions listed below.

Part (1): In the response to RAI 9.2.2-61 Part 1, the applicant noted that pipe sizes were identified on FSAR Tier 2, P&IDs Figures 9.2.2-1, 2, 3 and 4. While this response is acceptable, the staff noted that some pipe sizes were still missing from Figure 9.2.2-1 for: (1) normal surge tank makeup demineralized water and (2) emergency surge tank makeup water.

Part (3): In follow-up RAI 9.2.2-61 Part (3) the applicant was asked to provide detail design for I&C. In response the applicant stated that the CCWS control logic has been identified and referenced information provided in Section 9.2.2.6.1 "Control Features and Interlocks," which has been totally revised and reorganized in the FSAR markup provided with RAI 334, Supplement 1.

The staff's review of the markup of Section 9.2.2.6.1 identified the follow-up items listed below:

1. Page 9.2-43 of the markup proposes to add a new section entitled "CCWS Automatic I&C Safety-Related Functions." "Emergency Backup Switchover Sequence" addresses the case where "automatic" CCWS train switchover has failed this sequence implies that remote manual actions (from the control room) are needed to complete the switchover. The sequence should be revised in the FSAR to clearly state automatic actions and manual actions since it is confusing.
2. The FSAR should clearly explain the differences between the various types of common header switchovers that are described; (1) automatic, (2) emergency backup, (3) emergency, (4) normal and (5) semi-automatic. Similarly, on FSAR mark-up page 9.2-47 under "Normal Switchover Sequence" make it clear where the description "semi-automatic" applies.
3. Page 9.2-43 includes a description under "Emergency CCWS Temperature Control," that the bypass control valve closes when at a high temperature threshold of MAX 1. Describe if the valve goes fully closed at MAX1 or is stepped closed until MAX1 is cleared. This statement is confusing based on the staff's review of "CCWS Temperature Controls" on FSAR markup page 9.2-48. Also the last sentence states "this temperature control function is required during all plant modes of operation, except for SBO, when the CCWS (KAA10/20/30/40) is energized." Provide clarification of the SBO exception in the FSAR.
4. Page 9.2-44, "Emergency Leak Detection Sequence," third bullet from top states that if surge tank level continues to drop to less than MIN4 then the switchover sequence function is unlocked to allow supplying the common users by the "associated train". Clarify in the FSAR the basis for the restoration of flow to the common users, which were isolated at MIN3.
5. Page 9.2-45, "Thermal Barrier Isolation," the following clarifications are needed:
   a. Since both bullets list indications; the heading, "the following actions indicate" should be corrected.

b. The statement about high radiation not performing an isolation conflicts with Section 9.2.2.6.1.5, “Additional Controls Features and Interlocks,” (page 9.2-50) which states “only the RCP thermal barrier and CVCS HP cooler leaks results in automatic isolation of the failed user”. This quote is described under “detection of increased radiation” bullet and should be clarified in the FSAR. Thermal barrier isolation is based on pressure or high flow only.

c. Operating experiences with thermal barrier cracks indicate that among the various parameters utilized for early detection of cracks on the thermal barrier housing, the variation in exit temperature from the component cooling system water coil was the only one to be considered sufficiently representative and reliable. Describe in your FSAR the utilization of the CCWS temperature monitoring for the determination of degraded thermal barrier conditions and include any trip functions based on temperature rise in CCWS from the thermal barrier.

6. Page 9.2-46, fourth bullet lists valve AA015 twice and should be corrected in the FSAR.

7. Page 9.2-48, “CCWS Temperature Control,” described the CCW Hx bypass valve control that during normal operation the CCW Hx bypass valve is stepped ‘closed’ when the heat exchanger outlet temperature reaches MAX1. Clarify in the FSAR the step increments of the valve (for example 10% increments) and what is the end position of the valve (full closed or is this a temperature setpoint).

   Also describe in the FSAR if the bypass control valve is “manually positioned” in the field or manually positioned by the main control room operator in the control room on the control room display. While in “remote manual” describe in the FSAR if the automatic controls still function to control valve position based on control signals.

8. Page 9.2-49, “Dedicated CCWS Circuit Pressurization,” describe in the FSAR the means for preventing the nitrogen gas from entering the dedicated train piping system.

<u>Part (4):</u> In Part 4 of RAI 9.2.2-61 the applicant was asked to provide the detail design for valve positions. The applicant’s response included a list of CCWS valve responses to a safety injection. The staff noted the list of CCWS CCSs automatic system realignments that result from a safety injection signal (FSAR markup Page 9.2-44) needs to be considered for addition to the Tier 1 design description and ITAAC. This is references in SRP 14.3, Appendix C, page 14.3-26, paragraph V.I.

