ArevaEPRDCPEm Resource

From: Pederson Ronda M (AREVA NP INC) [Ronda.Pederson@areva.com]
Sent: Tuesday, January 20, 2009 5:51 PM
To: Getachew Tesfaye
Cc: WILLIFORD Dennis C (AREVA NP INC); KOWALSKI David J (AREVA NP INC); DELANO Karen V (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 87, Supplement 2
Attachments: RAI 87 Supplement 2 Response US EPR DC.pdf

Getachew,

AREVA NP Inc. provided responses to 10 of the 19 questions of RAI No. 87 on November 10, 2008. AREVA NP provided a response to 1 of the remaining 9 questions on December 5, 2008. The attached file, "RAI 87 Supplement 2 Response US EPR DC.pdf" provides technically correct and complete responses to 4 of the remaining 8 questions, as committed in the revised schedule provided on January 8, 2009.

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 87, Supplement 2, Questions 09.05.07-5, 09.01.03-7 and 09.01.03-10.

The following table indicates the respective page(s) in the response document, "RAI 87 Supplement 2 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 87 — 09.05.07-5	2	3
RAI 87 — 09.05.07-6	4	4
RAI 87 — 09.01.03-7	5	5
RAI 87 — 09.01.03-10	6	6

The schedule for technically correct and complete responses to the remaining 4 questions is unchanged and provided below:

Question #	Response Date
RAI 87 — 09.02.04-1	February 13, 2009
RAI 87 — 09.05.07-2	February 20, 2009
RAI 87 — 09.05.07-7	February 20, 2009
RAI 87 — 09.05.07-8	February 20, 2009

Sincerely,

Ronda Pederson
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From: Pederson Ronda M (AREVA NP INC)
Sent: Thursday, January 08, 2009 4:29 PM
To: 'Getachew Tesfaye'
Cc: KOWALSKI David J (AREVA NP INC); DELANO Karen V (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 87, Revised Schedule

Getachew,

AREVA NP Inc. (AREVA NP) provided responses to 10 of the 19 questions of RAI No. 87 on November 10, 2008. AREVA NP provided a response to 1 of the remaining 9 questions on December 5, 2008. However, the table which provided the schedule for technically complete and correct responses to the remaining questions incorrectly stated the Question #'s as "RAI 83" rather than "RAI 87."

In addition to correcting the Question #'s from "RAI 83" to "RAI 87," the schedule for technically correct and complete responses to the remaining 8 questions has been revised and is provided below:

Question #	Response Date
RAI 87 — 09.01.03-7	January 21, 2009
RAI 87 — 09.01.03-10	January 20, 2009
RAI 87 — 09.02.04-1	February 13, 2009
RAI 87 — 09.05.07-2	February 20, 2009
RAI 87 — 09.05.07-5	**January 21, 2009**
RAI 87 — 09.05.07-6	**January 21, 2009**
RAI 87 — 09.05.07-7	February 20, 2009
RAI 87 — 09.05.07-8	February 20, 2009

Sincerely,

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From: DUNCAN Leslie E (AREVA NP INC)
Sent: Friday, December 05, 2008 6:44 PM
To: Getachew Tesfaye
Cc: John Rycyna; Pederson Ronda M (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 87, Supplement 1, FSAR Ch 9

Getachew,

AREVA NP Inc. provided responses to 10 of the 19 questions of RAI No. 87 on November 10, 2008. The attached file, "RAI 87 Supplement 1 Response US EPR DC.pdf" provides technically correct and complete responses to one of the remaining 9 questions, as committed.

Appended to this file are affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the response to RAI 87 Question 09.01.03-4.

The following table indicates the respective pages in the response document, "RAI 87 Supplement 1 Response US EPR DC.pdf" that contain AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 87 — 09.01.03-4	2	2

The schedule for technically correct and complete responses to the remaining 8 questions is unchanged and provided below:

Question #	Response Date
RAI 83 — 09.01.03-7	January 21, 2009
RAI 83 — 09.01.03-10	January 20, 2009
RAI 83 — 09.02.04-1	February 13, 2009
RAI 83 — 09.05.07-2	February 20, 2009
RAI 83 — 09.05.07-5	January 9, 2009
RAI 83 — 09.05.07-6	January 9, 2009
RAI 83 — 09.05.07-7	February 20, 2009
RAI 83 — 09.05.07-8	February 20, 2009

Sincerely,

(Les Duncan on behalf of)

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From: Pederson Ronda M (AREVA NP INC)
Sent: Tuesday, November 11, 2008 2:55 PM
To: 'Getachew Tesfaye'
Cc: WELLS Russell D (AREVA NP INC); DELANO Karen V (AREVA NP INC); DUNCAN Leslie E (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 87, FSAR Ch 9 Correction

Getachew,

On November 10, 2008, AREVA NP transmitted a response to RAI 87 (see below e-mail). However, the table which provided the schedule for technically complete and correct responses to the remaining questions incorrectly stated the Question #'s as "RAI 83" rather than "RAI 87." Accordingly, a corrected table providing

the correct Question #'s is provided below. AREVA NP's response document, "RAI 87 Response US EPR DC.pdf" remains unchanged.

