ArevaEPRDCPEm Resource

From: WELLS Russell D (AREVA NP INC) [Russell.Wells@areva.com]
Sent: Thursday, January 29, 2009 5:52 PM
To: Getachew Tesfaye
Cc: Pederson Ronda M (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC); SLIVA Dana (EXT)
Subject: Response to U.S. EPR Design Certification Application RAI No. 149, FSAR Ch 3
Attachments: RAI 149 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 149 Response US EPR DC.pdf" provides technically correct and complete responses to all 11 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 149 Questions 03.09.05-1, 03.09.05-2, 03.09.05-3, 03.09.05-4, 03.09.05-5, 03.09.05-8, 03.09.05-9, 03.09.05-10, and 03.09.05-11.

The following table indicates the respective pages in the response document "RAI 149 Response US EPR DC.pdf" that contain AREVA NP's response to the subject questions.

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This concludes the formal AREVA NP response to RAI 149, and there are no questions from this RAI for which AREVA NP has not provided responses.

Sincerely,

(Russ Wells on behalf of)

Ronda Pederson
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New Plants Deployment
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From: Getachew Tesfaye [mailto:Getachew.Tesfaye@nrc.gov]
Sent: Monday, December 15, 2008 8:07 AM
To: ZZ-DL-A-USEPR-DL
Cc: Patrick Sekerak; Anthony Hsia; Jennifer Dixon-Herrity; Michael Miernicki; Joseph Colaccino; John Rycyna; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 149 (1366), FSARCh. 3

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on December 2, 2008, and discussed with your staff on December 10, 2008. Draft RAI Questions 03.09.05-7 and 03.09.05-8 were 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, excluding the time period of December 20, 2008 thru January 1, 2009, to account for the holiday season as discussed with AREVA NP Inc. For any RAIs that cannot be answered within 45 days, it is expected that a date for receipt of this information will be provided to the staff within the 45-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: 181

Mail Envelope Properties (1F1CC1BBDC66B842A46CAC03D6B1CD41010A3B78)

Subject: Response to U.S. EPR Design Certification Application RAI No. 149, FSAR Ch 3
Sent Date: 1/29/2009 5:52:18 PM
Received Date: 1/29/2009 5:52:43 PM
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Files	**Size**	**Date & Time**
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RAI 149 Response US EPR DC.pdf	5629154	

Options
Priority: Standard
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Sensitivity: Normal
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Recipients Received:

Response to

Request for Additional Information No. 149

12/15/2008

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 03.09.05 - Reactor Pressure Vessel Internals
Application Section: 3.9.5

QUESTIONS for Engineering Mechanics Branch 1 (AP1000/EPR Projects) (EMB1)

Question 03.09.05-1:

(Proj #1366)(Ref. EPR FSAR Tier 1 Table 2.2.1-1):

Revise FSAR Tier 1 Table 2.2.1-1 by addition of the reactor vessel core support structures as ASME Code Section III components identified separately from the RPV.

The ASME Boiler & Pressure Vessel Code, incorporated by reference in 10 CFR 50.55a, provides specific requirements for Code construction of core support structures which are different and separate from the requirements for the RPV. In recognition of these separate requirements, the component identification along with the Code construction requirements for core support structures must be added as a separate line item in Tier 1 Table 2.2.1-1.

Separate identification of RPV core support structures in Table 2.2.1-1 will also enable proper identification of a separate ITAAC for core support structures in Tier 1 Table 2.2.1-5.

Response to Question 03.09.05-1:

U.S. EPR FSAR Tier 1, Section 2.2.1 will be revised to add ITAAC for the reactor pressure vessel (RPV) internals as described below:

- RPV internals classified as ASME Code Section III will be added to U.S. EPR FSAR Tier 1, Table 2.2.1-1.
- Design commitment number 3.16 and 3.17 will be added to U.S. EPR FSAR Tier 1, Section 2.2.1.
- ITAAC number 3.16 and 3.17 will be added to U.S. EPR FSAR Tier 1, Table 2.2.1-5.

Since RPV internals are not pressure boundary items, the ASME Code Section III welding and hydrostatic testing requirements described in U.S. EPR FSAR Tier 1, Section 2.2.1, Item 3.1 and the seismic inspections described in U.S. EPR FSAR Tier 1, Section 2.2.1, Item 3.3b do not apply to RPV internals. Therefore, U.S. EPR FSAR Tier 1, Section 2.2.1, Item 3.1 and Item 3.3b will be revised to clarify that these ITAAC do not apply to RPV internals.

U.S. EPR FSAR Tier 1, Section 2.2.1, Item 3.12, “Specifications exist for components listed as ASME Section III in Table 2.2.1-1,” is redundant to Item 3.1, “Equipment listed in Table 2.2.1-1 as ASME Code Section III, other than RPV internals, is designed, welded, and hydrostatically tested in accordance with ASME Code Section III,” because equipment design specifications exist prior to ASME Section III components being designed, welded, and inspected. Also, equipment design specifications are not physical design features like the other ITAAC in U.S. EPR FSAR Tier 1. Therefore, U.S. EPR FSAR Tier 1, Section 2.2.1, Item 3.12 will be deleted because it is redundant to U.S. EPR FSAR Tier 1, Section 2.2.1, Item 3.1 and because it is not a physical design feature. This also applies to the U.S. EPR FSAR Tier 1 ITAAC for equipment specifications listed in Table 03.09.05-1-1, and these ITAAC will also be deleted. The wording for ASME Code Section III component ITAAC in U.S. EPR FSAR Tier 1 was standardized in the Response to RAI 148, Question 14.03.03-23.

U.S. EPR FSAR Tier 1, Section 2.2.1, Item 3.13, “Specifications exit for piping shown as ASME Section III on Figure 2.2.1-1,” is redundant to Item 3.4, “Piping indicated on Figure 2.2.1-1 as ASME Code Section III is designed, welded, and hydrostatically tested in accordance with

ASME Code Section III," because piping design specifications exist prior to ASME Section III piping being designed, welded, and inspected. Therefore, U.S. EPR FSAR Tier 1, Section 2.2.1, Item 3.13, and the other piping specifications ITAAC listed in Table 03.09.05-1-1 will be deleted. The wording for ASME III piping ITAAC in U.S. EPR FSAR Tier 1 was standardized in the Response to RAI 148, Question 14.03.03-23.

FSAR Impact:

U.S. EPR FSAR Tier 1, Chapters 2 and 3 will be revised as described in the response and indicated on the enclosed markup.

Table 03.09.05-1-1—Redundant U.S. EPR FSAR Tier 1 Design Commitments and ITAAC Related to ASME Code Section III Equipment Specifications

U.S. EPR FSAR Tier 1 Section	Design Commitment and ITAAC number for Component Specifications	Design Commitment and ITAAC number for Piping Specifications
2.2.1	3.12	3.13
2.2.2	3.5	3.6
2.2.3	3.7	3.8
2.2.4	3.6	3.7
2.2.5	3.6	3.7
2.2.6	3.7	3.8
2.2.7	3.7	3.8
2.3.3	3.6	3.7
2.5.4	3.4	3.5
2.7.1	3.6	3.7
2.7.2	3.6	3.7
2.7.11	3.9	3.10
2.8.2	3.5	3.6
2.8.6	3.6	3.7
2.8.7	3.5	3.6
3.5	3.5	3.6

Question 03.09.05-2:

(Proj #1367)(Ref. EPR FSAR Tier 1 Table 2.2.1-5):

Revise FSAR Tier 1 Table 2.2.1-5 by addition of a separate ITAAC for RPV core support structures which identifies the separate ASME Code construction requirements for the core support structures.

Existing ITAAC Item 3.1 in Table 2.2.1-5 is written to address ASME Code design of pressure boundary components. Core support structures are not pressure boundary components, but do require design and construction in accordance with ASME III, Subsection NG. A separate ITAAC must be added for core support structures including Acceptance Criteria appropriate for a non-pressure boundary, safety-related structure.

Response to Question 03.09.05-2:

ITAAC for reactor pressure vessel (RPV) core support structures will be added to U.S. EPR FSAR Tier 1, Section 2.2.1 as described in the Response to Question 03.09.05-1.

Existing ITAAC in U.S. EPR FSAR Tier 1, Section 2.2.1 for pressure boundary components will be revised as described in the Response to Question 03.09.05-1 to exclude the RPV core support structures, which are non-pressure boundary components.

FSAR Impact:

U.S. EPR FSAR Tier 1, Section 2.2.1 will be revised as described in the response and indicated on the enclosed markup.

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Question 03.09.05-3:

(Proj #1368) (Ref. EPR FSAR Tier 1 Table 2.2.1-5):

Revise the Acceptance Criteria for ITAAC Item 3.8 in Table 2.2.1-5 by providing reference to documentation which can be used to substantiate the Design Commitment.

The existing Acceptance Criteria states, “The RPV internals can withstand the effects of flow-induced vibration.” This is an inappropriate acceptance criterion, because it does not provide a basis for documenting that the Design Commitment has been met, it does not provide for comparison of documented results to any established standards, and it does not provide any means for inspection verification.

Response to Question 03.09.05-3:

U.S. EPR FSAR Tier 1, Section 2.2.1, Item 3.8 and Table 2.2.1-5, Item 3.8 will be revised to clarify the ITAAC for flow-induced vibration.

FSAR Impact:

U.S. EPR FSAR Tier 1, Section 2.2.1 and associated ITAAC will be revised as described in the response and indicated on the enclosed markup.

Question 03.09.05-4:

(Proj #1369) (Ref. EPR FSAR Tier 1 Table 2.2.1-5):

Revise ITAAC Item 3.15, including both the Design Commitment and the Acceptance Criteria.

The current ITAAC Item 3.15 states that the Design Commitment and Acceptance Criteria are exactly the same. This is an unacceptable ITAAC, because it does not identify a specific design commitment, it does not provide a basis for documenting that the design commitment has been met, it does not provide for comparison of documented results to any established standards, and it does not provide any means for inspection verification.

Provide a design commitment which indicates that the design bases for RPV core support structures conform to the industry Code requirements specified in 10 CFR 50.55a. Provide acceptance criteria that references documentation required to demonstrate that core support structures have been constructed to the requirements of the appropriate industry design Code incorporated by reference in 10 CFR 50.55a.

Response to Question 03.09.05-4:

ITAAC 3.16 for reactor pressure vessel (RPV) internals will be added to U.S. EPR FSAR Tier 1, Section 2.2.1 as described in the Response to Question 03.09.05-1. Equipment specifications will exist as part of completing ITAAC 3.16, which makes ITAAC 3.15 redundant. Therefore, U.S. EPR FSAR Tier 1, Section 2.2.1, ITAAC 3.15 will be deleted.

FSAR Impact:

U.S. EPR FSAR Tier 1, Section 2.2.1 will be revised as described in the response and indicated on the enclosed markup.

Question 03.09.05-5:

(Proj #1370) (Ref. EPR FSAR Tier 2 Table 3.2.2-1):

Clarify the basis for design and construction of those RPV internal structures whose safety classification is designated “NS-AQ.”

RPV internal structure components listed in Table 3.2.2-1, sheets 2, 8, 9, and 10, are classified as Safety Classification “NS-AQ,” Quality Group Classification “D.” The “Comments/Commercial Code” column identifies these same components as ASME Class CS, which implies that their basis for construction conforms to ASME III, Subsection NG rules. Explain to what extent these non-safety, Quality Group D classified components are designed and constructed to the requirements of ASME III, Subsection NG.

Response to Question 03.09.05-5:

As indicated in U.S. EPR FSAR Tier 2, Table 3.2.2-1, Note 4, ASME Class CS refers to “ASME Boiler and Pressure Vessel Code Section III, Division 1, Subsection NG - Core Support Structures - 2004 Edition with 10 CFR 50.55a Exceptions and Clarifications.”

The reactor vessel internal components are classified as either “Core Support” or “Internal Structures” in Table 3.9.5-1 of the U.S. EPR FSAR, Tier 2. The components classified as “Core Support” are in accordance with ASME Code, Section III, Subsection NG. The components classified as “Internal Structures” are designed such that they meet the guidelines of NG-3000 in accordance with SRP 3.9.5 and ASME Code Section III, Subsection NG-1122(c). U.S. EPR FSAR Tier 2, Section 3.9.5.2 will be revised to reference NG-3000.

FSAR Impact:

U.S. EPR FSAR Tier 2, Section 3.9.5.2 will be revised as described in the response and indicated on the enclosed markup.

Question 03.09.05-6:

(Proj #1371) (Ref. EPR FSAR Tier 2 Table 3.2.2-1):

Justify the different Safety Classifications listed in Table 3.2.2-1, sheet 2, for the various component parts of the RPV internals heavy reflector.

FSAR Section 3.9.5.1.2.7 describes the safety-related core support function of the heavy reflector, but certain component parts of the heavy reflector, i.e. positioning keys and tie rods, are given a Safety Classification of “NS-AQ” and Quality Group Classification D. Furthermore, these heavy reflector parts are listed as ASME Class CS, implying that they are constructed to ASME III, Subsection NG rules. Provide further explanation to clarify this apparent contradiction in classification.

Response to Question 03.09.05-6:

The heavy reflector components listed in U.S. EPR FSAR Tier 2, Table 3.2.2-1 are classified in accordance with the guidance in SRP 3.2.1 and SRP 3.2.2. In the Response to RAI 50, Supplement 1, Question 04.05.02-4c, the heavy reflector tie rods were reclassified to safety classification “S,” quality group classification “B” (see U.S. EPR FSAR Tier 2, Section 3.2 for further information on safety classifications and quality group classification). See the Response to RAI No. 50, Supplement 1, Question 04.05.02-4c for further information on the tie rods.

The heavy reflector-positioning keys do not serve a core support function. They assist in alignment of the lower slab during installation of the heavy reflector into the core barrel. Therefore, the keys are classified as safety classification “NS-AQ,” quality group classification “D.”