<u>Part 6:</u> In Part 6 the applicant was asked to simplify the 24 page CCWS functional arrangement drawing in Tier 1 (Figure 2.7.1-1). Accordingly the applicant provided a simplified version (11 pages) of Figure 2.7.1-1. The staff found the revised drawings were acceptable but noted that pipe transitions between ASME Class 2 and Class 3 need to be added as appropriate for the CCWS containment penetrations. This is based on SRP 14.3, Appendix C, page 14.3-35, “Figure Check List”. The applicant needs to correct the Tier 1 FSAR markup accordingly.

<u>Part 7b:</u> In Part 7(b) of RAI 9.2.2-12 the staff asked the applicant if the non-safety load hydraulic isolation valves operated in the same manner as the common header switchover valves described in FSAR Tier 2 Section 9.2.2.2. In response the applicant explained that the difference between the switchover valves and non-safety load isolation valves was in the actuation of the pilot valves. The switchover valve pilots are energized to open and bleed off the hydraulic fluid while the non-safety load isolation valve pilots are de-energized to open. The applicant also provided a markup of FSAR Tier 2 Section 9.2.2.2 consistent with this

explanation. In follow-up RAI 9.2.2-61 Part 7b the staff asked the applicant to explain the reason for the difference. However, in response the applicant stated that details of the pilot valve operation are part of vendor supplied information and that the vendor will be provided with details of system operation along with I&C logic requirements for all hydraulic valves. The vendor is required to develop an appropriate pilot operating system. The applicant also provided a markup to remove the description previously added to FSAR Tier 2 Section 9.2.2.2 and stated that information would be added when available from the vendor.

Since the details of the pilot valve will be added to the FSAR at a later date all inaccurate information presently in the FSAR related to these pilot valves should be removed (FSAR markup page 9.2-27 to 28 presently describes pilot valve operation). Once this new information is available, Tier 1 ITAACs should be considered for proper valve performance and the pilot valves should be added to the Tier 2 failure mode and effects analyses table related to single failure. The staff will consider this an open item until this information is added to the FSAR and has been evaluated by the staff.

Response to Question 09.02.02-109:

A response to this question will be provided by August 31, 2010.

Question 09.02.02-110:

Follow-up to RAI 334, Question 9.2.2-62 and RAI 174, Question 9.2.2-13

In RAI 9.2.2-62 the applicant was requested to determine CCWS minimum heat transfer and flow requirements for the various plant operating modes and accident conditions. The applicant previously stated this information would not be available until later in the design process. In response to RAI 9.2.2-62 the applicant provided a FSAR markup that included FSAR Tier 2 Table 9.2.2-2, "CCWS User Requirements," with heat load and flow information. The staff's review of this information identified the follow-up questions discussed below:

a. The applicant should provide a summary table in the FSAR to identify the total system flow and heat load requirements for normal and accident conditions as well as an assessment in the RAI response of margin by comparison with the design heat transfer and flow capacities for the CCWS heat exchanger and CCWS pump, respectively.

b. Explain the basis for the CCW LHSI heat exchanger DBA heat load (241 MBTU/Hr) in the markup of Table 9.2.2-2 and explain its difference from the DBA heat load identified elsewhere in the FSAR. For example both Tables 9.2.2-1 and 9.2.5-1 identify a DBA heat load of 291.3 MBTU/Hr. This should be explained in the FSAR.

c. Table 9.2.2-2 states that RCP motor air and bearing oil coolers isolate on a Stage 1 Containment isolation signal. However, FSAR Tier 2 Section 9.2.2 indicates that these loads isolate at Stage 2. This table should also state that the CVCS HP coolers isolate at Stage 2. These discrepancies should be corrected in the FSAR.

d. Describe in the RAI response the differences between the CCW Fuel Pool Cooling heat load for normal refueling (47.8 MBTU/Hr) which is significantly greater than the heat load for a full core offload (33.78 MBTU/Hr), see Table 9.2.2-2. The applicant should consider an explanatory note to the FSAR table for clarification of these heat loads.

e. The dedicated heat exchanger capacity is missing from FSAR Tier 2 Table 9.2.2-1. This information should be added to the FSAR.

f. For Table 9.2.2-2, sheet 1 identifies LHSI Hx heat load and flow values for the two cooldown conditions below. Explain in the RAI response the difference for the CCW heat load and flow being significantly less when the CCW train is connected to both the SIS users and the common header and when compared to only being connected to the SIS users (difference of 116 E6 BTU/hr). The applicant should consider adding an explanatory note to the FSAR Table.

Condition	Heat Load (MBTU/Hr)	Flow (10^6 Lb/Hr)
Normal Cooldown when CCW train is only connected to SIS users	152.8	2.984
Normal Cooldown when CCW train is also connected to the common header	36.54	2.1906

Response to Question 09.02.02-110:

A response to this question will be provided by August 31, 2010.