A complete answer was not provided for 9 of the 19 questions. The schedule for technically correct and complete responses to these questions is provided below.

Question #	Response Date
RAI 87 — 09.01.03-4	December 5, 2008
RAI 87 — 09.01.03-7	January 21, 2009
RAI 87 — 09.01.03-10	January 20, 2009
RAI 87 — 09.02.04-1	February 13, 2009
RAI 87 — 09.05.07-2	February 20, 2009
RAI 87 — 09.05.07-5	January 9, 2009
RAI 87 — 09.05.07-6	January 9, 2009
RAI 87 — 09.05.07-7	February 20, 2009
RAI 87 — 09.05.07-8	February 20, 2009

Sincerely,

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From: WELLS Russell D (AREVA NP INC)
Sent: Monday, November 10, 2008 5:48 PM
To: 'Getachew Tesfaye'
Cc: 'John Rycyna'; Pederson Ronda M (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 87, FSAR Ch 9

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 87 Response US EPR DC.pdf" provides technically correct and complete responses to 10 of the 19 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 87 Questions 09.01.03-5, 09.01.03-6, 09.01.03-8, 09.05.07-6, 09.05.07-9 and 09.05.07-10.

The following table indicates the respective pages in the response document, "RAI 87 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 87 — 09.01.03-4	2	2
RAI 87 — 09.01.03-5	3	3
RAI 87 — 09.01.03-6	4	5

RAI 87 — 09.01.03-7	6	6
RAI 87 — 09.01.03-8	7	7
RAI 87 — 09.01.03-9	8	9
RAI 87 — 09.01.03-10	10	10
RAI 87 — 09.02.04-1	11	11
RAI 87 — 09.03.02-1	12	12
RAI 87 — 09.05.07-1	13	13
RAI 87 — 09.05.07-2	14	14
RAI 87 — 09.05.07-3	15	15
RAI 87 — 09.05.07-4	16	16
RAI 87 — 09.05.07-5	17	17
RAI 87 — 09.05.07-6	18	18
RAI 87 — 09.05.07-7	19	19
RAI 87 — 09.05.07-8	20	21
RAI 87 — 09.05.07-9	22	22
RAI 87 — 09.05.07-10	23	23

A complete answer is not provided for 9 of the 19 questions. The schedule for a technically correct and complete response to these questions is provided below.

Question #	Response Date
RAI 83 — 09.01.03-4	December 5, 2008
RAI 83 — 09.01.03-7	January 21, 2009
RAI 83 — 09.01.03-10	January 20, 2009
RAI 83 — 09.02.04-1	February 13, 2009
RAI 83 — 09.05.07-2	February 20, 2009
RAI 83 — 09.05.07-5	January 9, 2009
RAI 83 — 09.05.07-6	January 9, 2009
RAI 83 — 09.05.07-7	February 20, 2009
RAI 83 — 09.05.07-8	February 20, 2009

Sincerely,

(Russ Wells on behalf of)
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From: Getachew Tesfaye [mailto:Getachew.Tesfaye@nrc.gov]
Sent: Thursday, October 09, 2008 3:56 PM
To: ZZ-DL-A-USEPR-DL
Cc: Raul Hernandez; Joshua Wilson; Anne-Marie Grady; Gerard Purciarello; John Segala; Steve Campbell; Christopher Jackson; Joseph Colaccino; John Rycyna
Subject: U.S. EPR Design Certification Application RAI No. 87(1149,1124,1238,992), FSAR Ch. 9

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on September 19, 2008, and on October 8, 2008, you informed us that the RAI is clear and no further clarification is needed. As a result, no change is made to the draft RAI. The schedule we have established for review of your application assumes technically correct and complete responses within 30 days of receipt of RAIs. For any RAIs that cannot be answered within 30 days, it is expected that a date for receipt of this information will be provided to the staff within the 30 day period so that the staff can assess how this information will impact the published schedule.

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

Hearing Identifier: AREVA_EPR_DC_RAIs
Email Number: 132

Mail Envelope Properties (5CEC4184E98FFE49A383961FAD402D319B4E69)

Subject: Response to U.S. EPR Design Certification Application RAI No. 87, Supplement 2
Sent Date: 1/20/2009 5:50:58 PM
Received Date: 1/20/2009 5:51:16 PM
From: Pederson Ronda M (AREVA NP INC)

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Tracking Status: None

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Files	**Size**	**Date & Time**
MESSAGE	10925	1/20/2009 5:51:16 PM
RAI 87 Supplement 2 Response US EPR DC.pdf	328445	

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

Response to

Request for Additional Information No. 87 Supplement 2 (1149,1124,1238,992), Revision 0