FSAR Impact:

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

Question 03.09.05-7:

(Proj #1372) (Ref. EPR FSAR Tier 2 Section 3.9.5.1.1):

1. Clarify and supplement the discussion of the "Flow Path" by providing another figure (as part of your response to this question) to illustrate the directions of cooling flow within the RPV showing both the main core cooling flow and the core bypass flow paths. Identify in this added figure, the locations of "RPV dome spray nozzles," and show the orifices in the upper support plate which allow core bypass flow to travel from the RPV upper dome down to the upper plenum.
2. Characterize in the FSAR the volume and velocity of the core bypass flow, and discuss whether the bypass flow is sufficient to cause vortex shedding and flow-induced vibration in the internals components located in the RPV upper dome above the upper support plate.

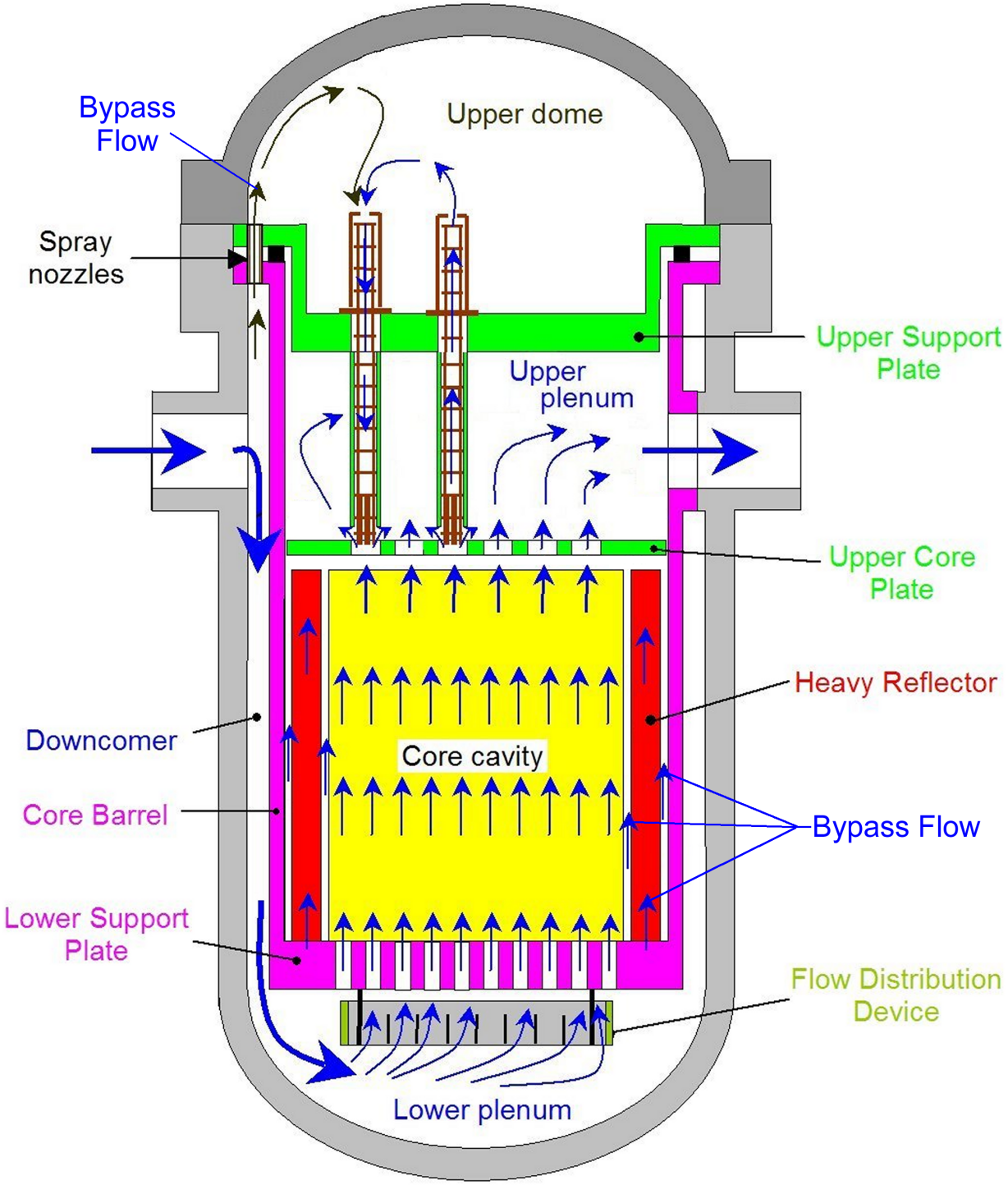
Response to Question 03.09.05-7:

1. Figure 03.09.05-7-1 shows the flow paths through the reactor pressure vessel (RPV) internals. This figure illustrates the directions of cooling flow within the RPV, including the main core cooling flow and the core bypass flow paths. Figure 03.09.05-7-1 also identifies the locations of RPV upper dome spray nozzles and illustrates the flow through the control rod guide assembly (CRGA) columns from the RPV upper dome down to the upper plenum.
2. Core bypass flow is discussed in U.S. EPR FSAR Tier 2, Section 4.4.4.2.1. However, neither RG 1.206 nor SRP 3.9.5 request that the U.S. EPR FSAR provide the volume and velocity of the core bypass flow and whether the bypass flow is sufficient to cause vortex shedding. Flow-induced vibration is discussed in U.S. EPR FSAR Tier 2, Section 3.9.2, which considers vibration sources, including vortex shedding.

FSAR Impact:

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

Figure 03.09.05-7-1—Flow Paths through the RPV Internals



Question 03.09.05-8:

(Proj #1373) (Ref. EPR FSAR Tier 2 Sections 3.9.5.3.1.2 and 3.9.5.1.2.5):

The fourth bullet of section 3.9.5.3.1.2 describes a core support function of the radial keys;

(a) Provide additional discussion in the appropriate FSAR Section clarifying the support function of the radial keys, and further explaining what is meant by the statement, "…fabricated both with and without lateral adjustments."

(b) Provide an additional figure in the FSAR illustrating the interface among the radial keys, the radial key inserts, the lower support plate, and the reactor vessel shell.

(c) Clarify the support load path for these components, discussed in (b) above, identifying the directions of load restraint (translation and rotation) of the lower support plate with respect to the principal orthogonal coordinate system.

(d) Quantify the "tight lateral clearances" attributed to the radial key inserts described in Section 3.9.5.1.2.5.

Response to Question 03.09.05-8:

(a) There are radial keys welded to the inside surface of the reactor pressure vessel (RPV), which fit into grooves located in the lower support plate (LSP). The LSP grooves and the radial keys have plates installed; which are radial key inserts. The radial keys and the corresponding inserts limit the lateral movement (i.e., swaying) of the core barrel and establish clearances in the circumferential direction to limit core barrel rotation. The keys and corresponding inserts are also designed to support the core barrel in the unlikely event of core barrel failure, a beyond design basis event. Figure 03.09.05-8-1 illustrates the radial keys and clearances. U.S. EPR FSAR Tier 2, Section 3.9.5.3.1.2 and Section 3.9.5.1.2.5 will be revised to clarify the support functions of the radial keys.

(b) Figure 03.09.05-8-1 illustrates the radial keys and clearances. The details illustrating the interface among the radial keys, the radial key inserts, the lower support plate, and the reactor vessel shell are provided in AREVA NP drawings of the core barrel, which are available for NRC inspection.

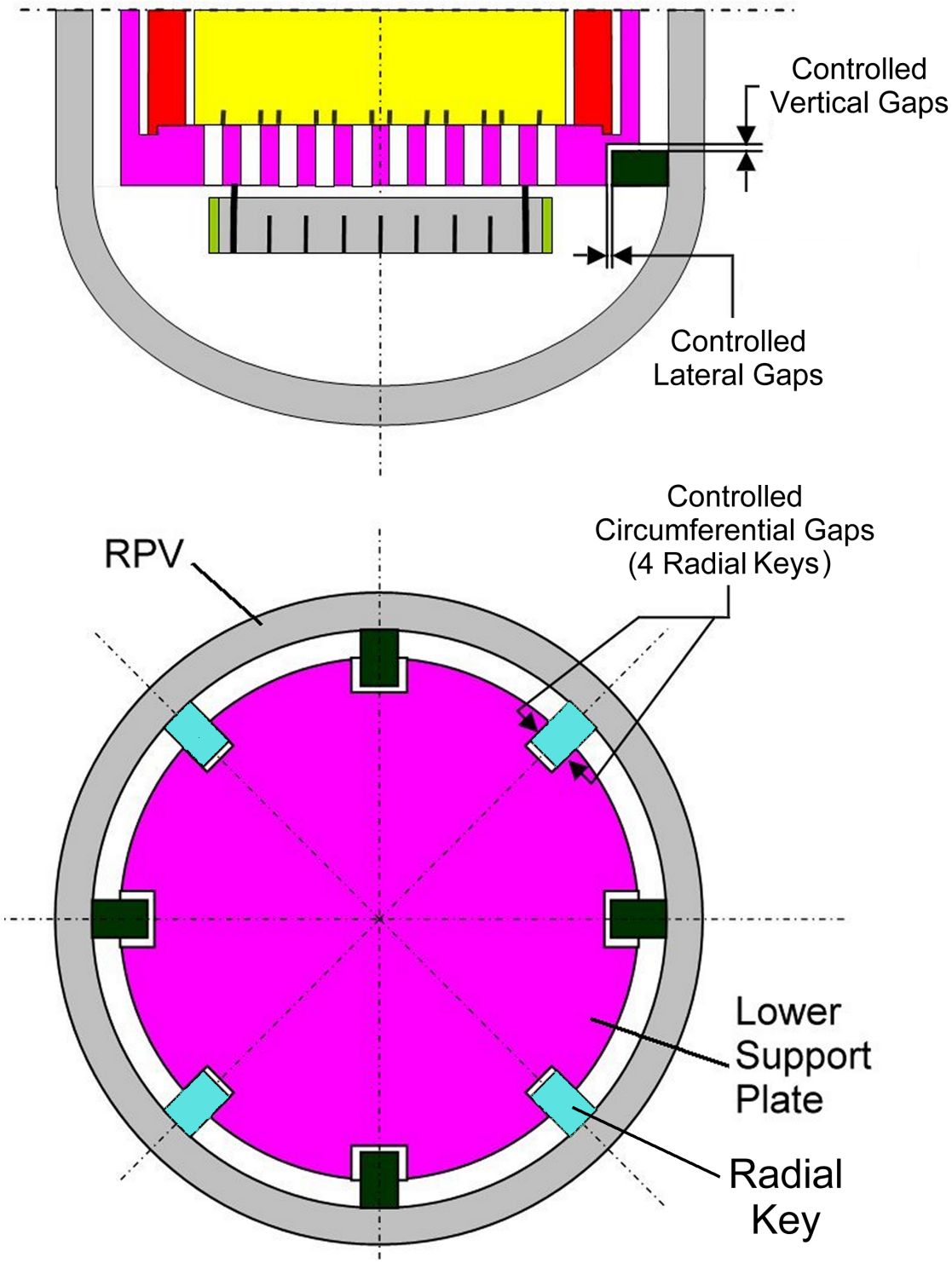
(c) As discussed in (a) above, the radial keys prevent lateral movement of the core barrel, which would impose a horizontal lateral load on the end of the keys. The keys also support the core barrel in the beyond design basis event of a core barrel failure. In this case, the load on the radial keys is vertical. The four keys that prevent rotation of the core barrel would have a horizontal lateral load imposed on the side of the keys.

(d) The details quantifying the radial key insert clearances are provided in AREVA NP drawings of the core barrel, which are available for NRC inspection.

FSAR Impact:

U.S. EPR FSAR Tier 2, Section 3.9.5.3.1.2 and Section 3.9.5.1.2.5 will be revised as described in the response and indicated on the enclosed markup.

Figure 03.09.05-8-1—Illustration of the Radial Keys and Clearances



Question 03.09.05-9:

(Proj #1374) (Ref. EPR FSAR Tier 2 Section 3.9.5.1.2.5):

The second paragraph of Section 3.9.5.1.2.5 mentions a postulated failure of the lower internals.

Provide additional discussion in the FSAR describing, or suitably referencing:

(a) The failure mechanism postulated for the internal structure;

(b) The analytical methodology addressing this accident postulation, including applicable design codes, load definition, and allowable stress and deformation criteria;

(c) Whether or not this is a design basis accident considered in Chapter 15 of the FSAR.

Response to Question 03.09.05-9:

See the Response to Question 03.09.05-8.

FSAR Impact:

U.S. EPR FSAR Tier 2, Section 3.9.5.1.2.5 will be revised as described in the Response to Question 03.09.05-8 and indicated on the enclosed markup.

Question 03.09.05-10:

(Proj #1375) (Ref. EPR FSAR Tier 2 Sections 3.9.5.2 and Table 3.9.5-1):

The FSAR states, in part, “In accordance with ASME Code, Section III, Subsection NG-1122(c), the internal structures are designed and constructed such that they do not adversely affect the integrity of the core support structures.” However, this statement does not provide the design criteria actually used for construction of the internal structure components which are not designated core support structures.

Provide in the FSAR, for those components classified as “IS” in Table 3.9.5-1, a discussion specifying the industry design code, or specific sections of the applicable design code, used as the design bases for identification of design loadings, loading combinations, material stress limits, and allowable stress and fatigue usage limit criteria.

Response to Question 03.09.05-10:

See the Response to Question 03.09.05-5.

FSAR Impact:

U.S. EPR FSAR Tier 2, Section 3.9.5.2 will be revised as described in the Response to Question 03.09.05-5 and indicated on the enclosed markup.

Question 03.09.05-11:

(Proj #1376) (Ref. EPR FSAR Tier 2 Sections 3.9.5.2 and 3.9.5.3):

Provide a tabular summary in the FSAR, including each component of the reactor internals and core support structures, listing the maximum calculated total stress, deformation, and cumulative usage factor for each designated design and service limit defined in ASME Section III, Subsection NG.