Question 09.02.02-111:

Follow-up to RAI 334, Question 9.2.2-65 and RAI 174, Question 9.2.2-16

Part (b): In Part (b) of RAI 9.2.2-16 of RAI 174 the staff asked the applicant if a previously non-running ESW pump would also be automatically started (i.e. in addition to the associated CCWS pump) upon failure of the CCWS pump in the opposite train. In the response to RAI 174 (Supplement 2) the applicant confirmed that the ESWS pump is 'automatically' actuated when the associated CCWS train is started. However, based on its review of the applicant's response, the staff provided follow-up RAI 9.2.2-65 (RAI 334) noting that a specific description of this design feature could not be located in FSAR Tier 2 Section 9.2.1 or Section 9.2.2 or ITAAC. In response to RAI 9.2.2-65 Part (b), the applicant in turn referenced the response to RAI 09.02.02-61 Part 3 (RAI 334), which included a full revision of Section 9.2.2.6.1, "Control Features and Interlocks." However, the staff's review of the markup of Section 9.2.2.6.1 could not locate a description of this specific scenario; therefore, the applicant should add this information to the Tier 1 and Tier 2 of the FSAR.

Response to Question 09.02.02-111:

A review of the design of the component cooling water system (CCWS) confirms that a manual or automatic actuation of a CCWS pump automatically actuates the corresponding essential service water system (ESWS) pump.

U.S. EPR FSAR Tier 1, Section 2.7.1 and Table 2.7.1-3—Component Cooling Water System ITAAC and U.S. EPR FSAR Tier 2, Section 9.2.2.6.1.5 will be revised to include this information.

FSAR Impact:

U.S. EPR FSAR Tier 1, Section 2.7.1 and Table 2.7.1-3, and U.S. EPR FSAR Tier 2, Section 9.2.2.6.1.5 will be revised as described in the response and indicated on the enclosed markup.

Question 09.02.02-112:

Follow-up to RAI 334, Question 9.2.2-67 and RAI 174, Question 9.2.2-18

In RAI 174, RAI 9.2.2-18 the staff requested that the applicant provide the bases for the design of the CCWS Surge Tanks including details such as pump NPSH available, level setpoints. Internal volume, inleakage thermal expansion and contraction volumes accounted for and the leakage rate assumptions. In general, the applicant's response to various parts of RAI 9.2.2-18 discussed considerations that would be taken into account by calculations later in the design. Consequently, the staff initiated follow-up RAI 9.2.2-67. The following items remain open based on the staff's review of the applicant's response to RAI 9.2.2-67 provided by Supplement 1 of RAI 334.

Part (c)1 and (c)2: In Part (c)1 of follow-up RAI 9.2.2-67 the applicant was asked to provide justification for the assumed 1 gpm leak rate and to consider the need to account for leakage through large diameter closed switchover valves. For Part (c)2 the applicant was asked to similarly consider the impact of any revised leak rate from (c)1 on volume loss from the tank until the initiation of emergency makeup. In response the applicant identified a revised position that assumed leakage of 5 gpm through each of four closed switchover valves (2-24" and 2-16" diameter valves) for a total of 20 gpm per train. This equated to an one hour surge tank leak rate of 1200 gallon.

As previously identified in RAI 9.2.2-107 (4644/17637), the staff concluded that the use of a NSR/ Seismic Category II surge tank makeup water source is inconsistent with guidance provided in SRP 9.2.2 paragraph III.3C for a safety related seismic makeup source. Accordingly, the applicant needs to specify that the makeup water source is safety related, seismic category I. The applicant should also identify the flow rate and water volume that is available from the finally selected makeup source to confirm that the requirements of the CCWS system can be met. Based on a 20 GPM loss for valve seat leakage only for 7 days 201,600 gallons is required for make-up for one train.

Other considerations for this water make-up should include;

a. Describe the surge tank level at the start of the scenario knowing that the non-safety make-up starts to make-up at MIN1 (if available) as described in Tier 2 FSAR Section 9.2.2.6.1 and that the non safety users isolate at MIN2 (based on delta flow) and switchover valves do not isolate until MIN3 is reached in the surge tank.
b. For Item (C)2, describe the basis for total required makeup volume for 7 days and that continuous outleakage must be assumed for the 7 day period as discussed in SRP 9.2.2.
c. The applicant should also discuss pump seal and valve packing leakage.

Part (c)3- See the follow-up to RAI 9.2.2-59 Part (d) In regard to the proposed use of the fire protection system as the source of Surge Tank Emergency Makeup.

Part (c)4- See the follow-up to RAI 9.2.2-59 Part (d) In regard to the proposed use of the fire protection system as the source of Surge Tank Emergency Makeup.

Parts (d and e)- In Parts (d) and (e) of follow-up RAI 9.2.2-67 in regard to loss of a common header the applicant was requested to provide a description of the necessary operator actions to transfer thermal barrier cooling to the common header that remains operable, the time available to complete these actions before overheating and to address the impact on continued plant operation due to loss of CCWS cooling to other important common header loads that may impact continued plant operation (e.g. RCP motor and bearing oil coolers). In response the applicant provided a detailed explanation which included the potential for RCP trips on high bearing temperature due to loss of CCWS to bearing oil coolers on two RCPs supplied by the common header that was lost. The staff found the applicant's response needed to be clarified.