10/9/2008

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 09.01.03 - Spent Fuel Pool Cooling and Cleanup System
Application Section: FSAR 9.1.3
SRP Section: 09.02.04 - Potable and Sanitary Water Systems
SRP Section: 09.03.02 - Process and Post-Accident Sampling Systems
SRP Section: 09.05.07 - Emergency Diesel Engine Lubrication System
SBPA and SPCV Branches

Question 09.05.07-5:

10 CFR 52.47(b) (1) requires that a DC application contain the proposed ITAAC that are necessary and sufficient to provide reasonable assurance that, if the ITAAC are performed and the acceptance criteria met, a plant that incorporates the design certification has been constructed and will be operated in conformity with the design certification, the provisions of the Act, and the Commission's rules and regulations

The emergency diesel generators (EDG) provide emergency power that is required by NRC regulations (GDC-17 of Appendix A to 10 CFR 50). Satisfactory installation and testing of the diesel generator lubricating system (DGLS) is necessary for EDG operation to full design requirements. Yet, the FSAR Tier 1 excludes an ITAAC that meets the above requirements. The existing ITAAC does not verify that a) the DGLS is installed in accordance with design, and b) the DGLS will operate in accordance with design, i.e. DGLS operating pressure, temperature differentials, flow rate and heat removal rate are in accordance with the engine manufacturer's recommendations and thus ensure reliable DGLS operation.

Provide an ITAAC in FSAR Tier 1 for the DGLS that meets the above requirements.

Response to Question 09.05.07-5:

U.S. EPR FSAR Tier 1, Section 2.5.4 will be revised to add Figure 2.5.4-2—Emergency Diesel Generator Lubricating Oil System Functional Arrangement. U.S. EPR FSAR Tier 1, Section 2.5.4 will be revised to add, "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."

U.S. EPR FSAR Tier 1, Table 2.5.4-1—Emergency Diesel Generator Equipment Mechanical Design, will be revised to include EDG lubricating oil system equipment that is designed and tested in accordance with ASME Code Section III.

U.S. EPR FSAR Tier 1, Table 2.5.4-2—Emergency Diesel Generator Support Systems Electrical Equipment Design, will be revised to include information related to diesel lubricating oil system valve Class 1E requirements.

U.S. EPR FSAR Tier 1, Section 2.5.4 and Table 2.5.4-4 will be revised to add Item 4.3, "Equipment listed as being controlled by a priority and actuator control system (PACS) module in Table 2.5.4-2 responds to the state requested by a test signal." U.S. EPR FSAR Tier 1, Table 2.5.4-4 acceptance criteria column will be revised to add, "Equipment listed as being controlled by a PACS module in Table 2.5.4-2 responds to the state requested by the signal."

U.S. EPR FSAR Tier 1, Section 2.5.4 and Table 2.5.4-4—Emergency Diesel Generator Inspections, Tests, Analyses, and Acceptance Criteria will be revised to add Item 3.14, "Each EDG lubricating oil system provides lubrication to the engine and turbocharger wearing parts during engine operation." U.S. EPR FSAR Tier 1, Table 2.5.4-4 acceptance criteria column will be revised to add, "Analysis demonstrates each EDG lubricating oil system volume is capable of supporting at least 7 days of full load operation." and, "A test report concludes each EDG and EDG lubricating oil system operating at rated load conditions achieves stable temperatures and pressures within EDG manufacturers recommendations."

U.S. EPR FSAR Tier 1, Section 2.5.4 and Table 2.5.4-4 will be revised to add Item 5.4, “Valves listed in Table 2.5.4-2 fail to the position as shown in Table 2.5.4-2 on loss of power.” U.S. EPR FSAR Tier 1, Table 2.5.4-4 acceptance criteria column will be revised to add, “Following the loss of power, the valves listed in Table 2.5.4-2 fail to the position as shown in Table 2.5.4-2.”

U.S. EPR FSAR Tier 1, Section 2.5.4 and Table 2.5.4-4 will be revised to add Item 6.4 to indicate, “The EDG lubricating oil system heat exchangers as listed in Table 2.5.4-1 have the capacity to transfer the design heat load to the essential service water system.” U.S. EPR FSAR Tier 1, Table 2.5.4-4 acceptance criteria column will be revised to indicate, “The EDG lubricating oil system has the capacity to remove the design heat load via the heat exchangers listed in Table 2.5.4-1.”

U.S. EPR FSAR Tier 1, Section 2.5.4 and Table 2.5.4-4 will be revised to add Item 6.5 to indicate, “Class 1E valves listed in Table 2.5.4-2 can perform the function listed in Table 2.5.4-1 under system design conditions.” U.S. EPR FSAR Tier 1, Table 2.5.4-4 acceptance criteria column will be revised to indicate, “The as-installed valves change position as listed in Table 2.5.4-1 under system design conditions.”