Response to Question 03.09.05-11:

U.S. EPR FSAR Tier 2, Section 3.9.3 describes the design and service level loadings used for the design of ASME Class 1, 2, and 3 components, piping, supports, and core support structures. The information provided in U.S. EPR FSAR Tier 2, Section 3.9.3 is consistent with the guidance provided in SRP 3.9.5, which states:

> "Evaluation of the adequacy of the structural integrity design of the RPV internals, including adequacy of the design fatigue curves for reactor internals materials to account for cumulative reactor service-related environmental and usage factor effects and consideration of each combination of design, service, and postulated event loadings is performed under 3.9.3."

The requested information is a COL Information Item (see U.S EPR FSAR Tier 2, Section 3.9.3.1 and Table 1.8-2); therefore, it will be deleted from U.S EPR FSAR Tier 2, Section 3.9.5.3 because this section refers to U.S. EPR FSAR Tier 2, Section 3.9.3.1.

FSAR Impact:

U.S EPR FSAR Tier 2, Section 3.9.5.3 will be revised as described in the response and indicated on the enclosed markup.

U.S. EPR Final Safety Analysis Report Markups

2.2 The functional arrangement of the RPV and heavy reflector is shown on Figure 2.2.1-2—RPV Functional Arrangement.

2.3 The location of the RCS equipment is as listed in Table 2.2.1-1—RCS Equipment Mechanical Design.

2.4 Physical separation exists between the RCS loops.

03.09.05-1; 03.09.05-2

3.0 Mechanical Design Features

3.1 Equipment listed in Table 2.2.1-1 as ASME Code Section III, other than RPV internals, is designed, welded, and hydrostatically tested in accordance with ASME Code Section III.

3.2 Check valves listed in Table 2.2.1-1 will function as listed in Table 2.2.1-1.

3.3 Equipment identified as Seismic Category 1 in Table 2.2.1-1 can withstand ~~a~~ seismic design basis ~~seismic~~ loads without loss of safety function as listed in Table 2.2.1-1.

3.4 Piping indicated on Figure 2.2.1-1 as ASME Code Section III is designed, welded, and tested in accordance with ASME Code Section III.

3.5 The steam outlet nozzles on the SGs include flow-limiting devices.

3.6 The RCP motors include a device to prevent reverse rotation.

3.7 The applicable piping and interconnected component nozzles listed in Table 2.2.1-1 are evaluated for LBB.

03.09.05-3

3.8 The RPV internals ~~are designed to~~will withstand the effects of flow-induced vibration.

3.9 The RCS is designed to allow movement of the components as necessary due to thermal expansion and contraction.

3.10 Supports for piping shown as ASME Section III on Figure 2.2.1-1 are designed in accordance with ASME Section III.

3.11 Components listed as ASME Code Class I in Table 2.2.1-1 are analyzed for fatigue in accordance with ASME Section III Class I.

03.09.05-1

3.12 ~~Specifications exist for components listed as ASME Section III in Table 2.2.1-1~~ Deleted.

3.13 ~~Specifications exist for piping shown as ASME Section III on Figure 2.2.1-1~~ Deleted.

3.14 Specifications exist for supports for piping shown as ASME Section III on Figure 2.2.1-1.

3.15 ~~Specifications exist for core support structures shown on Figure 2.2.1-2~~Deleted.

03.09.05-4

3.16 RPV internals listed in Table 2.2.1-1 are designed in accordance with ASME Code Section III, Subsection NG.

3.17 Core support structure welds meet ASME Code Section III, Sebsection NG requirements.

03.09.05-1; 03.09.05-2

Table 2.2.1-1—RCS Equipment Mechanical Design (~~8~~ 9 Sheets)

Equipment Description	Equipment Tag Number[1]	Equipment Location	ASME Code Section III	LBB Eval	Function	Seismic Category
RCP 4 Seal 1 injection 2nd Check Valve	30JEB40 AA005	Reactor Building	I	N/A	Open/Close	I
RCP 4 Seal 1 Outlet Isolation Valve	30JEB40 AA009	Reactor Building	Yes	N/A	Open/Close	I
RCP 4 SSSS N2 Supply	30JEB40 AA018	Reactor Building	N/A	N/A	Open	II
RCP 4 SSSS Check Valve	30JEB40 AA019	Reactor Building	N/A	N/A	Open/Close	II
RCP 4 SSSS N2 Discharge	30JEB40 AA020	Reactor Building	N/A	N/A	Close	II
RCP 4 Thermal Barrier Cooling CCW Supply Isolation Valve	30JEB40 AA021	Reactor Building	Yes	N/A	Open/Close	I
RCP 4 Thermal Barrier Cooling Safety Valve (CCW)	30JEB40 AA191	Reactor Building	Yes	N/A	Open/Close	I
PZR Heater – Mechanical Pressure Boundary	30JEF10 AH111 to 114A/B/C, AH121 to 123A/B/C, AH211 to 215A/B/C, AH221 to 222A/B/C, AH231 to 234A/B/C, AH311 to 315A/B/C, AH321 to 322A/B/C, AH331 to 334A/B/C, AH411 to 414A/B/C, AH421 to 423A/B/C	Reactor Building	I	N/A	RCPB	I
CRDM Pressure Housing	30JDA01 to 30JDA22, 30JDA26 to 30JDA47, 30JDA51 to 30JDA72, 30JDA76 to 30JDA97, and 30JDA99	Reactor Building	I	N/A	RCPB	I
RPV Internals – Core Barrel	N/A	Reactor Building	Yes	N/A	Support	I

03.09.05-1; 03.09.05-2

Table 2.2.1-1—RCS Equipment Mechanical Design (~~8~~ 9 Sheets)

Equipment Description	Equipment Tag Number[1]	Equipment Location	ASME Code Section III	LBB Eval	Function	Seismic Category
RPV Internals – Lower Support Plate	N/A	Reactor Building	Yes	N/A	Support	I
RPV Internals – Heavy Reflector Slabs	N/A	Reactor Building	Yes	N/A	Support	I
RPV Internals – Heavy Reflector Tie Rods	N/A	Reactor Building	Yes	N/A	Support	I
RPV Internals – Upper Support Plate	N/A	Reactor Building	Yes	N/A	Support	I
RPV Internals – Upper Core Plate	N/A	Reactor Building	Yes	N/A	Support	I
RPV Internals – Normal Support Columns	N/A	Reactor Building	Yes	N/A	Support	I
RPV Internals – Control Rod Guide Assembly Columns	N/A	Reactor Building	Yes	N/A	Support	I

1) Equipment tag numbers are provided for information only and are not part of the certified design.
2) Leak-before-break (LBB) analysis is applicable to piping and interconnected component nozzles.

03.09.05-1; 03.09.05-2

Table 2.2.1-5—RCS Inspections, Tests, Analyses, and Acceptance Criteria (~~6~~ 8 Sheets)

~~Design~~ Commitment Wording		Inspection, Test or Analysis	Acceptance Criteria
2.1	The functional arrangement of the RCS is shown on Figure 2.2.1-1.	Inspections of the as-built system will be conducted.	The as-built RCS conforms to the functional arrangement shown on Figure 2.2.1-1.
2.2	The functional arrangement of the RPV and heavy reflector is shown on Figure 2.2.1-2.	Inspections of the as-built system will be conducted.	The as-built RPV and heavy reflector conforms to the functional arrangement shown on Figure 2.2.1-2.
~~2.4~~2.3	The location of RCS equipment is as listed in Table 2.2.1-1.	An inspection will be performed.	The equipment listed in Table 2.2.1-1 is located as listed in Table 2.2.1-1.
~~2.5~~2.4	Physical separation exists between the RCS loops.	An inspection will be performed.	The loops of the RCS are separated.
3.1	~~The components designated as~~Equipment listed in Table 2.2.1-1 as ASME Code Section III, other than RPV internals, ~~in Table 2.2.1-1 are~~ is designed, welded, and hydrostatically tested in accordance with ~~to~~ ASME Code Section III ~~requirements~~.	a. Analysis of the equipment identified in Table 2.2.1-1 as ASME Code Section III, other than RPV internals, will be performed per ASME Code Section III design requirements. 03.09.05-1; 03.09.05-2 b. Inspections will be conducted ~~of~~ on the equipment identified in Table 2.2.1-1 as ~~ASME design, NDE, and hydrostatic test reports for the components listed as~~ ASME Code Section III ~~in Table 2.2.1-1~~, other than RPV internals, to verify welding has been performed per ASME Code Section III welding requirements. 03.09.05-1; 03.09.05-2 c. Hydrostatic testing of the equipment identified in Table 2.2.1-1 as ASME Code Section III, other than RPV internals, will be performed per ASME Code Section III hydrostatic testing requirements.	a. ASME Code Section III stress~~A~~ reports exist~~s~~ and conclude~~s~~ that the ~~components~~ equipment ~~listed as~~identified in Table 2.2.1-1 as ASME Code Section III, other than RPV internals, ~~in Table 2.2.1-1 have been designed and hydrostatically tested in accordance~~meets ASME Code Section III design requirements. b. Equipment identified in Table2.2.1-1 as ASME Code Section III, other than RPV internals, has been welded per ASME Code Section III welding requirements. c. Equipment identified in Table 2.2.1-1 as ASME Code Section III, other than RPV internals, has been hydrostatically tested per ASME Code Section III hydrostatic testing requirements.

Table 2.2.1-5—RCS Inspections, Tests, Analyses, and Acceptance Criteria (~~6~~ 8 Sheets)

~~Design~~ Commitment Wording		Inspection, Test or Analysis	Acceptance Criteria
3.2	Check valves listed in Table 2.2.1-1 will function as listed in Table 2.2.1-1.	Tests will be performed for the operation of the check valves listed in Table 2.2.1-1.	The check valves listed in Table 2.2.1-1 perform the functions listed in Table 2.2.1-1.
3.3	Equipment identified as Seismic Category I in Table 2.2.1-1 can withstand ~~a~~ seismic design basis ~~seismic~~ loads without loss of safety function as listed in Table 2.2.1-1.	~~a. Inspection will be performed of the equipment identified as Seismic Category I in Table 2.2.1-1.~~	~~a. The equipment designated as Seismic Category I in Table 2.2.1-1 is installed as designed.~~
		~~b~~a. Type tests, ~~tests,~~ analyses, or a combination of type tests and analyses will be performed on the equipment designated as Seismic Category I in Table 2.2.1-1 using analytical assumptions, or under conditions, which bound the Seismic Category I design requirements.	~~b~~a. Tests/analysis reports exists and conclude that ~~The~~ the Seismic Category I equipment ~~designated as Seismic Category I~~listed in Table 2.2.1-1 can with-stand ~~a~~ sesimic design basis ~~seismic~~ loads without loss of safety function.
		~~c~~b. Inspections will be performed of the as-installed Seismic Category I equipment listed in Table 2.2.1-1, other than RPV internals,to verify that the equipment including anchorage is installed as specified on the construction drawings.	~~c~~b. ~~The as-installed equipment supports and restraints are seismically bounded by tested or analyzed conditions~~Inspection reports exist and conclude that the as-installed Seismic Category I equipment listed in Table 2.2.1-1, other than RPV internals, including anchorage is installed as specified on the construction drawings.

03.09.05-1;
03.09.05-2

Table 2.2.1-5—RCS Inspections, Tests, Analyses, and Acceptance Criteria (~~6~~ 8 Sheets)

~~Design~~ Commitment Wording		Inspection, Test or Analysis	Acceptance Criteria
3.5	The steam outlet nozzles on the SGs include flow-limiting devices.	An inspection will be performed.	The flow area through each flow-limiting device is less than 1.39 ft^2.
3.6	The RCP motors include a device to prevent reverse rotation.	An ~~inspection~~ test will be performed.	~~A device to prevent reverse rotation is installed on each RCP motor.~~Idle RCPs do not rotate in the reverse direction as a result of flow.
3.7	The piping and interconnected component nozzles listed in Table 2.2.1-1 have been evaluated for LBB.	An analysis will be performed. 03.09.05-3	An analysis exists and concludes that ~~assesses~~ the ~~LBB capability of the~~ piping and equipment listed in Table 2.2.1-1 meets the LBB acceptance criteria.
3.8	The RPV internals ~~are designed to~~will withstand the effects of flow-induced vibration.	a. ~~Type tests, t~~Tests~~,~~ and analyses~~, or a combination of tests and analyses~~of test results will be performed ~~for~~ on ~~the first~~a plant containing RPV internals representative of the U.S. EPR~~only~~. b. An inspection will be performed after hot functional testing.	a. ~~The RPV internals can withstand the effects of flow-induced vibration.~~A report exists and concludes that RPV internals have no observable damage, no loose parts, and stress is within ASME code limits. b. Inspections show that the RPV internals have no observable damage or loose parts.
3.9	The RCS is designed to allow movement of the components as necessary due to thermal expansion and contraction.	A test of the RCS will be performed.	The measured gaps meet the specification requirements for the necessary component supports.
3.10	Supports for piping shown as ASME Section III on Figure 2.2.1-1 will be designed in accordance with ASME section III.	An analysis will be performed.	a. Supports for piping shown as ASME Section III on Figure 2.2.1-1 are designed in accordance with ASME section III. b. Snubbers have been identified, including those analyzed for fatigue for piping shown as ASME Section III on Figure 2.2.1-1. c. Support mass is less than ten percent of the adjacent pipe span for piping shown as ASME Section III on Figure 2.2.1-1.