In response to Parts d and e of RAI 9.2.2-67, the applicant stated "In the event that two CCWS trains supplying the same common header are inoperable, reactor coolant pump (RCP) thermal barrier cooling must be aligned to the CCWS common header that has two operable CCWS trains. There is no time requirement to transfer the thermal barrier cooling in this event since the non-safety chemical and volume control system (CVCS) seal injection to the RCPs is available from the CVCS train that is supplied by the available CCWS common header."

The applicant's positions is that "there is no time requirement to transfer the thermal barrier cooling in this event since the non-safety chemical and volume control system (CVCS) seal injection to the RCPs is available…" does not appear consistent with the plant design. While CVCS seal injection and CCWS thermal barrier cooling provide equivalent thermal barrier cooling (FSAR Tier 2 Section 5.4.1), only CCWS is safety related and relied upon to remain operable under post accident conditions. For an accident the CVCS pumps are not automatically loaded on the EDGs (FSAR Tier 2 Section 7.3.1.2) and seal injection is isolated on a Stage 2 Containment Isolation signal (FSAR Tier 2 Section 9.3.4). RCP seal cooling is necessary to provide assurance of seal integrity during accident conditions. Furthermore the staff noted that the 72 hour LCO condition identified in Technical Specification 3.7.7 Note A-1 appeared only to be intended to minimize the unavailability time of the automatic switchover feature of the two CCWS trains that support the common header supplying the RCP thermal barriers. In other words flow to all RCP thermal barriers is still present when Note A-1 is applicable. In contrast, with both trains inoperable no RCP thermal barrier cooling would be present until operators took manual action to swap the thermal barrier supply to the other common header. These actions would also need to be performed if an accident were to occur during this condition. In conclusion, the staff requests that the applicant clarify the response to Parts d and e of RAI 9.2.2-67 based on the preceding discussion related to time requirements to transfer the thermal barrier cooling if CVCS in not available.

Response to Question 09.02.02-112:

A response to this question will be provided by August 31, 2010.

Question 09.02.02-113:

Follow-up to RAI 334, Question 9.2.2-68 and RAI 174, Question 9.2.2-19

Part (a)- See follow-up RAI to Part 3 of 9.2.2-61 for Page 9.2-45 of FSAR Markup.

Part (d)- In Part (d) of follow-up RAI 9.2.2-68 the staff asked the applicant to add a qualifying discussion for the RCP thermal barrier loads to the statement in FSAR Section 9.2.2 that indicate common header 1b cools RCPs 1 and 2 while common header 2b cools RCPs 3 and 4. While these statements are correct for other CCWS cooling loads on the RCPs, they require modification to recognize the exception for the Thermal Barriers. In response the applicant FSAR markup included new Table 9.2.2-3, "CCWS Common Header Users," listing the 1.b and 2.b common header users. The staff found Table 9.2.2-3 misleading since it does not include the thermal barriers which can be supplied by either common 1.b or 2.b. Accordingly, the applicant is requested to address the RCP thermal barrier loads in Table 9.2.2-3 of the FSAR markup.

Response to Question 09.02.02-113:

Part (a):

A response to this question will be provided by August 31, 2010.

Part (d):

A review of the design of the component cooling water system (CCWS) confirms that the reactor coolant pump (RCP) thermal barrier cooling function is from either Common 1.b or 2.b header.

U.S. EPR FSAR Tier 2, Table 9.2.2-3—CCWS Common Header Users will be revised to include this information.

FSAR Impact:

U.S. EPR FSAR Tier 2, Table 9.2.2-3 will be revised as described in the response and indicated on the enclosed markup.

Question 09.02.02-114:

Follow-up to RAI 334, Question 9.2.2-69 and RAI 174, Question 9.2.2-20

In follow-up RAI 9.2.2-69 the staff concluded that the response and markup of FSAR Tier 2 Section 9.2.2 provided by the applicant for RAI 9.2.2-20 did not specifically demonstrate satisfying the guidance of SRP 9.2.2 Section II 4.G ii. In follow-up RAI 9.2.2-69 the staff noted examples of information needed in the FSAR markup to more completely identify the CCWS thermal barrier cooling design including; (1) Specifically state the CCWS associated with the RCPs can withstand a single, active failure or a moderate-energy crack as defined in Branch Technical Position ASB 3-1, (2) Also credit Seismic Category I, Quality Group C, and ASME Section III Class 3 requirements and (3) to identify that future RCP seal SBO testing would be performed.