FSAR Impact:

U.S. EPR FSAR Tier 1, Section 2.5.4 will be revised as described in the response and as indicated on the enclosed markup.

Question 09.05.07-6:

The auxiliary lube oil storage tank is needed for a 7-day supply of lube oil to support continuous engine operation and its contents is associated with Technical Specification Limited Condition of Operability (LCO) 3.8.3, yet FSAR Tier 2, Section 9.5.7.2.2 designates this tank as non-safety related. Note that FSAR Tier 2 Figure 9.5.7-1 does not show the C-to-E class-break between the lube oil storage tank and its connected piping and valves, which would indicate that the tank is safety-related.

a) Explain the apparent inconsistency

b) Justify excluding the auxiliary lube oil storage tank from the emergency diesel generator (EDG) mechanical equipment in FSAR Tier 1, Table 2.5.4-1.

c) Finally, justify excluding other safety related diesel generator lubricating system (DGLS) components from FSAR Tier 1 Table 2.5.4-1?

Revise the FSAR accordingly to clarify compliance with the above stated requirements and guidelines.

Response to Question 09.05.07-6:

a) The response to this part of the question was submitted in the initial response to RAI No. 87.

b) The response to this part of the question is provided in the response to Question 09.05.07-5 (RAI 87 Supplement 2).

c) The response to this part of the question is provided in the response to Question 09.05.07-5 (RAI 87 Supplement 2).

FSAR Impact:

U.S. EPR FSAR Tier 2, Section 9.5.7.2.2 will be revised as described in the initial response to RAI No. 87. U.S. EPR FSAR Tier 1, Section 2.5.4 will be revised as described in the response to Question 09.05.07-5.

Question 09.01.03-7:

GDC 61, as related to the system design for fuel storage and handling of radioactive materials, requires that the design includes the capability and capacity to remove corrosion products, radioactive materials and impurities from the pool water and reduce occupational exposures to radiation. Typical purification system design includes filtering in stages to prevent overloading the filters that remove the smallest particulate. However, design data presented for cartridge filters in Table 9.1.3-1 indicates that the cartridge pre-filter retention rating is 1 micron while the cartridge post-filter rating is 10 micron; this is not a typical configuration. Include in the FSAR a more detail description of the design of the purification system.

Response to Question 09.01.03-7:

The cartridge filter retention rating (pore size) in U.S. EPR FSAR Tier 2, Table 9.1.3.1 will be revised to 10 micron for the pre-filter and 1 micron for the post filter. The housings are identical and will use similar disposable filter cartridges that differ only in their retention rating.

FSAR Impact:

U.S. EPR FSAR Tier 2, Table 9.1.3.1 will be revised as described in the response and indicated on the enclosed markup.

Question 09.01.03-10:

In FSAR Tier 2 Chapter 14.2 (Initial Startup Test Program), Test #001 addresses the FPCPS. The system will be tested for various leakage paths, make-up capacity, system flow rates, pump-head, and related critical parameters. The applicant stated that the acceptance criteria for this testing will be in FSAR Tier 2 Section 9.1.3. The staff could not identify the applicable acceptance criteria for Test # 001. Provide in the FSAR a list of the initial conditions and the specific acceptance criteria for Test # 001.

Response to Question 09.01.03-10:

U.S. EPR FSAR Tier 2, Section 14.2.12.1.1 (Test #001), the "Fuel Pool Cooling and Purification System (Test #001)" pre-operational test abstract has been revised for consistency with other tests given in Section 14.2 and in response to RAI 77, Question 14.02-32. In addition, reference has been made to U.S. EPR FSAR Tier 2, Sections 9.1.2 and 9.1.3. The design requirements for the fuel pool cooling and purification system (FPCPS) are provided in Section 9.1.3. The functionality of the spent fuel pool gates is not associated specifically with the FPCPS; however, it has been included in this test since it is most closely related to the testing of this system (the gates are discussed in Section 9.1.2). Testing of the leakage associated with the refueling cavity and the reactor vessel (to the refueling cavity seal) has also been deleted from Test #001 in Section 14.2.12.1.1 as it is outside the scope of the FPCPS. Testing of leakage from the in-containment refueling water storage tank (IRWST) has been moved to Test #022 (U.S. EPR FSAR Tier 2, Section 14.2.12.2.10) because it is more appropriate to add this to the testing of the IRWST.

For most of the tests, it is not possible to generate the COL Holder test acceptance criteria (e.g., values, prescribed limits, or measurable parameters) at this stage of the design process. As stated in the response to RAI 77, Question 14.02-32, test procedures generated by the COL Holder will contain final, explicit, and measurable criteria.

FSAR Impact:

U.S. EPR FSAR Tier 2, Section 14.2.12 will be revised as described in the response and indicated on the enclosed markup.

U.S. EPR Final Safety Analysis Report Markups

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.

09.05.07-5

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 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 designed and tested to ASME Code Section III.