Table 2.2.1-5—RCS Inspections, Tests, Analyses, and Acceptance Criteria (~~6~~ 8 Sheets)

~~Design~~ Commitment Wording		Inspection, Test or Analysis	Acceptance Criteria
3.11	Components listed as ASME Code Class I in Table 2.2.1-1 will be analyzed for fatigue per ASME Section III Class I.	An analysis will be performed. 03.09.05-1	a. Fatigue analysis has been performed for components listed as ASME Code Class I in Table 2.2.1-1. b. For components listed as ASME code Class I in Table 2.2.1-1, operating modes where peak stresses are within ten percent of allowable have been identified.
3.12	~~Specifications exist for components listed as ASME Section III in Table 2.2.1-1~~ Deleted.	~~An inspection will be performed~~ Deleted.	~~Specifications exist for components listed as ASME Section III in Table 2.2.1-1~~ Deleted.
3.13	~~Specifications exist for piping shown as ASME Section III on Figure 2.2.1-1~~ Deleted.	~~An inspection will be performed~~ Deleted.	~~Specifications exist for piping identified as ASME Section III on Figure 2.2.1-1~~ Deleted.
3.14	Specifications exist for supports for piping shown as ASME Section III on Figure 2.2.1-1.	An inspection will be performed. 03.09.05-4	Specifications exist for supports for piping shown as ASME Section III on Figure 2.2.1-1.
3.15	~~Specifications exist for core support structures shown on figure 2.2.1-2~~Deleted.	~~An inspection will be performed.~~ Deleted.	~~Specifications exist for core support structures shown on Figure 2.2.1-2.~~ Deleted.
3.16	RPV internals listed in Table 2.2.1-1 are designed in accordance with ASME Code Section III, Subsection NG.	An analysis will be performed.	An ASME Code Section III, Subsection NG stress report exists for each RPV internal component listed in Table 2.2.1-1.
3.17	Core support structure welds meet ASME Code Section III, Subsection NG requirements.	Inspections of core support structure welds will be performed.	Inspection reports show that core support structure welds for the following RPV welded components listed in Table 2.2.1-1 meet ASME Code Section III, Subsection NG requirements: core barrel, lower support plate, upper support plate, normal support columns, and control rod guide assembly columns.

03.09.05-1; 03.09.05-2

2.2.2 In-Containment Refueling Water Storage Tank System

1.0 Description

The in-containment refueling water storage tank system (IRWSTS) is a safety-related system. The IRWSTS provides the following safety-related functions:

- Borated water supply for the emergency core cooling systems.
- Containment isolation.

The IRWSTS provides the following non-safety-related function:

- Borated water supply to the severe accident heat removal system (SAHRS) during a severe accident.

2.0 Arrangement

2.1 The functional arrangement of the IRWSTS is as shown in Figure 2.2.2-1—In-Containment Refueling Water Storage Tank System Functional Arrangement.

2.2 The location of the IRWSTS equipment is as listed in Table 2.2.2-1—IRWSTS Equipment Mechanical Design.

2.3 Physical separation exists between divisions of the IRWSTS.

3.0 Mechanical Design Features

3.1 Equipment listed in Table 2.2.2-1 as ASME Code Section III is designed, welded, and hydrostatically tested in accordance with ASME Code Section III.

3.2 Piping indicated in Figure 2.2.2-1 as ASME Code Section III is designed, welded, and tested in accordance with ASME Code Section III.

3.3 Equipment identified as Seismic Category I in Table 2.2.2-1 can withstand ~~a~~ seismic design basis ~~seismic~~ loads without loss of safety function as listed in Table 2.2.2-1.

3.4 Supports for piping shown as ASME Section III on Figure 2.2.2-1 will be designed in accordance with ASME Section III.

03.09.05-1

3.5 ~~Specifications exist for components listed as ASME Section III in Table 2.2.2-1~~Deleted.

3.6 ~~Specifications exist for piping shown as ASME Section III on Figure 2.2.2-1~~Deleted.

3.7 Specifications exist for supports for piping shown as ASME Section III on Figure 2.2.2-1

Table 2.2.2-3—IRWSTS Inspections, Tests, Analyses, and Acceptance Criteria (~~5~~ 8 Sheets)

Commitment Wording		Inspection, Test or Analysis	Acceptance Criteria
3.4	Supports for piping shown as ASME Section III on Figure 2.2.2-1 will be designed in accordance with ASME Section III.	An analysis will be performed. 03.09.05-1	a. Supports for piping shown as ASME Section III on Figure 2.2.2-1 are designed in accordance with ASME Section III. b. Snubbers have been identified, including those analyzed for fatigue for piping shown as ASME Section III on Figure 2.2.2-1. c. Support mass is less than ten percent of the adjacent pipe span for piping shown as ASME Section III on Figure 2.2.2-1.
3.5	~~Specifications exist for components listed as ASME Section III in Table 2.2.2-1~~Deleted.	~~An inspection will be performed~~Deleted.	~~Specifications exist for components listed as ASME Section III in Table 2.2.2-1~~Deleted.
3.6	~~Specifications exist for piping shown as ASME Section III on Figure 2.2.2-1~~Deleted.	~~An inspection will be performed~~Deleted.	~~Specifications exist for piping identified as ASME Section III on Figure 2.2.2-1~~Deleted.
3.7	Specifications exist for supports for piping shown as ASME Section III on Figure 2.2.2-1.	An inspection will be performed.	Specifications exist for supports for piping shown as ASME Section III on Figure 2.2.2-1.
4.1	Displays exist or can be retrieved in the MCR and the RSS as identified in Table 2.2.2-2.	Inspections will be performed for the existence or retrievability of the displays in the MCR or the RSS as listed in Table 2.2.2-2.	a. The displays listed in Table 2.2.2-2 as being retrieved in the MCR can be retrieved in the MCR. b. The displays listed in Table 2.2.2-2 as being retrieved in the RSS can be retrieved in the RSS.

2.2.3 Safety Injection System and Residual Heat Removal System

1.0 Description

The safety injection system and residual heat removal system (SIS/RHRS) is a safety-related system. The SIS/RHRS has four divisions. The SIS/RHRS provides the following safety-related functions:

- Emergency core cooling.
- Residual heat removal.
- Reactor coolant pressure boundary integrity.
- Containment isolation.

2.0 Arrangement

2.1 The functional arrangement of the SIS/RHRS is as shown in Figure 2.2.3-1—Safety Injection System and Residual Heat Removal System Functional Arrangement.

2.2 The location of the SIS/RHRS equipment is as listed in Table 2.2.3-1—SIS/RHRS Equipment Mechanical Design.

2.3 Physical separation exists between portions of the divisions of the SIS/RHRS.

3.0 Mechanical Design Features

3.1 Equipment listed in Table 2.2.3-1 as ASME Code Section III is designed, welded, and hydrostatically tested ~~to~~ in accordance with ASME Code Section III.

3.2 Check valves listed in Table 2.2.3-1 will function as listed in Table 2.2.3-1.

3.3 Piping indicated in Figure 2.2.3-1 as ASME Code Section III is designed, welded, and tested in accordance with ASME Code Section III.

3.4 Equipment identified as Seismic Category I in Table 2.2.3-1 can withstand ~~a~~ seismic design basis ~~seismic~~ loads without loss of safety function as listed in Table 2.2.3-1.

3.5 Supports for piping shown as ASME Section III on Figure 2.2.3-1 will be designed in accordance with ASME Section III.

3.6 Components listed as ASME Code Class 1 in Table 2.2.3-1 will be analyzed for fatigue per ASME Section III Class 1.

03.09.05-1

3.7 ~~Specifications exist for components listed as ASME Section III in Table 2.2.3-1~~Deleted.

3.8 ~~Specifications exist for piping shown as ASME Section III on Figure 2.2.3-1~~Deleted.

3.9 Specifications exist for supports for piping shown as ASME Section III on Figure 2.2.3-1.

Table 2.2.3-3—SIS/RHRS Inspections, Tests, Analyses, and Acceptance Criteria (~~6~~ 8 Sheets)

Commitment Wording		Inspection, Test or Analysis	Acceptance Criteria
			pipe span for piping shown as ASME Section III on Figure 2.2.3-1.
3.6	Components listed as ASME Code Class 1 in Table 2.2.3-1 will be analyzed for fatigue per ASME Section III Class 1.	An analysis will be performed. 03.09.05-1	a. Fatigue analysis has been performed for components listed as ASME Code Class 1 in Table 2.2.3-1. b. For components listed as ASME Code Class 1 in Table 2.2.3-1 operating modes where peak stresses are within 10% of allowable have been identified.
3.7	Deleted~~Specifications exist for components listed as ASME Section III in Table 2.2.3-1~~.	Deleted~~An inspection will be performed~~.	Deleted~~Specifications exist for components listed as ASME Section III in Table 2.2.3-1~~.
3.8	Deleted~~Specifications exist for piping shown as ASME Section III on Figure 2.2.3-1~~.	Deleted~~An inspection will be performed~~.	Deleted~~Specifications exist for piping identified as ASME Section III on Figure 2.2.3-1~~.
3.9	Specifications exist for supports for piping shown as ASME Section III on Figure 2.2.3-1.	An inspection will be performed.	Specifications exist for supports for piping shown as ASME Section III on Figure 2.2.3-1.
4.1	Displays exist or can be retrieved in the MCR and the RSS as identified in Table 2.2.3-2.	Inspections will be performed for the existence or retrievability of the displays in the MCR or the RSS as listed in Table 2.2.3-2.	a. The displays listed in Table 2.2.3-2 as being retrieved in the MCR can be retrieved in the MCR. b. The displays listed in Table 2.2.3-2 as being retrieved in the RSS can be retrieved in the RSS.
4.2	Controls exist in the MCR and the RSS as identified in Table 2.2.3-2.	Tests will be performed for the existence of control signals from the MCR and the RSS to the equipment listed in Table 2.2.3-2.	a. The controls listed in Table 2.2.3-2 as being in the MCR exist in the MCR. b. The controls listed in Table 2.2.3-2 as being in the RSS exist in the RSS.

2.2.4 Emergency Feedwater System

1.0 Description

The emergency feedwater system (EFWS) is a safety-related system. The EFWS has four divisions. The EFWS provides the following safety-related functions:

- Restoration and maintaining of the steam generator (SG) water inventory in the unaffected SGs.
- Manual EFW isolation.
- Automatic closure of the SG isolation valve and the SG level control valve.
- Containment isolation.

2.0 Arrangement

2.1 The functional arrangement of the EFWS is as shown in Figure 2.2.4-1—Emergency Feedwater System Functional Arrangement.

2.2 The location of the EFWS equipment is as listed in Table 2.2.4-1—EFWS Equipment Mechanical Design.

2.3 Physical separation exists between divisions of the EFWS.

3.0 Mechanical Design Features

3.1 Equipment listed in Table 2.2.4-1 as ASME Code Section III is designed, welded, and hydrostatically tested ~~to~~ in accordance with ASME Code Section III.

3.2 Check valves listed in Table 2.2.4-1 will function as listed in Table 2.2.4-1.

3.3 Piping indicated in Figure 2.2.4-1 as ASME Code Section III is designed, welded, and tested in accordance with ASME Code Section III.

3.4 Equipment identified as Seismic Category I in Table 2.2.4-1 can withstand ~~a~~ seismic design basis ~~seismic~~ loads without loss of safety function as listed in Table 2.2.4-1.

3.5 Supports for piping shown as ASME Section III on Figure 2.2.4-1 will be designed in accordance with ASME Section III.

03.09.05-1

3.6 ~~Specifications exist for components listed as ASME Section III in Table 2.2.4-1~~Deleted.

3.7 ~~Specifications exist for piping shown as ASME Section III on Figure 2.2.4-1~~Deleted.

3.8 Specifications exist for supports for piping shown as ASME Section III on Figure 2.2.4-1.

Table 2.2.4-3 - EFWS Inspections, Tests, Analyses, and Acceptance Criteria (~~5~~ 7 Sheets)

Commitment Wording		Inspection, Test or Analysis	Acceptance Criteria
3.5	Supports for piping shown as ASME Section III on Figure 2.2.4-1 will be designed in accordance with ASME Section III. 03.09.05-1	An analysis will be performed.	a. Supports for piping shown as ASME Section III on Figure 2.2.4-1 are designed to ASME Section III. b. Snubbers have been identified, including those analyzed for fatigue for piping shown as ASME Section III on Figure 2.2.4-1. c. Support mass is less than ten percent of the adjacent pipe span for piping shown as ASME Section III on Figure 2.2.4-1.
3.6	~~Specifications exist for components listed as ASME Section III in Table 2.2.4-1~~Deleted.	~~An inspection will be performed~~Deleted.	~~Specifications exist for components listed as ASME Section III in Table 2.2.4-1~~Deleted.
3.7	~~Specifications exist for piping shown as ASME Section III on Figure 2.2.4-1~~Deleted.	~~An inspection will be performed~~Deleted.	~~Specifications exist for piping identified as ASME Section III on Figure 2.2.4-1~~Deleted.
3.8	Specifications exist for supports for piping shown as ASME Section III on Figure 2.2.4-1	An inspection will be performed.	Specifications exist for supports for piping shown as ASME Section III on Figure 2.2.4-1
4.1	Displays exist or can be retrieved in the MCR and the RSS as identified in Table 2.2.4-2.	Inspections will be performed for the existence or retrievability of the displays in the MCR or the RSS as listed in Table 2.2.4-2.	a. The displays listed in Table 2.2.4-2 as being retrieved in the MCR can be retrieved in the MCR. b. The displays listed in Table 2.2.4-2 as being retrieved in the RSS can be retrieved in the RSS.
4.2	Controls exist in the MCR and the RSS as identified in Table 2.2.4-2.	Tests will be performed for the existence of control signals from the MCR and the RSS to the equipment listed in Table 2.2.4-2.	a. The controls listed in Table 2.2.4-2 as being in the MCR exist in the MCR. b. The controls listed in Table 2.2.4-2 as being in the RSS exist in the RSS.

2.2.5 Fuel Pool Cooling and Purification System

1.0 Description

The fuel pool cooling and purification system (FPCPS) is made up of the following two separate subsystems:

- fuel pool cooling system (FPCS)
- fuel pool purification system (FPPS)

The FPCS is a safety-related system with two divisions. The FPCS provides the safety-related function of removing decay heat from the spent fuel pool.

The FPPS is a non-safety-related system that provides the following safety-related functions:

- Provides containment isolation.
- Provides SFP makeup water.

2.0 Arrangement

2.1 The functional arrangement of the FPCPS is as shown in Figure 2.2.5-1—Fuel Pool Cooling and Purification System Functional Arrangement.