The applicant's response to RAI 9.2.2-69 included a detailed explanation and revised markup of FSAR Tier 2 Section 9.2.2. However, the staff's review of this response identified the follow-up questions listed below:

a. In regard to the discussion in the response about mid position failure of a thermal barrier containment isolation valve (CIV) upon attempting transfer of thermal barrier cooling to the other common header:
    1. Describe the type of actions (and priority) that would be needed if the failure occurred with the valve nearly closed resulting in insufficient cooling to all thermal barriers while still preventing transfer to the other common header, that is, permissive not satisfied. Describe if this is considered a common mode loss of thermal barrier cooling.
    2. Describe in the FSAR the acceptability of taking credit for CVCS seal injection in this scenario when the CVCS is only considered an operational system that may not be present in post accident conditions.
    3. Describe in the FSAR if the plant design basis requires CCWS thermal barrier cooling to be functional in post accident conditions (besides during all plant operating modes when the RCPs are running).
    4. The applicant's response stated that failure of a CCWS CIV to fully close does not place the plant in a four hour TS action statement to close the other CIV in that flowpath but TS 3.6.3 Containment Isolation does apply. The applicant should provide the basis for these conclusions and explain the aspect of TS 3.6.3 that does apply including the applicable LCO duration.
    5. Describe in the FSAR if the RCP standstill seal (discussed in the original response) is credited as a safety-related design basis accident mitigation feature or is it intended only for conditions that are beyond the normal design basis.
b. Provide an explanation in the RAI response that demonstrates that the guidance of SRP 9.2.2, Section II 4.G is satisfied by testing that the RCPs can withstand a complete loss of cooling water for 20 minutes without operator action or state that in lieu of testing the CCWS meets Section ii.4.G, item ii. This was not addressed as requested by RAI 9.2.2-69.

Response to Question 09.02.02-114:

A response to this question will be provided by August 31, 2010.

Question 09.04.01-2:

Follow-up to RAI 267, Question 12.03-12.04-16

Provide the HVAC Filter Design Feature and Anticipated Operating Procedure.

10 CFR 52.47(a)(6) and 10 CFR 20.1406 , "Minimization of Contamination," require applicant to demonstrate that the facility design and procedures for operation will minimize, to the extent practicable, contamination of the facility and the environment.

The staff noted from the applicant's RAI response that the HVAC filters would be designed, fabricated, and tested in accordance with ASME AG-1. During operation, a negative pressure with respect to the adjoin environment will be created in the housing. However, the response did not indicate if there exists any design feature and anticipated operating procedures to minimize the possibility for HVAC system filter element from failure during operation. Provide this area of information to have reasonable assurance that the consequences with respect to the spread of contamination with a filter failure will be minimized.

Response to Question 09.04.01-2:

A response to this question will be provided by August 31, 2010.

Question 09.05.01-77:

Follow-up to RAI 337, Question 09.05.01-74

The applicant's RAI 09.05.01-74 response stated the following: In addition, NUREG -1805 stated: "The burning rate of deep-seated fires can be reduced by the presence of a clean agent, and they may be extinguished if a high concentration can be maintained for an adequate soaking time. However, it is normally not practical to maintain a sufficient concentration for a sufficient time to extinguish deep-seated fires." However, this is not a direct quote. The applicant needs to remove the quotes and qualify statement such as follows: In addition, NUREG -1805 stated, in context, that: The burning rate of deep-seated fires can be reduced by the presence of a clean agent, and they may be extinguished if a high concentration can be maintained for an adequate soaking time. However, it is normally not practical to maintain a sufficient concentration for a sufficient time to extinguish deep-seated fires.

FSAR Table 9.5.1-1, RG Section C.3.3.2 for Gaseous Fire Suppression shows that the EPR Design status is in "Compliance" but since RG 1.189 Regulatory Positiion C.3.3.2 guidance is not met since the manually actuated gaseous suppression system is not acting as a backup to automatic water-based fire suppression systems the status needs to be "Alternate Compliance." The applicant needs to revise FSAR Table 9.5.1-1 RG Section C.3.3.2 status to "Alternate Compliance."

Response to Question 09.05.01-77:

The Response to RAI 337, Question 09.05.01-74 has three places where the response indicated direct quotes which were not direct quotes. The affected areas of the response are as follows:

Dinenno and Budnick also state:

> "[T]he problem of deep-seated fires should be put in context. The impact of not extinguishing all the locations in a fuel array which are undergoing condensed phase reaction is the possibility of a re-flash or transition to flaming combustion. These re-flash conditions are expected to be slowly developing (on typical solid fuels) and…typically they will not be immediately threatening."

INUREG-1805 states:

> "[T]he burning rate of deep-seated fires can be reduced by the presence of a clean agent, and they may be extinguished if a high concentration can be maintained for an adequate soaking time. However, it is normally not practical to maintain a sufficient concentration for a sufficient time to extinguish deep-seated fires."