3.2 Piping indicated in Figure 2.5.4-1 and Figure 2.5.4-2 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 and Figure 2.5.4-2 will be designed per ASME Section III.

09.05.07-5

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

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

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

09.05.07-5

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.

3.10 Each EDG has a fuel oil day tank.

3.11 Each fuel oil transfer pump capacity is greater than EDG fuel oil consumption at the continuous rating.

09.05.07-5

3.12 Each EDG starting air system is capable of providing air to start the respective EDG without being recharged.

3.13 Check valves listed in Table 2.5.4-1 will function as listed in Table 2.5.4-1.

3.14 Each EDG lubricating oil system provides lubrication to the engine and turbocharger wearing parts during engine operation.

3.15 Each EDG exhaust path has a bypass exhaust path.

09.05.07-5

I&C Design Features, Alarms, Displays and Controls

4.1 Displays listed in Table 2.5.4-2 and Table 2.5.4-3 are retrievable in the main control room (MCR) and the remote shutdown station (RSS) as listed in Table 2.5.4-2 and Table 2.5.4-3.

4.2 EDG equipment controls are provided in the MCR and RSS as listed in Table 2.5.4-2 and Table 2.5.4-3.

4.3 Equipment listed as being controlled by a priority and actuator control system (PACS) module in Table 2.5.4-2 responds to the state requested by a test signal.

5.0 Electrical Considerations

09.05.07-5

The EDG control power is provided by the EUPS system from the respective division.

5.2 The components identified~~Equipment loads listed~~ as Class 1E in Table 2.5.4-2~~—Emergency Diesel Generator Electrical Equipment Design,~~ are powered from the Class 1E ~~power supplies~~division listed in Table 2.5.4-2.

5.3 Each EDG ~~is sized to provide power to the~~ output rating is greater than the analyzed loads assigned in the respective emergency power supply system (EPSS) division and loads capable of being connected to the EPSS division through ~~an~~ the alternate feed.

5.4 Valves listed in Table 2.5.4-2 fail to the position as shown in Table 2.5.4-2 on loss of power.

6.0 Equipment and System Performance

6.1 Each EDG is started by a protection system loss of offsite power (LOOP) signal from the respective EPSS division medium voltage bus.

6.2 Each EDG is started by a protection system safety injection system (SIS) actuation signal.

6.3 Each EDG will start and connect to the respective EPSS division medium voltage bus in an undervoltage condition concurrent with a SIS actuation signal.

6.4 The EDG lubricating oil system heat exchangers listed in Table 2.5.4-1 have the capacity to transfer the design heat load to the essential service water system.

6.5 Class 1E valves listed in Table 2.5.4-2 can perform the function listed in Table 2.5.4-1 under system design conditions.

7.0 Inspection, Tests, Analyses and Acceptance Criteria

7.1 Table 2.5.4-~~3~~4—Emergency Diesel Generator Inspections, Tests, Analyses, and Acceptance Criteria, provides the ITAAC for the EDGs.

09.05.07-5

Table 2.5.4-1—Emergency Diesel Generator Equipment Mechanical Design (~~2~~6 Sheets)

Equipment Description	Equipment Tag Number (1)	Equipment Location	ASME Code Section III	Function	Seismic Category
Fuel Oil Day Tank	30XJN20BB002	Division 2 Emergency Power Generating Building	Yes	Storage Volume	I
Fuel Oil Day Tank	30XJN30BB002	Division 3 Emergency Power Generating Building	Yes	Storage Volume	I
Fuel Oil Day Tank	30XJN40BB002	Division 4 Emergency Power Generating Building	Yes	Storage Volume	I
Lube Oil System Valve	30XJV10AA170 30XJV20AA170 30XJV30AA170 30XJV40AA170	Division 1 EPGB Division 2 EPGB Division 3 EPGB Division 4 EPGB	Yes	Open, close	I
Lube Oil System Valve	30XJV10AA171 30XJV20AA171 30XJV30AA171 30XJV40AA171	Division 1 EPGB Division 2 EPGB Division 3 EPGB Division 4 EPGB	Yes	Open, close	I
Lube Oil System Valve	30XJV10AA154 30XJV20AA154 30XJV30AA154 30XJV40AA154	Division 1 EPGB Division 2 EPGB Division 3 EPGB Division 4 EPGB	Yes	Open, close	I
Lube Oil Temperature Control Valve	30XJV10AA111 30XJV20AA111 30XJV30AA111 30XJV40AA111	Division 1 EPGB Division 2 EPGB Division 3 EPGB Division 4 EPGB	Yes	Open, close	I
Lube Oil Strainer Supply Selector Valve	30XJV10AA265 30XJV20AA265 30XJV30AA265	Division 1 EPGB Division 2 EPGB Division 3 EPGB	Yes	Open, close	I

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Table 2.5.4-1—Emergency Diesel Generator Equipment Mechanical Design (~~2~~6 Sheets)