2.2 The location of the FPCPS equipment is as listed in Table 2.2.5-1—FPCPS Equipment Mechanical Design.

2.3 Physical separation exists between divisions of the FPCPS.

3.0 Mechanical Design Features

3.1 Equipment listed in Table 2.2.5-1 as ASME Code Section III is designed, welded, and hydrostatically tested in accordance with ASME Code Section III.

3.2 Check valves listed in Table 2.2.5-1 will function as listed in Table 2.2.5-1.

3.3 Piping indicated in Figure 2.2.5-1 as ASME Code Section III is designed, welded, and tested in accordance with ASME Code Section III.

3.4 Equipment identified as Seismic Category I in Table 2.2.5-1 can withstand ~~a~~ seismic design basis ~~seismic~~ loads without loss of safety function as listed in Table 2.2.5-1.

3.5 Supports for piping shown as ASME Section III on Figure 2.2.5-1 will be designed in accordance with ASME Section III.

03.09.05-1

3.6 ~~Specifications exist for components listed as ASME Section III in Table 2.2.5-1~~Deleted.

3.7 ~~Specifications exist for piping shown as ASME Section III on Figure 2.2.5-1~~Deleted.

Table 2.2.5-3—FPCPS Inspections, Tests, Analyses, and Acceptance Criteria (~~5~~ 7 Sheets)

Commitment Wording		Inspection, Test or Analysis	Acceptance Criteria
3.5	Supports for piping shown as ASME Section III on Figure 2.2.5-1 will be designed per ASME Section III.	An analysis will be performed. 03.09.05-1	a. Supports for piping shown as ASME Section III on Figure 2.2.5-1 are designed to ASME Section III. b. Snubbers have been identified, including those analyzed for fatigue for piping shown as ASME Section III on Figure 2.2.5-1. c. Support mass is less than ten percent of the adjacent pipe span for piping shown as ASME Section III on Figure 2.2.5-1.
3.6	~~Specifications exist for components listed as ASME Section III in Table 2.2.5-1~~Deleted.	~~An inspection will be performed~~Deleted.	~~Specifications exist for components listed as ASME Section III in Table 2.2.5-1~~Deleted.
3.7	~~Specifications exist for piping shown as ASME Section III on Figure 2.2.5-1~~Deleted.	~~An inspection will be performed~~Deleted.	~~Specifications exist for piping identified as ASME Section III on Figure 2.2.5-1~~Deleted.
3.8	Specifications exist for supports for piping shown as ASME Section III on Figure 2.2.5-1.	An inspection will be performed.	Specifications exist for supports for piping shown as ASME Section III on Figure 2.2.5-1.
4.1	Displays exist or can be retrieved in the MCR and the RSS as identified in Table 2.2.5-2.	Inspections will be performed for the existence or retrievability of the displays in the MCR and the RSS as listed in Table 2.2.5-2.	a. The displays listed in Table 2.2.5-2 as being retrieved in the MCR can be retrieved in the MCR. b. The displays listed in Table 2.2.5-2 as being retrieved in the RSS can be retrieved in the RSS.

03.09.05-1

3.7 ~~Specifications exist for components listed as ASME Section III in Table 2.2.6-1~~Deleted.

3.8 ~~Specifications exist for piping shown as ASME Section III on Figure 2.2.6-1~~Deleted.

3.9 Specifications exist for supports for piping shown as ASME Section III on Figure 2.2.6-1.

4.0 Instrumentation and Controls (I&C) Design Features, Displays, and Controls

4.1 Displays listed in Table 2.2.6-2—CVCS Equipment I&C and Electrical Design are retrievable in the main control room (MCR) and the remote shutdown station (RSS) as listed in Table 2.2.6-2.

4.2 The CVCS equipment controls are provided in the MCR and the RSS as listed in Table 2.2.6-2.

4.3 ~~Actuators~~ Equipment listed as being controlled by a priority and actuat~~i~~o~~n~~r ~~and~~ control system (PACS) module in Table 2.2.6-2 responds to the state requested by a test signal~~are controlled by a PACS module~~.

4.4 The CVCS has the following system interlocks:

- Isolation of the charging pump suction from the volume control tank and normal letdown path during a boron dilution event by closure of valves 30KBA21AA001, 30KBA21AA009, and 30KBA25AA017.
- Isolation of the charging line by closure of valves 30KBA34AA002, 30KBA34AA012, and 30KBA35AA001.
- Isolation of the letdown line on a safety injection actuation signal by closure of valves 30KBA10AA001 and 30KBA10AA002.

5.0 Electrical Power Design Features

5.1 The components designated as Class 1E in Table 2.2.6-2 are powered from the Class 1E division as listed in Table 2.2.6-2 in a normal or alternate feed condition.

5.2 Valves listed in Table 2.2.6-2 fail as-is on loss of power.

6.0 Environmental Qualifications

6.1 Equipment listed in Table 2.2.6-2 for harsh environment can perform the function in Table 2.2.6-1 following exposure to the design basis environments for the time required.

7.0 Equipment and System Performance

7.1 The CVCS heat exchangers as listed in Table 2.2.6-1 have the capacity to transfer the design heat load to the component cooling water system.

7.2 Class 1E valves listed in Table 2.2.6-2 can perform the function listed in Table 2.2.6-1 under system design conditions.

Table 2.2.6-3—CVCS Inspections, Tests, Analyses, and Acceptance Criteria (~~6~~ 8 Sheets)

Commitment Wording		Inspection, Test or Analysis	Acceptance Criteria
3.5	Supports for piping shown as ASME Section III on Figure 2.2.6-1 will be designed per ASME Section III.	An analysis will be performed.	a. Supports for piping shown as ASME Section III on Figure 2.2.6-1 are designed to ASME Section III. b. Snubbers have been identified, including those analyzed for fatigue for piping shown as ASME Section III on Figure 2.2.6-1 . c. Support mass is less than ten percent of the adjacent pipe span for piping shown as ASME Section III on Figure 2.2.6-1.
3.6	Components listed as ASME Code Class ~~I~~ 1 in Table 2.2.6-1 will be analyzed for fatigue per ASME Section III Class 1.	An analysis will be performed. 03.09.05-1	a. Fatigue analysis has been performed for components listed as ASME Code Class ~~I~~ 1 in Table 2.2.6-1. ~~a.~~b. For components listed as ASME Code Class ~~I~~ 1 in Table 2.2.6-1, operating modes where peak stresses are within ~~10%~~ten percent of allowable have been identified.
3.7	~~Specifications exist for components listed as ASME Section III in Table 2.2.6-1~~Deleted.	~~An inspection will be performed~~Deleted.	~~Specifications exist for components listed as ASME Section III in Table 2.2.6-1~~Deleted.
3.8	~~Specifications exist for piping shown as ASME Section III on Figure 2.2.6-1~~Deleted.	~~An inspection will be performed~~Deleted.	~~Specifications exist for piping identified as ASME Section III on Figure 2.2.6-1~~Deleted.
3.9	Specifications exist for supports for piping shown as ASME Section III on Figure 2.2.6-1.	An inspection will be performed.	Specifications exist for supports for piping shown as ASME Section III on Figure 2.2.6-1.

2.2.7 Extra Borating System

1.0 Description

The extra borating system (EBS) is a safety-related system. The EBS has two divisions. The EBS provides the following safety related functions:

- Core reactivity control.
- Reactor coolant pressure boundary integrity.
- Containment isolation.

The EBS provides the following non-safety related functions:

- Borated water to the RCS for beyond design basis events.

2.0 Arrangement

2.1 The functional arrangement of the EBS is as shown in Figure 2.2.7-1—Extra Borating System Functional Arrangement.

2.2 The location of the EBS equipment is as listed in Table 2.2.7-1—EBS Equipment Mechanical Design.

2.3 Physical separation exists between divisions of the EBS.

3.0 Mechanical Design Features

3.1 Equipment listed in Table 2.2.7-1 as ASME Code Section III is designed, welded, and hydrostatically tested in accordance with ASME Code Section III.

3.2 Check valves listed in Table 2.2.7-1 will function as listed in Table 2.2.7-1.

3.3 Piping indicated in Figure 2.2.7-1 as ASME Code Section III is designed, welded, and tested in accordance with ASME Code Section III.

3.4 Equipment identified as Seismic Category I in Table 2.2.7-1 can withstand ~~a~~ seismic design basis ~~seismic~~ loads without loss of safety function as listed in Table 2.2.7-1.

3.5 Supports for piping shown as ASME Section III on Figure 2.2.7-1 will be designed per ASME Section III.

3.6 Components listed as ASME Code Class 1 in Table 2.2.7-1 will be analyzed for fatigue in accordance with ASME Section III Class 1.

03.09.05-1

3.7 ~~Specifications exist for components listed as ASME Section III in Table 2.2.7-1~~Deleted.

3.8 ~~Specifications exist for piping shown as ASME Section III on Figure 2.2.7-1~~Deleted.

3.9 Specifications exist for supports for piping shown as ASME Section III on Figure 2.2.7-1.

Table 2.2.7-3 - EBS Inspections, Tests, Analyses, and Acceptance Criteria (~~6~~ 7 Sheets)

Commitment Wording		Inspection, Test or Analysis	Acceptance Criteria
3.5	Supports for piping shown as ASME Section III on Figure 2.2.7-1 will be designed in accordance with ASME Section III.	An analysis will be performed.	a. Supports for piping shown as ASME Section III on Figure 2.2.7-1 are designed to ASME Section III. b. Snubbers have been identified, including those analyzed for fatigue for piping shown as ASME Section III on Figure 2.2.7-1. c. Support mass is less than 10% of the adjacent pipe span for piping shown as ASME Section III on Figure 2.2.7-1.
3.6	Components listed as ASME Code Class 1 in Table 2.2.7-1 will be analyzed for fatigue per ASME Section III Class 1.	An analysis will be performed. 03.09.05-1	a. Fatigue analysis has been performed for components listed as ASME Code Class 1 in Table 2.2.7-1. b. For components listed as ASME Code Class 1 in Table 2.2.7-1 operating modes where peak stresses are within 10% of allowable have been identified.
3.7	Deleted~~Specifications exist for components listed as ASME Section III in Table 2.2.7-1~~.	Deleted~~An inspection will be performed~~.	Deleted~~Specifications exist for components listed as ASME Section III in Table 2.2.7-1~~.
3.8	Deleted~~Specifications exist for piping shown as ASME Section III on Figure 2.2.7-1~~.	Deleted~~An inspection will be performed~~.	Deleted~~Specifications exist for piping identified as ASME Section III on Figure 2.2.7-1~~.
3.9	Specifications exist for supports for piping shown as ASME Section III on Figure 2.2.7-1.	An inspection will be performed.	Specifications exist for supports for piping shown as ASME Section III on Figure 2.2.7-1.

2.3.3 Severe Accident Heat Removal System

1.0 Description

The severe accident heat removal system (SAHRS) is a dedicated cooling water system for the primary containment to support mitigation of beyond design basis events (BDBEs). The system does not operate during normal plant operations or design basis accidents.

The SAHRS provides the following safety related functions:

- Containment isolation.

The SAHRS provides the following non-safety related functions:

- Passive cooling of the core melt stabilization system (CMSS).
- Active spray for environmental control of the containment atmosphere.
- Active recirculation cooling of the CMSS and containment.

2.0 Arrangement

2.1 The functional arrangement of the SAHRS is as shown in Figure 2.3.3-1—SAHRS Functional Arrangement.

2.2 The location of the SAHRS equipment is as listed in Table 2.3.3-1—SAHRS Equipment Mechanical Design.

3.0 Mechanical Design Features

3.1 Equipment listed in Table 2.3.3-1 as ASME ~~Boiler and Pressure Vessel (BPV)~~ Code Section III is designed, welded, and hydrostatically tested ~~to~~ in accordance with ASME ~~BPV~~ Code Section III.

3.2 Check valves listed in Table 2.3.3-1 will function as listed in Table 2.3.3-1.

3.3 Piping indicated in Figure 2.3.3-1 as ASME ~~BPV~~ Code Section III is designed, welded, and tested in accordance with ASME ~~BPV~~ Code Section III.

3.4 Equipment identified as Seismic Category I in Table 2.3.3-1 can withstand ~~a~~ seismic design basis ~~seismic~~ loads without loss of safety function as listed in Table 2.3.3-1.

3.5 Supports for piping shown as ASME BPV Code Section III on Figure 2.3.3-1 will be designed per ASME BPV Code Section III.

03.09.05-1

3.6 ~~Specifications exist for components listed as ASME BPV Code Section III in Table 2.3.3-1~~Deleted.

3.7 ~~Specifications exist for piping shown as ASME BPV Code Section III on Figure 2.3.3-1~~Deleted.

Table 2.3.3-3—SAHRS Inspections, Tests, Analyses, and Acceptance Criteria (~~5~~ 6 Sheets)

Commitment Wording		Inspection, Test or Analysis	Acceptance Criteria
3.5	Supports for piping shown as ASME BPV Code Section III on Figure 2.3.3-1 will be designed per ASME BPV Code Section III.	An analysis will be performed. 03.09.05-1	a. Supports for piping shown as ASME BPV Code Section III on Figure 2.3.3-1 are designed to ASME BPV Code Section III. b. Snubbers have been identified, including those analyzed for fatigue for piping shown as ASME BPV Code Section III on Figure 2.3.3-1. c. Support mass is less than ten percent of the adjacent pipe span for piping shown as ASME BPV Code Section III on Figure 2.3.3-1.
3.6	Deleted~~Specifications exist for components listed as ASME BPV Code Section III in Table 2.3.3-1~~.	Deleted~~An inspection will be performed~~.	Deleted~~Specifications exist for components listed as ASME BPV Code Section III in Table 2.3.3-1~~.
3.7	Deleted~~Specifications exist for piping shown as ASME BPV Code Section III on Figure 2.3.3-1~~.	Deleted~~An inspection will be performed~~.	Deleted~~Specifications exist for piping identified as ASME BPV Code Section III on Figure 2.3.3-1~~.
3.8	Specifications exist for supports for piping shown as ASME BPV Code Section III on Figure 2.3.3-1.	An inspection will be performed.	Specifications exist for supports for piping shown as ASME BPV Code Section III on Figure 2.3.3-1.
4.1	Controls exist in the MCR as identified in Table 2.3.3-2.	Tests will be performed for the existence of control signals from the MCR to the equipment listed in Table 2.3.3-2.	The controls listed in Table 2.3.3-2 as being in the MCR exist in the MCR.
4.2	~~Actuators~~ Equipment listed as being controlled by a PACS module in Table 2.3.3-2 responds to the state requested by a test signal~~are controlled by a PACS module~~.	A~~n operational~~ test will be performed using test signals~~ for the actuators being controlled by a PACS module as listed in Table 2.3.3-2. An inspection will be performed on the actuation of the actuator~~.	~~The actuators~~Equipment listed as being controlled by a PACS module in Table 2.3.3-2 ~~actuate~~ responds to the state requested by the test signal.