NUREG-1805 also states:

> "[E]xtinguishment of a surface fire does not guarantee a deep-seated fire may also be eliminated. Extinguishment of deep-seated fires requires an individual to investigate the interior of a material once the surface fire has been extinguished to determine if interior extinguishment has also been accomplished."

The Response to RAI 337, Question 09.05.01-74 is revised as follows:

> Dinenno and Budnick state, in summary, that the problem of deep-seated fires should be put in context. The impact of not extinguishing the locations in a fuel array that are undergoing condensed phase reaction may result in a re-flash or transition to flaming combustion. These re-flash conditions are expected to be slowly developing (on typical solid fuels) and typically they will not be immediately threatening.
>
> INUREG-1805 states that the burning rate of deep-seated fires can be reduced by the presence of a clean agent, and they may be extinguished if a high concentration can be maintained for an adequate soaking time. It is normally not practical to maintain a sufficient concentration for a sufficient time to extinguish deep-seated fires.
>
> NUREG-1805 also states that extinguishment of a surface fire does not guarantee that a deep-seated fire will also be eliminated. Extinguishment of deep-seated fires requires an individual to investigate the interior of a material once the surface fire has been extinguished to determine if interior extinguishment has also been accomplished.

U.S. EPR FSAR Tier 2, Table 9.5.1-1—Fire Protection Program Compliance with Regulatory Guide 1.189 will be revised as follows:

- For RG Section C.3.3.2 and C3.3.2.3, the Compliance Column will be changed from “Compliance” to "Alternate Compliance," and the following note will be added in the U.S. EPR Comment Column:

  “A manually actuated gaseous suppression system is provided for the subfloor area of the MCR. The subfloor area is provided with fire detection. The Control Room is continuously occupied allowing for prompt identification and response. See Section 9.5.1.2.1 “Automatic Fire Suppression Systems” for details.”

FSAR Impact:

U.S. EPR FSAR Tier 2, Table 9.5.1-1 will be revised as described in the response and indicated on the enclosed markup.

U.S. EPR Final Safety Analysis Report Markups

4.0 I&C Design Features, Displays and Controls

4.1 Displays listed in Table 2.7.1-2—Component Cooling Water System Equipment I&C and Electrical Design are retrievable in the main control room (MCR) and the remote shutdown station (RSS) as listed in Table 2.7.1-2.

4.2 The CCWS equipment controls are provided in the MCR and the RSS as listed in Table 2.7.1-2.

4.3 Equipment listed as being controlled by a priority and actuator control system (PACS) module in Table 2.7.1-2 responds to the state requested by a test signal.

4.4 A CCWS low flow condition automatically opens the low head safety injection (LHSI)/residual heat removal (RHR) heat exchanger (HX) inlet valve.

4.5 A surge tank level of MIN3 automatically isolates the associated train common header switchover valves.

4.6 ~~A surge tank level of MIN4 automatically trips the associated CCWS pump~~Deleted.

4.7 A flowrate difference between the supply and return from the Nuclear Auxiliary Building (NAB) and the Radioactive Waste Building (RWB) automatically isolates the non-safety-related branch.

4.8 Loss of one CCWS train initiates an automatic switchover to allow cooling of the common ‘a’ and/or ‘b’ headers.

4.9 Deleted.

4.10 CCWS train separation to RCP thermal barriers is maintained by interlocks provided on the supply and return thermal barrier containment isolation valves. The interlocks require that CIVs associated with one common header be closed before the other common header CIVs can be opened.

4.11 Manual or automatic actuation of a CCWS pump automatically actuates the corresponding ESWS pump.

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5.0 Electrical Power Design Features

5.1 The components designated as Class 1E in Table 2.7.1-2 are powered from the Class 1E division as listed in Table 2.7.1-2 in a normal or alternate feed condition.

5.2 Valves listed in Table 2.7.1-2 fail as-is on loss of power.

6.0 Environmental Qualifications

6.1 Components in Table 2.7.1-2, that are designated as harsh environment, will perform the function listed in Table 2.7.1-1 in the environments that exist during and following design basis events.~~Electrical drivers for equipment listed in Table 2.7.1-2 for harsh environment can perform the safety function in Table 2.7.1-1 following exposure to the design basis environments for the time required.~~

Table 2.7.1-3—Component Cooling Water System ITAAC (7 Sheets)

09.02.02-111

	Commitment Wording	Inspections, Tests, Analyses	Acceptance Criteria
4.11	Manual or automatic actuation of a CCWS pump automatically actuates the corresponding ESWS pump.	Tests will be performed using test signals to verify the interlocks.	The following interlock responds as specified below when activated by a test signal: • Actuation of a CCWS pump automatically actuates the corresponding ESWS pump.
5.1	The components designated as Class 1E in Table 2.7.1-2 are powered from the Class 1E division as listed in Table 2.7.1-2 in a normal or alternate feed condition.	a. Testing will be performed for components designated as Class 1E in Table 2.7.1-2 by providing a test signal in each normally aligned division. b. Testing will be performed for components designated as Class 1E in Table 2.7.1-2 by providing a test signal in each division with the alternate feed aligned to the divisional pair.	a. The test signal provided in the normally aligned division is present at the respective Class 1E component identified in Table 2.7.1-2. b. The test signal provided in each division with the alternate feed aligned to the divisional pair is present at the respective Class 1E component identified in Table 2.7.1-2.
5.2	Valves listed in Table 2.7.1-2 fail as-is on loss of power.	Testing will be performed for the valves listed in Table 2.7.1-2 to fail as-is on loss of power.	Following loss of power, the valves listed in Table 2.7.1-2 fail as-is.