Equipment Description	Equipment Tag Number (1)	Equipment Location	ASME Code Section III	Function	Seismic Category
	30XJV40AA265	Division 4 EPGB			
Lube Oil Pump Discharge Filter Selection Valve	30XJV10AA260 30XJV20AA260 30XJV30AA260 30XJV40AA260	Division 1 EPGB Division 2 EPGB Division 3 EPGB Division 4 EPGB	Yes	Open, close	I
Lube Oil System Heat Exchanger	30XJV10AC001 30XJV20AC001 30XJV30AC001 30XJV40AC001	Division 1 EPGB Division 2 EPGB Division 3 EPGB Division 4 EPGB	Yes	Heat transfer device	I
Check Valve	30XJV10AA207 30XJV20AA207 30XJV30AA207 30XJV40AA207	Division 1 EPGB Division 2 EPGB Division 3 EPGB Division 4 EPGB	Yes	Open, close	I
Check Valve	30XJV10AA206 30XJV20AA206 30XJV30AA206 30XJV40AA206	Division 1 EPGB Division 2 EPGB Division 3 EPGB Division 4 EPGB	Yes	Open, close	I
Lube Oil Filter	30XJV10AT110A 30XJV20AT110A 30XJV30AT110A 30XJV40AT110A	Division 1 EPGB Division 2 EPGB Division 3 EPGB Division 4 EPGB	Yes	Filter	I
Lube Oil Filter	30XJV10AT110B 30XJV20AT110B 30XJV30AT110B 30XJV40AT110B	Division 1 EPGB Division 2 EPGB Division 3 EPGB Division 4 EPGB	Yes	Filter	I

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Table 2.5.4-1—Emergency Diesel Generator Equipment Mechanical Design (~~2~~6 Sheets)

Equipment Description	Equipment Tag Number (1)	Equipment Location	ASME Code Section III	Function	Seismic Category
Lube Oil Strainer	30XJV10AT115A 30XJV20AT115A 30XJV30AT115A 30XJV40AT115A	Division 1 EPGB Division 2 EPGB Division 3 EPGB Division 4 EPGB	Yes	Filter	I
Lube Oil Strainer	30XJV10AT115B 30XJV20AT115B 30XJV30AT115B 30XJV40AT115B	Division 1 EPGB Division 2 EPGB Division 3 EPGB Division 4 EPGB	Yes	Filter	I
Lube Oil Pump	30XJV10AP110 30XJV20AP110 30XJV30AP110 30XJV40AP110	Division 1 EPGB Division 2 EPGB Division 3 EPGB Division 4 EPGB	Yes	Run	I
Lube Oil Pump Suction Strainer	30XJV10AT109 30XJV20AT109 30XJV30AT109 30XJV40AT109	Division 1 EPGB Division 2 EPGB Division 3 EPGB Division 4 EPGB	Yes	Filter	I
Engine Sump	30XJV10BB110 30XJV20BB110 30XJV30BB110 30XJV40BB110	Division 1 EPGB Division 2 EPGB Division 3 EPGB Division 4 EPGB	Yes	Storage volume	I
Lube Oil Tank	30XJV10BB100 30XJV20BB100 30XJV30BB100 30XJV40BB100	Division 1 EPGB Division 2 EPGB Division 3 EPGB Division 4 EPGB	Yes	Storage volume	I

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Table 2.5.4-1—Emergency Diesel Generator Equipment Mechanical Design (~~2~~6 Sheets)

Equipment Description	Equipment Tag Number (1)	Equipment Location	ASME Code Section III	Function	Seismic Category
Keep-Warm/Prelube Pump Relief Valve	30XJV10AA194 30XJV20AA194 30XJV30AA194 30XJV40AA194	Division 1 EPGB Division 2 EPGB Division 3 EPGB Division 4 EPGB	Yes	Open	I
Keep-Warm/Prelube Pump	30XJV10AP170 30XJV20AP170 30XJV30AP170 30XJV40AP170	Division 1 EPGB Division 2 EPGB Division 3 EPGB Division 4 EPGB	N/A	Stop	II
Lube Oil Keep-Warm Heater	30XJV10AH170 30XJV20AH170 30XJV30AH170 30XJV40AH170	Division 1 EPGB Division 2 EPGB Division 3 EPGB Division 4 EPGB	N/A	De-energize	II
Lube Oil Strainer	30XJV10AT272A 30XJV20AT272A 30XJV30AT272A 30XJV40AT272A	Division 1 EPGB Division 2 EPGB Division 3 EPGB Division 4 EPGB	N/A	Filter	II
Lube Oil Strainer	30XJV10AT272B 30XJV20AT272B 30XJV30AT272B 30XJV40AT272B	Division 1 EPGB Division 2 EPGB Division 3 EPGB Division 4 EPGB	N/A	Filter	II
Keep-Warm/Prelube Pump Duplex Suction Strainer Selection Valve	30XJV10AA272 30XJV20AA272 30XJV30AA272 30XJV40AA272	Division 1 EPGB Division 2 EPGB Division 3 EPGB Division 4 EPGB	N/A	Open, close	II