2.5.4 Emergency Diesel Generator

1.0 Description

The emergency diesel generators (EDG) provide a standby source of Class 1E power to safety-related and non-safety-related loads during conditions that result in a loss of preferred power to emergency power supply system (EPSS) buses.

2.0 Arrangement

2.1 The functional arrangement of the EDG fuel oil system is as shown in Figure 2.5.4-1—Emergency Diesel Generator Fuel Oil System Functional Arrangement.

2.2 EDGs and their respective support systems are located as listed in Table 2.5.4-1—Emergency Diesel Generator Equipment Mechanical Design.

2.3 ~~There are four independent EDGs.~~Deleted.

2.4 The functional arrangement of the EDG lubricating oil system is as shown in Figure 2.5.4-2—Emergency Diesel Generator Lubricating Oil System Functional Arrangement.

2.5 The functional arrangement of the EDG air intake and exhaust system is as shown in Figure 2.5.4-3—Emergency Diesel Generator Air Intake and Exhaust System Functional Arrangement.

3.0 Mechanical Design Features, Electrical and Seismic Classifications

3.1 Equipment listed in Table 2.5.4-1 as ASME Code Section III ~~are~~ is designed, welded, and hydrostatically tested ~~to~~ in accordance with ASME Code Section III.

3.2 Piping indicated in Figure 2.5.4-1, Figure 2.5.4-2 and Figure 2.5.4-3 as ASME Code Section III is designed, welded, and tested in accordance with ASME Code Section III.

3.3 Supports for piping shown as ASME Section III on Figure 2.5.4-1, Figure 2.5.4-2 and Figure 2.5.4-3 will be designed per ASME Section III.

03.09.05-1

3.4 Deleted~~Specifications exist for components listed as ASME Section III in Table 2.5.4-1~~.

3.5 Deleted~~Specifications exist for piping shown as ASME Section III on Figure 2.5.4-1, Figure 2.5.4-2 and Figure 2.5.4-3~~.

3.6 Specifications exist for supports for piping shown as ASME Section III on Figure 2.5.4-1, Figure 2.5.4-2 and Figure 2.5.4-3.

3.7 Equipment identified as Seismic Category I in Table 2.5.4-1 can withstand seismic design basis ~~seismic~~ loads without loss of safety function.

3.8 ~~Equipment listed as Class 1E in Table 2.5.4-2 are qualified as Seismic Category I and can withstand seismic design basis loads without loss of safety function~~Deleted.

3.9 Each EDG has a fuel oil storage tank.

Table 2.5.4-~~3~~4—Emergency Diesel Generator Inspections, Tests, Analyses, and Acceptance Criteria (~~4~~ ~~6~~8 Sheets)

Commitment Wording		Inspection, Test or Analysis	Acceptance Criteria
3.3	Supports for piping shown as ASME Section III on ~~f~~Figure 2.5.4-1, Figure 2.5.4-2 and Figure 2.5.4-3 will be designed per ASME Section III. 03.09.05-1	An analysis will be performed.	~~a. Fatigue analysis has been performed for components listed as ASME Code Class I in Table 2.5.4-1.~~ ~~b. For components listed as ASME Code Class I in Table 2.5.4-1 operating modes where peak stresses are within 10% of allowable have been identified.~~ a. Supports for piping shown as ASME Section III on Figures 2.5.4-1, Figure 2.5.4-2 and Figure 2.5.4-3 are designed to ASME Section III. b. Snubbers have been identified, including those analyzed for fatigue for piping shown as ASME Section III on Figures 2.5.4-1, Figure 2.5.4-2 and Figure 2.5.4-3. c. Support mass is less than ten percent of the adjacent pipe span for piping shown as ASME Section III on Figures 2.5.4-1, Figure 2.5.4-2 and Figure 2.5.4-3.
3.4	Deleted~~Specifications exist for components listed as ASME Section III in Table 2.5.4-1~~.	Deleted~~An inspection will be performed~~.	Deleted~~Specifications exist for components listed as ASME Section III in Table 2.5.4-1~~.
3.5	Deleted~~Specifications exist for piping shown as ASME Section III on fFigure 2.5.4-1, Figure 2.5.4-2 and Figure 2.5.4-3~~.	Deleted~~An inspection will be performed~~.	Deleted~~Specifications exist for piping identified as ASME Section III on Figure 2.5.4-1, Figure 2.5.4-2 and Figure 2.5.4-3~~.
3.6	Specifications exist for supports for piping shown as ASME Section III on ~~f~~Figure 2.5.4-1, Figure 2.5.4-2 and Figure 2.5.4-3.	An inspection will be performed.	Specifications exist for supports for piping shown as ASME Section III on Figure 2.5.4-1, Figure 2.5.4-2 and Figure 2.5.4-3.

3.2 Check valves will function as listed in Table 2.7.1-1.

3.3 Piping indicated in Figure 2.7.1-1 as ASME Code Section III is designed, welded, and tested in accordance with ASME Code Section III.

3.4 Equipment identified as Seismic Category I in Table 2.7.1-1 can withstand ~~a~~ seismic design basis ~~seismic~~ loads without loss of safety function as listed in Table 2.7.1-1.

3.5 Supports for piping shown as ASME Section III on Figure 2.7.1-1 will be designed per ASME Section III.

03.09.05-1

3.6 ~~Specifications exist for components listed as ASME Section III in Table 2.7.1-1~~Deleted.

3.7 ~~Specifications exist for piping shown as ASME Section III on Figure 2.7.1-1~~Deleted.

3.8 Specifications exist for supports for piping shown as ASME Section III on Figure 2.7.1-1.

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 2.7.1-1.

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

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

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

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

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

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

4.9 ~~If the surge tank level falls to MIN4, the CCWS pump is tripped~~Deleted.

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.

Table 2.7.1-3—Component Cooling Water System Inspections, Tests, Analyses, and Acceptance Criteria (~~7~~ 9 Sheets)

Commitment Wording		Inspection, Test or Analysis	Acceptance Criteria
3.5	Supports for piping shown as ASME Section III in Figure 2.7.1-1 will be designed ~~per~~ in accordance with ASME Section III.	An analysis will be performed. 03.09.05-1	a. Supports for piping shown as ASME Section III in Figure 2.7.1-1 are designed ~~to~~ in accordance with ASME Section III. b. Snubbers have been identified, including those analyzed for fatigue for piping shown as ASME Section III in Figure 2.7.1-1. c. Support mass is less than ten percent of the adjacent pipe span for piping shown as ASME Section III in Figure 2.7.1-1 .
3.6	Deleted~~Specifications exist for components listed as ASME Section III in Table 2.7.1-1~~.	Deleted~~An inspection will be performed~~.	Deleted~~Specifications exist for components listed as ASME Section III in Table 2.7.1-1~~.
3.7	Deleted~~Specifications exist for piping shown as ASME Section III in Figure 2.7.1-1~~.	Deleted~~An inspection will be performed~~.	Deleted~~Specifications exist for piping identified as ASME Section III in Figure 2.7.1-1~~.
3.8	Specifications exist for supports for piping shown as ASME Section III in Figure 2.7.1-1.	An inspection will be performed.	Specifications exist for supports for piping shown as ASME Section III in Figure 2.7.1-1.
4.1	Displays exist or can be retrieved in the MCR and the RSS as identified in Table 2.7.1-2.	Inspections will be performed for the existence or retrieveability of the displays in the MCR or the RSS as listed in Table 2.7.1-2.	a. The displays listed in Table 2.7.1-2 as being retrieved in the MCR can be retrieved in the MCR. b. The displays listed in Table 2.7.1-2 as being retrieved in the RSS can be retrieved in the RSS.
4.2	Controls exist in the MCR and the RSS as identified in Table 2.7.1-2.	Tests will be performed for the existence of control signals from the MCR and the RSS to the equipment listed in Table 2.7.1-2.	a. The controls listed in Table 2.7.1-2 as being in the MCR exist in the MCR. b. The controls listed in Table 2.7.1-2 as being in the RSS exist in the RSS.

2.7.2 Safety Chilled Water System

1.0 Description

The safety chilled water system (SCWS) is a safety-related system that delivers refrigerated chilled water to the safety-related heating, ventilation, air conditioning (HVAC) systems and to Division 1 and Division 4 low head safety injection (LHSI) motor cooler and pump sealing cooler.

The SCWS significant safety-related function is to provide chilled water as a heat sink to safety-related HVAC systems, the main control room (MCR) habitability, and cooling of the LHSI pump seal coolers and motor coolers in Division 1 and Division 4 in the event of a design basis accident.

The SCWS significant non-safety-related function is for Division 1 and Division 4 to function in the event of a station blackout (SBO) or loss of ultimate heat sink (LUHS).

2.0 Arrangement

2.1 The functional arrangement of the SCWS is as shown in Figure 2.7.2-1—Safety Chilled Water System Functional Arrangement.

2.2 The location of the SCWS equipment is as listed in Table 2.7.2-1—Safety Chilled Water System Equipment Mechanical Design.

2.3 Physical separation exists between divisions of the SCWS.

3.0 Mechanical Design Features

3.1 Equipment listed in Table 2.7.2-1 as ASME Code Section III is designed, welded, and hydrostatically tested ~~to~~ in accordance with ASME Code Section III.

3.2 Check valves listed in Table 2.7.2-1 will function as listed in Table 2.7.2-1.

3.3 Piping indicated in Figure 2.7.2-1 as ASME Code Section III is designed, welded, and tested in accordance with ASME Code Section III.

3.4 Equipment identified as seismic Category I in Table 2.7.2-1 can withstand ~~a~~ seismic design basis ~~seismic~~ loads without loss of safety function as listed in Table 2.7.2-1.

3.5 Supports for piping shown as ASME Section III in Figure 2.7.2-1 will be designed per ASME Section III.

03.09.05-1

3.6 Deleted~~Specifications exist for components listed as ASME Section III in Table 2.7.2-1~~.

3.7 Deleted~~Specifications exist for piping shown as ASME Section III in Figure 2.7.2-1~~.

3.8 Specifications exist for supports for piping shown as ASME Section III in Figure 2.7.2-1.

Table 2.7.2-3—Safety Chilled Water System Inspections, Tests, Analyses, and Acceptance Criteria (~~6~~ 7 Sheets)

Commitment Wording		Inspection, Test or Analysis	Acceptance Criteria
3.5	Supports for piping shown as ASME Section III in Figure 2.7.2-1 will be designed ~~per~~ in accordance with ASME Section III.	An analysis will be performed. 03.09.05-1	a. Supports for piping shown as ASME Section III in Figure 2.7.2-1 are designed ~~to~~ in accordance with ASME Section III. b. Snubbers have been identified, including those analyzed for fatigue for piping shown as ASME Section III in Figure 2.7.2-1. c. Support mass~~-~~ is less than ~~10~~ ten percent of the adjacent pipe span for piping shown as ASME Section III in Figure 2.7.2-1.
3.6	Deleted~~Specifications exist for components listed as ASME Section III in Table 2.7.2-1~~.	Deleted~~An analysis will be performed~~.	Deleted~~Specifications exist for components listed as ASME Section III in Table 2.7.2-1~~.
3.7	Deleted~~Specifications exist for piping shown as ASME Section III in Figure 2.7.2-1~~.	Deleted~~An analysis will be performed~~.	Deleted~~Specifications exist for piping identified as ASME Section III in Figure 2.7.2-1~~.
3.8	Specifications exist for supports for piping shown as ASME Section III in Figure 2.2.7-2.	An analysis will be performed.	Specifications exist for supports for piping shown as ASME Section III in Figure 2.7.2-1.
4.1	Displays exist or can be retrieved in the MCR and RSS as identified in Table 2.7.2-2.	Inspections will be performed for the existence or retrievability of the displays in the MCR or the RSS as listed in Table 2.7.2-2.	a. The displays listed in Table 2.7.2-2 as being retrieved in the MCR can be retrieved in the MCR. b. The displays listed in Table 2.7.2-2 as being retrieved in the RSS can be retrieved in the RSS.
4.2	Controls exist in the MCR and the RSS as identified in Table 2.7.2-2.	Test will be performed for the existence of control signals from the MCR and the RSS to the equipment listed in Table 2.7.2-2.	a. The controls listed in Table 2.7.2-2 as being in the MCR exist in the MCR. b. The controls listed in Table 2.7.2-2 as being in the RSS exist in the RSS.

3.7 ~~Non-safety-related piping in the dedicated ESWS as indicated in Figure 2.7.11-1 is designed and tested in accordance with ASME B31.1 Section Code~~Deleted.

3.8 Supports for piping shown as ASME Section III in Figure 2.7.11-1 will be designed per ASME Section III.

03.09.05-1

3.9 ~~Specifications exist for components listed as ASME Section III in Table 2.7.11-1~~Deleted.

3.10 ~~Specifications exist for piping shown as ASME Section III in Figure 2.7.11-1~~Deleted.