9.2.2.6.1.4 CCWS Pump Control, Protection and Monitoring

High Bearings Temperatures

An alarm is relayed to the operator in the MCR when the pump bearing temperature or the motor bearing temperature is near the first threshold value. The second threshold value trips the pump.

High Windings Temperatures

An alarm is relayed to the operator in the MCR when the motor stator windings temperature is near the first threshold value. The second threshold value trips the pump.

9.2.2.6.1.5 Additional Control Features and Interlocks

- Each CCWS pump is interlocked with its associated LHSI/RHR HX supply valve so that when the pump is stopped the supply valve closes, following a delay to allow for pump coast down. This action prevents potential leakage of the CCWS into the SIS train.

- In the event of a pump low flow condition, the associated LHSI HX isolation valve automatically opens to provide a minimum flow path for CCWS pump protection. In the event of a pump high flow condition, the FPCS HX outlet flow control valve is closed to its minimum opening mechanical stop position to reduce the CCWS flow rate and to maintain normal pump operation.

- The CCWS surge tanks are instrumented with level indication and graduated level control and equipment protection set points designated from lowest to highest level (MIN4, MIN3, MIN2, MIN1, MAX1, MAX2, MAX3 and MAX4). A CCWS train can operate continuously so long as the water level in its surge tank is maintained between MIN1 and MAX1.

- Detection of increasing radiation in the CCWS from the CVCS HP coolers indicates leakage and triggers automatic isolation of the affected CVCS HP cooler via motor-operated valves (KBA11/12 AA001/003) in the CVCS. Leakage of reactor coolant into the CCWS from such users as the LHSI HXs is also indicated by increasing radiation in the CCWS and prompts isolation of the user. Only the RCP thermal barrier and CVCS HP cooler leaks result in automatic isolation of the failed users.

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- Manual or automatic actuation of a CCWS pump automatically actuates the corresponding ESWS pump.

9.2.2.7 References

1. ASME Boiler and Pressure Vessel Code, Section III: "Rules for Construction of Nuclear Facility Components," Class 2 and 3 Components, The American Society of Mechanical Engineers, 2004.

Table 9.2.2-3—CCWS Common Header Users
Sheet 1 of 3

Common 1.b	
System	**User Description**
Reactor Coolant	RCP1 Motor Air Cooler
	RCP1 Motor Air Cooler
	RCP1 Lower Bearing Oil Cooler
	RCP1 Upper Bearing Oil Cooler
	RCP2 Motor Air Cooler
	RCP2 Motor Air Cooler
	RCP2 Lower Bearing Oil Cooler
	RCP2 Upper Bearing Oil Cooler
	RCP1 Thermal Barrier[1]
	RCP2 Thermal Barrier[1]
	RCP3 Thermal Barrier[1]
	RCP4 Thermal Barrier[1]
Containment Building Ventilation	Containment HVAC Cooler 1
	Containment HVAC Cooler 2
	Containment HVAC Cooler 3
	Containment HVAC Cooler 4
Nuclear Island Drain and Vent	Primary Effluents HX
Chemical and Volume Control	CVCS HP Cooler 1
	Charging Pump Motor Cooler 1
	Charging Pump Oil Cooler 1
	Charging Pump Motor Cooler 1
Nuclear Sampling	RCS/PZR
	RCS/HL1
Steam Generator Blowdown Sampling	Secondary Sampling HX SG1
	Secondary Sampling HX SG2
Operational Chilled Water	OCWS Chiller
	OCWS Chiller
	OCWS Chiller
Safety Chilled Water	SCWS Condenser Train 2

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Table 9.2.2-3—CCWS Common Header Users
Sheet 2 of 3