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Delete Table

Table 2.5.4-2—Emergency Diesel Generator Support Systems Electrical Equipment Design (2 Sheets)

Equipment Description	Equipment Tag Number (1)	IEEE Class 1E	MCR / RSS Displays	MCR / RSS Controls
Emergency Diesel Generator	30XKA10AG	Yes	Generator voltage, current, frequency, power, reactive power. Engine running, not running / Generator voltage, current, frequency, power, reactive power. Engine running, not running	Generator output voltage raise-lower, output breaker close-trip. Engine start-stop, governor raise-lower / Generator output voltage raise-lower, output breaker close-trip. Engine start-stop, governor raise-lower
Emergency Diesel Generator	30XKA20AG	Yes	Generator voltage, current, frequency, power, reactive power. Engine running, not running / Generator voltage, current, frequency, power, reactive power. Engine running, not running	Generator output voltage raise-lower, output breaker close-trip. Engine start-stop, governor raise-lower / Generator output voltage raise-lower, output breaker close-trip. Engine start-stop, governor raise-lower
Emergency Diesel Generator	30XKA30AG	Yes	Generator voltage, current, frequency, power, reactive power. Engine running, not running / Generator voltage, current, frequency, power, reactive power. Engine running, not running	Generator output voltage raise-lower, output breaker close-trip. Engine start-stop, governor raise-lower / Generator output voltage raise-lower, output breaker close-trip. Engine start-stop, governor raise-lower
Emergency Diesel Generator	30XKA40AG	Yes	Generator voltage, current, frequency, power, reactive power. Engine running, not running / Generator voltage, current, frequency, power, reactive power. Engine running, not running	Generator output voltage raise-lower, output breaker close-trip. Engine start-stop, governor raise-lower / Generator output voltage raise-lower, output breaker close-trip. Engine start-stop, governor raise-lower
Fuel Oil Transfer Pump	30XJN10AP001 A	Division 1	On-Off / On-Off	Start-Stop / Start-Stop

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Delete Table

~~Table 2.5.4-2—Emergency Diesel Generator~~ Support Systems ~~Electrical Equipment Design (2 Sheets)~~

~~Equipment Description~~	~~Equipment Tag Number (1)~~	~~IEEE Class 1E~~	~~MCR / RSS Displays~~	~~MCR / RSS Controls~~
~~Fuel Oil Transfer Pump~~	~~30XJN20AP001 A~~	~~Division 2~~	~~On-Off / On-Off~~	~~Start-Stop / Start-Stop~~
~~Fuel Oil Transfer Pump~~	~~30XJN30AP001 A~~	~~Division 3~~	~~On-Off / On-Off~~	~~Start-Stop / Start-Stop~~
~~Fuel Oil Transfer Pump~~	~~30XJN40AP001 A~~	~~Division 4~~	~~On-Off / On-Off~~	~~Start-Stop / Start-Stop~~

(1) Equipment tag numbers are provided for information only and are not part of the certified design.

Table 2.5.4-2—Emergency Diesel Generator Support Systems Electrical Equipment Design

Equipment Description	Equipment Tag Number (1)	IEEE Class 1E Source	Failure Position	PACS	MCR / RSS Displays	MCR / RSS Controls
Fuel Oil Transfer Pumps	30XJN10AP001A 30XJN20AP001A 30XJN30AP001A 30XJN40AP001A	Division 1 Division 2 Division 3 Division 4	N/A	Yes	On-Off / On-Off	Start-Stop / Start-Stop
Lube Oil System Valves	30XJV10AA170 30XJV20AA170 30XJV30AA170 30XJV40AA170	Division 1 Division 2 Division 3 Division 4	Closed	Yes	None / None	None / None
Lube Oil System Valves	30XJV10AA171 30XJV20AA171 30XJV30AA171 30XJV40AA171	Division 1 Division 2 Division 3 Division 4	Closed	Yes	None / None	None / None
Lube Oil System Valve	30XJV10AA154 30XJV20AA154 30XJV30AA154 30XJV40AA154	Division 1 Division 2 Division 3 Division 4	Closed	Yes	None / None	None / None

(1) Equipment tag numbers are provided for information only and are not part of the certified design.