3.11 Specifications exist for supports for piping shown as ASME Section III in Figure 2.7.11-1.

4.0 I&C Design Features, Displays and Controls

4.1 Displays listed in Table 2.7.11-2— Essential Service 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 2.7.11-2.

4.2 The ESWS equipment controls are provided in the MCR and the RSS as listed in Table 2.7.11-2.

4.3 ~~Actuators~~ Equipment listed as being controlled by a priority and actuator~~ion and~~ control system (PACS) module in Table 2.7.11-2 responds to the state requested by a test signal~~are controlled by a PACS module~~.

4.4 If one ESWS pump (30PEB10/20/30/40 AP001) fails during normal operation, a switchover to the other ESWS train is carried out automatically for the entire cooling train and is initiated by the CCWS Switchover sequence.

4.5 A spurious closure of the ESWS pump discharge valve (30PEB10/20/30/40 AA005) ~~has the same consequences as the failure of the ESW pump (30PEB10/20/30/40 AP001),~~ results in a switchover to the other ESWS train ~~is carried out~~ automatically for the entire cooling train and is initiated by the CCWS Switchover sequence.

4.6 ~~The non-safety-related dedicated ESWS is provided with displays retrievable in the MCR and the RSS~~Deleted.

4.7 ~~The non-safety-related dedicated ESWS is provided with controls in the MCR and the RSS~~Deleted.

5.0 Electrical Power Design Features

5.1 The components designated as Class 1E in Table 2.7.11-2 are powered from the Class 1E division as listed in Table 2.7.11-2 in a normal or alternate feed condition.

5.2 Valves listed in Table 2.7.11-2 fail as-is on loss of power.

5.3 ~~The non-safety-related dedicated ESWS is powered from Class 1E division power. In the case of LOOP, the dedicated ESWS is powered from the station blackout diesel generator~~Deleted.

Table 2.7.11-3—Essential Service Water System Inspections, Tests, Analyses, and Acceptance Criteria (~~6~~ 9 Sheets)

	Commitment Wording	Inspection, Test or Analysis	Acceptance Criteria
3.8	Supports for piping shown as ASME Section III in Figure 2.7.11-1 will be designed ~~per~~ in accordance with ASME Section III.	An inspection will be performed. 03.09.05-1	a. Supports for piping shown as ASME Section III in Figure 2.7.11-1 are designed ~~to~~ in accordance with ASME Section III. b. Snubbers have been identified, including those analyzed for fatigue for piping shown as ASME Section III in Figure 2.7.11-1. c. Support mass is less than ten percent of the adjacent pipe span for piping shown as ASME Section III in Figure 2.7.11-1 .
3.9	Deleted~~Specifications exist for components listed as ASME Section III in Table 2.7.11-1~~.	Deleted~~An inspection will be performed~~.	Deleted~~Specifications exist for components listed as ASME Section III in Table 2.7.11-1~~.
3.10	Deleted~~Specifications exist for piping shown as ASME Section III in Figure 2.7.11-1~~.	Deleted~~An inspection will be performed~~.	Deleted~~Specifications exist for piping identified as ASME Section III in Figure 2.7.11-1~~.
3.11	Specifications exist for supports for piping shown as ASME Section III in Figure 2.7.11-1.	An inspection will be performed.	Specifications exist for supports for piping shown as ASME Section III in Figure 2.7.11-1.
4.1	Displays exist or can be retrieved in the MCR and the RSS as identified in Table 2.7.11-2.	Inspections will be performed for the existence or retrievability of the displays in the MCR or the RSS as listed in Table 2.7.11-2.	a. The displays listed in Table 2.7.11-2 as being retrieved in the MCR can be retrieved in the MCR. b. The displays listed in Table 2.7.11-2 as being retrieved in the RSS can be retrieved in the RSS.
4.2	Controls exist in the MCR and the RSS as identified in Table 2.7.11-2.	Tests will be performed for the existence of control signals from the MCR and the RSS to the equipment listed in Table 2.7.11-2.	a. The controls listed in Table 2.7.11-2 as being in the MCR exist in the MCR. b. The controls listed in Table 2.7.11-2 as being in the RSS exist in the RSS.

2.8.2 Main Steam System

1.0 Description

The main steam system (MSS) is a safety-related system. It transports steam from the steam generators to the turbine generator during normal operations. The MSS also isolates the steam generators and the safety-related portion of MSS from the non-safety-related portion during design basis accidents. The main steam pipe lines from the steam generators to and including the fixed seismic restraints downstream of the main steam isolation valves (MSIVs) are safety related. The main steam lines downstream of the fixed seismic restraints to the turbine generator are non-safety-related.

The MSS provides the following safety-related functions:

- The MSS isolates the steam generators and associated portion of main steam lines.
- The MSS provides residual heat removal by venting steam to the atmosphere via the main steam relief trains (MSRTs) and the main steam safety valves (MSSVs).

The MSS provides the following non-safety-related functions:

- The MSS and the turbine bypass system provide the capability to dump steam to the main condenser.

2.0 Arrangement

2.1 The functional arrangement of the MSS is as shown in Figure 2.8.2-1—MSS Functional Arrangement.

2.2 The location of the MSS equipment is as listed in Table 2.8.2-1—MSS Equipment Mechanical Design.

2.3 Physical separation exists between divisions of the MSS.

3.0 Mechanical Design Features

3.1 Equipment listed in Table 2.8.2-1 as ASME Code Section III is designed, welded, and hydrostatically tested in accordance with ASME Code Section III.

3.2 Piping indicated in Figure 2.8.2-1 as ASME Code Section III is designed, welded, and tested in accordance with ASME Code Section III.

3.3 Equipment identified as Seismic Category I in Table 2.8.2-1 can withstand ~~a~~ seismic design basis ~~seismic~~ loads without loss of safety function as listed in Table 2.8.2-1.

3.4 Supports for piping shown as ASME Section III on Figure 2.8.2-1 will be designed in accordance with ASME Section III.

03.09.05-1

3.5 Deleted~~Specifications exist for components listed as ASME Section III in Table 2.8.2-1~~.

3.6 Deleted~~Specifications exist for piping shown as ASME Section III on Figure 2.8.2-1~~.

Table 2.8.2-3—MSS Inspections, Tests, Analyses, and Acceptance Criteria (~~5~~ 7 Sheets)

Commitment Wording		Inspection, Test or Analysis	Acceptance Criteria
3.4	Supports for piping shown as ASME Section III on Figure 2.8.2-1 will be designed per ASME Section III.	An analysis will be performed. 03.09.05-1	a. Supports for piping shown as ASME Section III on Figure 2.8.2-1 are designed to ASME Section III. b. Snubbers have been identified, including those analyzed for fatigue for piping shown as ASME Section III on Figure 2.8.2-1. c. Support mass is less than ten percent of the adjacent pipe span for piping shown as ASME Section III on Figure 2.8.2-1.
3.5	Deleted~~Specifications exist for components listed as ASME Section III in Table 2.8.2-1~~.	Deleted~~An inspection will be performed~~.	Deleted~~Specifications exist for components listed as ASME Section III in Table 2.8.2-1~~.
3.6	Deleted~~Specifications exist for piping shown as ASME Section III on Figure 2.8.2-1~~.	Deleted~~An inspection will be performed~~.	Deleted~~Specifications exist for piping identified as ASME Section III on Figure 2.8.2-1~~.
3.7	Specifications exist for supports for piping shown as ASME Section III on Figure 2.8.2-1	An inspection will be performed.	Specifications exist for supports for piping shown as ASME Section III on Figure 2.8.2-1.
4.1	Displays exist or can be retrieved in the MCR and the RSS as identified in Table 2.8.2-2.	Inspections will be performed for the existence or retrievability of the displays in the MCR or the RSS as listed in Table 2.8.2-2.	a. The displays listed in Table 2.8.2-2 as being retrieved in the MCR can be retrieved in the MCR. b. The displays listed in Table 2.8.2-2 as being retrieved in the RSS can be retrieved in the RSS.
4.2	Controls exist in the MCR and the RSS as identified in Table 2.8.2-2.	Tests will be performed for the existence of control signals from the MCR and the RSS to the equipment listed in Table 2.8.2-2.	a. The controls listed in Table 2.8.2-2 as being in the MCR exist in the MCR. b. The controls listed in Table 2.8.2-2 as being in the RSS exist in the RSS.

2.8.6 Main Feedwater System

1.0 Description

The main feedwater system (MFWS) is a non-safety-related system with portions that are safety related. It transports and controls feedwater from the deaerator/feedwater storage tank to the steam generators (SG). It includes the startup/shutdown feedwater supply. The MFWS is safety related from the connections to the SGs to the fixed seismic restraint in each main feedwater line and to the fixed seismic restraint in each startup/shutdown feedwater line.

The MFWS provides the following safety-related function:

- Shut off main feedwater supply and startup/shutdown feedwater supply.

The MFWS provides the following non-safety-related functions:

- The MFWS supplies feedwater to the SGs for power operation.
- A startup/shutdown system supplies feedwater to the SGs for low-power operation.

2.0 Arrangement

2.1 The functional arrangement of the MFWS is as shown in Figure 2.8.6-1—MFWS Functional Arrangement.

2.2 The location of the MFWS equipment is as listed in Table 2.8.6-1—MFWS Equipment Mechanical Design.

2.3 Physical separation exists between the safety-related portions of the main feedwater divisions. The safety-related valves in Divisions 1 and 2 are located in separate valve rooms in Safeguard Building (SB) 1. The safety-related valves in Divisions 3 and 4 are located in separate valve rooms in SB 4.

3.0 Mechanical Design Features

3.1 Equipment listed in Table 2.8.6-1 as ASME Code Section III is designed, welded, and hydrostatically tested in accordance with ASME Code Section III.

3.2 Check valves listed in Table 2.8.6-1 will function as listed in Table 2.8.6-1.

3.3 Piping indicated in Figure 2.8.6-1 as ASME Code Section III is designed, welded, and tested in accordance with ASME Code Section III.

3.4 Equipment identified as Seismic Category I in Table 2.8.6-1 can withstand ~~a~~ seismic design basis ~~seismic~~ loads without loss of safety function as listed in Table 2.8.6-1.

3.5 Supports for piping shown as ASME Section III on Figure 2.2.4-1 will be designed per ASME Section III.

03.09.05-1

3.6 Deleted~~Specifications exist for components listed as ASME Section III in Table 2.2.4-1~~.

03.09.05-1

3.7 Deleted~~Specifications exist for piping shown as ASME Section III on Figure 2.2.4-1~~.

3.8 Specifications exist for supports for piping shown as ASME Section III on Figure 2.2.4-1.

4.0 Instrumentation and Control (I&C) Design Features, Displays, and Controls

4.1 Displays listed in Table 2.8.6-2—MFWS Equipment I&C and Electrical Design are retrievable in the main control room (MCR) as listed in Table 2.8.6-2.

4.2 The MFWS equipment controls are provided in the MCR as listed in Table 2.8.6-2.

4.3 ~~Actuators~~ Equipment listed as being controlled by a priority and ~~actuation~~ actuator~~and~~ control system (PACS) module in Table 2.8.6-2 responds to the state requested by a test signal~~are controlled by a PACS module~~.

5.0 Electrical Power Design Features

5.1 The components designated as Class 1E in Table 2.8.6-2 are powered from the Class 1E division as listed in Table 2.8.6-2 in a normal or alternate feed condition.

5.2 The main feedwater full load isolation valves (MFWFLIV) ~~are energized to close via two separate closing lines. The MFWFLIVs~~ fail closed on loss of hydraulic pressure to the valve actuator. ~~The main feedwater check valves inside the Reactor Building (RB) close on flow reversal. Other valves listed in Table 2.8.6-2 fail as-is on loss of power.~~

5.3 Other valves listed in Table 2.8.6-2 except the MFWFLIVs fail as-is on loss of electric power to the valve actuator.

6.0 Environmental Qualifications

6.1 Electrical drivers for equipment listed in Table 2.8.6-2 for harsh environment can perform the safety function in Table 2.8.6-1 following exposure to the design basis environments for the time required.

7.0 Equipment and System Performance

7.1 Class 1E valves listed in Table 2.8.6-2 can perform the function listed in Table 2.8.6-1 under system design conditions.

8.0 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.8.6-3—MFWS Inspections, Tests, Analyses, and Acceptance Criteria specifies the inspections, tests, analyses, and acceptance criteria for the MFWS.

Table 2.8.6-3—MFWS Inspections, Tests, Analyses, and Acceptance Criteria (~~4~~ 6 Sheets)

Commitment Wording		Inspection, Test, or Analysis	Acceptance Criteria
3.5	Supports for piping shown as ASME Section III on Figure 2.8.6-1 will be designed per ASME Section III.	An analysis will be performed. 03.09.05-1	a. Supports for piping shown as ASME Section III on Figure 2.8.6-1 are designed to ASME Section III. b. Snubbers have been identified, including those analyzed for fatigue for piping shown as ASME Section III on Figure 2.8.6-1. c. Support mass is less than ten percent of the adjacent pipe span for piping shown as ASME Section III on Figure 2.8.6-1.
3.6	Deleted~~Specifications exist for components listed as ASME Section III in Table 2.8.6-1~~.	Deleted~~An inspection will be performed~~.	Deleted~~Specifications exist for components listed as ASME Section III in Table 2.8.6-1~~.
3.7	Deleted~~Specifications exist for piping shown as ASME Section III on Figure 2.8.6-1~~.	Deleted~~An inspection will be performed~~.	Deleted~~Specifications exist for piping identified as ASME Section III on Figure 2.8.6-1~~.
3.8	Specifications exist for supports for piping shown as ASME Section III on Figure 2.8.6-1.	An inspection will be performed.	Specifications exist for supports for piping shown as ASME Section III on Figure 2.8.6-1.
4.1	Displays exist or can be retrieved in the MCR as identified in Table 2.8.6-2.	Inspections will be performed for the existence or retrievability of the displays in the MCR as listed in Table 2.8.6-2.	The displays listed in Table 2.8.6-2 as being retrieved in the MCR can be retrieved in the MCR.
4.2	Controls exist in the MCR as identified in Table 2.8.6-2.	Tests will be performed for the existence of control signals from the MCR to the equipment listed in Table 2.8.6-2.	The controls listed in Table 2.8.6-2 as being in the MCR exist in the MCR.