Common 2.b	
System	**User Description**
Reactor Coolant	RCP3 Motor Air Cooler
	RCP3 Motor Ai Cooler
	RCP3 Lower Bearing Oil Cooler
	RCP3 Upper Bearing Oil Cooler
	RCP4 Motor Air Cooler
	RCP4 Motor Ai Cooler
	RCP4 Lower Bearing Oil Cooler
	RCP4 Upper Bearing Oil Cooler
	RCP1 Thermal Barrier[1]
09.02.02-113(d)	RCP2 Thermal Barrier[1]
	RCP3 Thermal Barrier[1]
	RCP4 Thermal Barrier[1]
Chemical and Volume Control	CVCS HP Cooler 2
	Charging Pump Motor Cooler 2
	Charging Pump Oil Cooler 2
	Charging Pump Motor Cooler 2
Steam Generator Blowdown Sampling	Secondary Sampling HX SG3
	Secondary Sampling HX SG4
Nuclear Sampling	RCS/HL3
Operational Chilled Water	OCWS Chiller
	OCWS Chiller
	OCWS Chiller
Steam Generator Blowdown	Second Stage Cooler
Coolant Treatment	Seal Water Cooler
	Condenser
	Gas Cooler
	After Cooler
	Condensate Cooler
	Reflux Condenser
	Gas Cooler

Table 9.2.2-3—CCWS Common Header Users
Sheet 3 of 3

Coolant Degasification	Condenser
	Gas Cooler
Solid Water	Condenser
	Condenser
	Condenser
	Vacuum Unit
Liquid Waste Processing	Vent Gas Cooler
	Seal Water Cooler
	Cooler for Injection Water
	Distillate Cooler
Safety Chilled Water	SCWS Condenser Train 3

Notes:

1. Either CCWS Common 1.b or 2.b headers can provide cooling to the RCP thermal barriers.

09.02.02-113(d)

Table 9.5.1-1—Fire Protection Program Compliance with Regulatory Guide 1.189
Sheet 3 of 10

R.G. Section	Regulatory Guide 1.189 "C. Regulatory Position"[1]	Compliance[2]	U.S. EPR Comment
C.3.1.1	Fire Detection and Alarm Design Objectives and Performance Criteria	Compliance	
C.3.2	Fire Protection Water Supply Systems		See below.
C.3.2.1	Fire Protection Water Supply	Compliance	
C.3.2.2	Fire Pumps	Compliance	
C.3.2.3	Fire Mains	Compliance	
C.3.3	Automatic Suppression Systems	Compliance	
C.3.3.1	Water Based Systems	Compliance	
C.3.3.1.1	Sprinkler and Spray Systems	Compliance	
C.3.3.1.2	Water Mist Systems	N/A	Water mist suppression systems are not provided.
C.3.3.1.3	Foam-Water Sprinkler and Spray Systems	N/A	Foam sprinkler and spray systems are not provided.
C.3.3.2	Gaseous Fire Suppression 09.05.01-77 →	Alternate Compliance	A manually-actuated gaseous suppression system is provided for the subfloor area of the MCR. The subfloor area is provided with fire detection. The MCR is continuously occupied, allowing for prompt identification and response. See Section 9.5.1.2.1, "Automatic Fire Supression Systems," for details.
C.3.3.2.1	Carbon Dioxide (CO_2) Systems	N/A	Carbon dioxide extinguishing systems are not provided.
C.3.3.2.2	Halon	N/A	Halon fire extinguishing systems are not provided.

Table 9.5.1-1—Fire Protection Program Compliance with Regulatory Guide 1.189
Sheet 4 of 10

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R.G. Section	Regulatory Guide 1.189 "C. Regulatory Position"[1]	Compliance[2]	U.S. EPR Comment
C.3.3.2.3	Clean Agents	Alternate Compliance	A manually-actuated gaseous suppression system is provided for the subfloor area of the MCR. The subfloor area is provided with fire detection. The MCR is continuously occupied, allowing for prompt identification and response. See Section 9.5.1.2.1, "Automatic Fire Supression Systems," for details.
C.3.4	Manual Suppression Systems and Equipment	Compliance	
C.3.4.1	Standpipes and Hose Stations	Compliance	
C.3.4.2	Hydrants and Hose Houses	Compliance	
C.3.4.3	Manual Foam	Compliance	
C.3.4.4	Fire Extinguishers	Compliance	
C.3.4.5	Fixed Manual Suppression		
	Some fixed fire suppression systems may be manually actuated (e.g., fixed suppression systems provided in accordance with Section III.G.3 of Appendix R to 10 CFR Part 50). Manual actuation is generally limited to water spray systems and should not be used for gaseous suppression systems except when the system provides backup to an automatic water suppression system. Fixed manual suppression systems should be designed in accordance with applicable guidance of the appropriate NFPA standards. A change from an automatic system to a manually actuated system should be supported by an appropriate evaluation.	Alternate Compliance	A manually actuated gaseous suppression system is provided for the subfloor area of the MCR. The subfloor area is provided with fire detection. The Control Room is continuously occupied allowing for prompt identification and response. See Section 9.5.1.2.1 "Automatic Fire Suppression Systems" for details.
C.3.5	Manual Firefighting Capabilities	Compliance	
C.3.5.1	Fire Brigade	Compliance	
C.3.5.1.1	Fire Brigade Staffing	Compliance	