2.8.7 Steam Generator Blowdown System

1.0 Description

The steam generator blowdown system (SGBS) is a non-safety-related system with safety-related portions. It assists in maintaining the chemical characteristics of the secondary water within permissible limits. The SGBS is safety related from its connections to the steam generators to the outer containment isolation valves. The remaining portion of the blowdown system downstream of the outer containment isolation valves is non-safety-related.

The SGBS provides the following safety-related functions:

- Containment isolation.
- SG blowdown isolation.

2.0 Arrangement

2.1 The functional arrangement of the SGBS is as shown in Figure 2.8.7-1—SGBS Functional Arrangement.

2.2 The location of the SGBS equipment is as listed in Table 2.8.7-1—SGBS Equipment Mechanical Design.

3.0 Mechanical Design Features

3.1 Equipment listed in Table 2.8.7-1 as ASME Code Section III is designed, welded, and hydrostatically tested in accordance with ASME Code Section III.

3.2 Piping indicated in Figure 2.8.7-1 as ASME Code Section III is designed, welded, and tested in accordance with ASME Code Section III.

3.3 Equipment identified as Seismic Category I in Table 2.8.7-1 can withstand ~~a~~ seismic design basis ~~seismic~~ loads without loss of safety function as listed in Table 2.8.7-1.

3.4 Supports for piping shown as ASME Section III on Figure ~~2.2.4~~2.8.7-1 will be designed per ASME Section III.

03.09.05-1

3.5 Deleted~~Specifications exist for components listed as ASME Section III in Table 2.2.4~~2.8.7~~-1~~.

3.6 Deleted~~Specifications exist for piping shown as ASME Section III on Figure 2.2.4~~2.8.7~~-1~~.

3.7 Specifications exist for supports for piping shown as ASME Section III on Figure ~~2.2.4~~2.8.7-1.

Table 2.8.7-3—SGBS Inspections, Tests, Analyses, and Acceptance Criteria (~~4~~ 5 Sheets)

Commitment Wording		Inspection, Test or Analysis	Acceptance Criteria
3.4	Supports for piping shown as ASME Section III on Figure 2.8.7-1 will be designed per ASME Section III.	An analysis will be performed. 03.09.05-1	a. Supports for piping shown as ASME Section III on Figure 2.8.7-1 are designed in accordance with ASME Section III. b. Snubbers have been identified, including those analyzed for fatigue for piping shown as ASME Section III on Figure 2.8.7-1. c. Support mass is less than ten percent of the adjacent pipe span for piping shown as ASME Section III on Figure 2.8.7-1.
3.5	Deleted~~Specifications exist for components listed as ASME Section III in Table 2.8.7-1~~.	Deleted~~An inspection will be performed~~.	Deleted~~Specifications exist for components listed as ASME Section III in Table 2.8.7-1~~.
3.6	Deleted~~Specifications exist for piping shown as ASME Section III on Figure 2.8.7-1~~.	Deleted~~An inspection will be performed~~.	Deleted~~Specifications exist for piping identified as ASME Section III on Figure 2.8.7-1~~.
3.7	Specifications exist for supports for piping shown as ASME Section III on Figure 2.8.7-1	An inspection will be performed.	Specifications exist for supports for piping shown as ASME Section III on Figure 2.8.7-1
4.1	Displays exist or can be retrieved in the MCR and the RSS as identified in Table 2.8.7-2.	Inspections will be performed for the existence or retrieveability of the displays in the MCR or the RSS as listed in Table 2.8.7-2.	a. The displays listed in Table 2.8.7-2 as being retrieved in the MCR can be retrieved in the MCR. b. The displays listed in Table 2.8.7-2 as being retrieved in the RSS can be retrieved in the RSS.
4.2	Controls exist in the MCR and the RSS as identified in Table 2.8.7-2.	Tests will be performed for the existence of control signals from the MCR and the RSS to the equipment listed in Table 2.8.7-2.	a. The controls listed in Table 2.8.7-2 as being in the MCR exist in the MCR. b. The controls listed in Table 2.8.7-2 as being in the RSS exist in the RSS.

3.5 Containment Isolation

1.0 Description

1.1 The reactor building is designed with a primary containment building and a separate shield building. The primary containment building provides the primary means of confining radioactivity that may be released following a postulated design basis accident. The primary containment and shield buildings are penetrated by systems to provide various functions for systems housed inside containment. These penetrations are made for mechanical and electrical systems, and include facilities for the transport of personnel and equipment.

1.2 The function for containment isolation is to isolate fluid system piping that penetrates the Reactor Building to prevent the discharge of radioactivity from containment following a postulated design basis accident. Containment isolation barriers are components of the penetrating systems and are generally included with the system descriptions in Chapter 2. This section includes containment isolation barriers that are not included in Chapter 2.

2.0 Arrangement

2.1 The functional arrangement of the containment isolation equipment is as shown in Figure 3.5-1—Representative Containment Isolation Valve Arrangements and as indicated in Table 3.5-1—Containment Isolation Equipment Mechanical Design.

2.2 The location of the containment isolation equipment is as listed in Table 3.5-1.

3.0 Mechanical Design Features

3.1 Equipment listed in Table 3.5-1 as ASME Code Section III is designed, welded, and hydrostatically tested ~~to~~ in accordance with ASME Code Section III.

3.2 Check valves listed in Table 3.5-1 will function as listed in Table 3.5-1.

3.3 Piping indicated in Figure 3.5-1 as ASME Code Section III ~~for the containment isolation configurations identified in Table 3.5-1~~ is designed, welded, and tested in accordance with ASME Code Section III.

3.4 Equipment identified as Seismic Category I in Table 3.5-1 can withstand ~~a~~ seismic design basis ~~seismic~~ loads without loss of safety function as listed in Table 3.5-1.

03.09.05-1

3.5 Deleted~~Specifications exist for components listed as ASME Section III in Table 3.5-1~~.

3.6 Deleted~~Specifications exist for piping shown as ASME Section III in Figure 3.5-1 for the containment isolation configurations identified in Table 3.5-1~~.

4.0 I&C Design Features, Displays and Controls

4.1 Displays listed in Table 3.5-2—Containment Isolation Equipment I&C and Electrical Design are retrievable in the main control room (MCR) as listed in Table 3.5-2.

Table 3.5-3—Containment Isolation Inspections, Tests, Analyses, and Acceptance Criteria (~~7~~ 6 Sheets)

Commitment Wording		Inspection, Test or Analysis	Acceptance Criteria
3.4	Equipment identified as Seismic Category I in Table 3.5-1 can withstand ~~a~~ seismic design basis ~~seismic~~ loads without loss of safety function as listed in Table 3.5-1. 03.09.05-1	~~a. Inspection will be performed of the equipment identified as Seismic Category I in Table 3.5-1.~~ ~~b~~a. Type tests, ~~tests,~~ analyses or a combination of type tests and analyses will be performed on the equipment designated as Seismic Category I in Table 3.5-1 using analytical assumptions, or under conditions, which bound the Seismic Category I design requirements. b. Inspections will be performed of the as-installed Seismic Category I equipment listed in Table 3.5-1 to verify that the equipment including anchorage is installed as specified on the construction drawings.	~~a. A report exists and concludes that the equipment designated as Seismic Category I in Table 3.5-1 is installed as designed.~~ ~~b~~a. Tests/analysis~~A~~ reports exist~~s~~ and conclude~~s~~ that the Seismic Category I equipment ~~designated as Seismic Category I~~listed in Table 3.5-1 can withstand ~~a design basis~~ seismic design basis loads without loss of safety function. b. Inspection reports exist and conclude that the as-installed Seismic Category I equipment listed in Table 3.5-1 including anchorage is installed as specified on the construction drawings.
3.5	Deleted~~Specifications exist for components listed as ASME Section III in Table 3.5-1~~.	Deleted~~An inspection will be performed~~.	Deleted~~Specifications exist for components listed as ASME Section III in Table 3.5-1~~.
3.6	Deleted~~Specifications exist for piping shown as ASME Section III in Figure 3.5-1 for the containment isolation configurations identified in Table 3.5-1~~.	Deleted~~An inspection will be performed~~.	Deleted~~Specifications exist for piping identified as ASME Section III in Figure 3.5-1 for the containment isolation configurations identified in Table 3.5-1~~.
4.1	Displays exist or can be retrieved in the MCR as identified in Table 3.5-2.	Inspections will be performed for the existence or retrievability of the displays in the MCR as listed in Table 3.5-2.	The displays listed in Table 3.5-2 as being retrieved in the MCR can be retrieved in the MCR.

3.9.5.1.2.2 Core Barrel Cylinder

The core barrel cylinder is composed of two cylindrical shells welded together. The upper section of the barrel has four integrated outlet nozzles located opposite the RPV outlet nozzles. The core barrel cylinder provides the passageway for the reactor coolant from the core to the RPV outlet nozzles. The core barrel outlet nozzle external radius is customized to the corresponding RPV nozzle radius in order to control the radial gap. The radial gap restricts the bypass flow between the RPV inlet and outlet nozzles.

3.9.5.1.2.3 Irradiation Specimen Baskets

Irradiation specimen baskets are attached to the outside of the core barrel lower shell at locations where the neutron flux is higher. The irradiation specimen baskets support, hold, protect, and guide the irradiation specimen capsules and also provide specimen capsule cooling.

3.9.5.1.2.4 Lower Support Plate

The LSP is welded to the core barrel lower shell. The top face supports and restrains the fuel assemblies and the heavy reflector. The top face is equipped with lower fuel alignment pins at each fuel assembly location that position, align, and restrain the fuel assemblies. The top face also contains heavy reflector positioning blocks that provide the proper gap between the heavy reflector and the core barrel. The bottom face of the LSP supports the flow distribution device. The LSP has inlet holes under each fuel assembly location which have an orifice at their base to equalize the flow rates at the fuel assembly inlets.

3.9.5.1.2.5 Radial Key Inserts

03.09.05-8; 03.09.05-9

The lower internals are centered within the RPV by radial ~~support~~ keys and grooves machined in the LSP. The radial ~~support~~ keys are welded to and integral with the RPV. The radial keys limit lateral movement of the core barrel via controlled lateral gaps between the radial keys and the LSP. Some of the radial ~~support~~ keys and corresponding LSP grooves also limit rotation of the core barrel via controlled ~~provide~~ circumferential gaps~~centering~~. These radial keys and the LSP grooves have radial key inserts installed to maintain ~~tight~~controlled lateral, circumferential, and vertical clearances. The radial key inserts are plates that are pinned and bolted ~~in~~ to the radial keys and the LSP grooves.

The radial keys also provide a secondary support function by limiting the consequences of a postulated failure of the core barrel, which would cause the core barrel to drop~~lower internals~~. This postulated failure is a Beyond-Design-Basis event. The energy that would be absorbed by the radial keys is limited by the controlled vertical gaps between the radial keys and the LSP.

3.9.5.2 Loading Conditions

The design, analysis, fabrication, and non-destructive examination of the RPV internals, Class CS core support structures, is in accordance with the ASME Boiler and Pressure Vessel Code, Section III, Division 1, Subsection NG (Reference 1). The design documentation for these Class CS core support structures includes a certified design specification and a certified design report conforming to the provisions of Subsection NCA of Reference 1.

Those RPV internals components not designated as ASME Code, Section III, Class CS core support structures are designated as internal structures in accordance with ASME Code, Section III, Subsection NG-1122. ~~In accordance with ASME Code, Section III, Subsection NG-1122(c), t~~The components designated as internal structures are designed such that they meet the guidelines of NG-3000 and are in accordance with ASME Code Section III, Subsection NG-1122(c)~~and constructed such that they do not adversely affect the integrity of the core support structures~~. Table 3.9.5-1—Component Classification lists the core support structures (CS) and internal structures (IS) for the RPV internals.

03.09.05-5; 03.09.05-10

Evaluations of rupture locations, rupture loads, and dynamic effects of postulated rupture of piping are provided in Section 3.6.2. Evaluation of the adequacy of analysis methods for Seismic Category I RPV internals is provided in Section 3.9.1. The plant and system operating conditions and design-basis events that provide the basis for the design of the RPV internals are addressed in Section 3.9.3. The preoperational vibration test program for the RPV internals is consistent with the guidelines of RG 1.20 and is addressed in Section 3.9.2.

3.9.5.3 Design Bases

Pursuant to GDC 10, the reactor internals are designed with appropriate margin to assure that specified acceptable fuel design limits are not exceeded during any condition of normal operation, including the effects of anticipated operational occurrences.

The combinations of design and service loadings accounted for in the design of the RPV internals, and the method of combining loads for normal, upset, emergency, and faulted service conditions, are addressed in Section 3.9.3. The allowable design or service limits to be applied to the RPV internals and the effects of service environments, deflection, cycling, and fatigue limits~~—along with a summary of the maximum calculated total stress, deformation, and cumulative usage factor for each designated design or service limit—~~ are addressed in Section 3.9.3.1.

03.09.05-11

Evaluation of the adequacy of dynamic analyses under steady-state and operational flow transient conditions, and the proposed program for pre-operational and startup testing of flow-induced vibration and acoustic resonance for RPV internals, is

- The heavy reflector bottom includes a lip that fits in a ledge machined in the LSP. The reduced radial gap between the ledge and the lip avoids sliding of the heavy reflector.

- The diameter of the UCP is customized to the corresponding core barrel shell inner diameter. This gap is also controlled in order to reduce possible lateral displacement.

03.09.05-8; 03.09.05-9

- The radial key~~s~~ inserts are customized to the corresponding LSP grooves to maintain controlled lateral, circumferential, and vertical clearances. Additional information on the radial keys is provided in Section 3.9.5.1.2.5.~~fabricated both with and without lateral adjustments. The radial gap at the key ends is limited, as is the vertical gap between the keys and the LSP. The radial gaps limit the relative displacement between the LSP and the RPV~~.

3.9.5.4 BWR Reactor Pressure Vessel Internal Including Steam Dryer

This section does not apply to the U.S. EPR.

3.9.5.5 References

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