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New Table

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
2.1	The functional arrangement of the EDG fuel oil system is as shown in Figure 2.5.4-1.	An inspection will be performed.	The as-built EDG fuel oil system conforms to the functional arrangement as shown in Figure 2.5.4-1.
2.2	EDGs and their respective support systems are located as listed in Table 2.5.4-1.	An inspection will be performed.	EDGs listed in Table 2.5.4-1 and their respective support systems are located as listed in Table 2.5.4-1.
2.3	~~There are four independent EDGs~~Deleted.	~~An inspection will be performed~~Deleted.	~~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	An inspection will be performed.	The as-built EDG lubricating oil system conforms to the functional arrangement as shown in Figure 2.5.4-2.
2.5	The functional arrangement of the EDG air intake and exhaust system is shown in Figure 2.5.4-3.	An inspection will be performed.	The as-built EDG air intake and exhaust system conforms to the functional arrangement shown in Figure 2.5.4-3.
3.1	Equipment listed in Table 2.5.4-1 as ASME Code Section III is designed and tested to ASME Code Section III.	An inspection will be performed.	A report exists and concludes that the components listed as ASME Code Section III in Table 2.5.4-1 have been designed and tested in accordance ASME Code Section III requirements.

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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
3.2	Piping indicated in Figure 2.5.4-1 and Figure 2.5.4-2 as ASME Code Section III is designed and tested in accordance with ASME Code Section III.	a. Analysis will be performed. b. An inspection will be performed.	a. ASME Code Section III stress reports exist and conclude that the as-designed piping identified as ASME Code Section III in Figure 2.5.4-1 and Figure 2.5.4-2 meets ASME Code Section III design requirements. b. A report exists and concludes that the piping as indicated in Figure 2.5.4-1 and Figure 2.5.4-2 as ASME Code Section III has been welded in accordance with ASME Code Section III welding requirements. A report exists and concludes that the piping as indicated in Figure 2.5.4-1 and Figure 2.5.4-2 as ASME Code Section III has been hydrostatically tested in accordance with ASME Code Section III requirements.

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Table 2.5.4-34—Emergency Diesel Generator Inspections, Tests, Analyses, and Acceptance Criteria (4 68 Sheets)

	Commitment Wording	Inspection, Test or Analysis	Acceptance Criteria
3.3	Supports for piping shown as ASME Section III on fFigure 2.5.4-1 and Figure 2.5.4-2 will be designed per ASME Section III.	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 and 2.5.4-2 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 and 2.5.4-2. 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 and 2.5.4-2.
3.4	Specifications exist for components listed as ASME Section III in Table 2.5.4-1.	An inspection will be performed.	Specifications exist for components listed as ASME Section III in Table 2.5.4-1.
3.5	Specifications exist for piping shown as ASME Section III on fFigure 2.5.4-1 and Figure 2.5.4-2.	An inspection will be performed.	Specifications exist for piping identified as ASME Section III on Figure 2.5.4-1 and Figure 2.5.4-2.
3.6	Specifications exist for supports for piping shown as ASME Section III on fFigure 2.5.4-1 and Figure 2.5.4-2.	An inspection will be performed.	Specifications exist for supports for piping shown as ASME Section III on Figure 2.5.4-1 and Figure 2.5.4-2.

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Table 2.5.4-34—Emergency Diesel Generator Inspections, Tests, Analyses, and Acceptance Criteria (4 of 8 Sheets)

Commitment Wording		Inspection, Test or Analysis	Acceptance Criteria
3.9	Each EDG has a fuel oil storage tank.	An inspection and analysis will be performed.	Each EDG fuel oil storage tank capacity is greater than the volume of fuel oil consumed by the EDG operating at the continuous rating for seven days.
3.10	Each EDG has a fuel oil day tank.	An inspection and analysis will be performed.	Each EDG fuel oil day tank capacity is greater than the volume of fuel oil consumed by the EDG operating at the continuous rating for two hours.
3.11	Each fuel oil transfer pump capacity is greater than EDG fuel oil consumption at the continuous rating.	A test will be performed.	The capacity of each fuel oil transfer pump is greater than EDG fuel oil consumption at the continuous rating.
3.12	Each EDG starting air system is capable of providing air to start the respective EDG without being recharged.	A test will be performed.	Each EDG starts five consecutive times without recharging respective starting air receivers between EDG starts.
3.13	Check valves listed in Table 2.5.4-1 will function as listed in Table 2.5.4-1.	Tests will be performed for the operation of the check valves listed in Table 2.5.4-1.	The check valves listed in Table 2.5.4-1 perform the functions listed in Table 2.5.4-1.
3.14	Each EDG lubricating oil system provides lubrication to the engine and turbocharger wearing parts during engine operation.	Analysis and tests will be performed.	a. Analysis demonstrates each EDG lubricating oil system oil volume is capable of supporting at least 7 days of full load operation. b. A test report concludes each EDG and lubricating oil system operating at rated load conditions achieves stable temperatures and pressures within EDG manufacturers recommendations.

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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
4.2	EDG equipment controls are provided in the MCR and RSS as listed in Table 2.5.4-2 and Table 2.5.4-3.	A test will be performed.	Controls listed in Table 2.5.4-2 and Table 2.5.4-3 as being in the MCR exist in the MCR. Controls listed in Table 2.5.4-2 and Table 2.5.4-3 as being in the RSS exist in the RSS.
4.3	Equipment listed as being controlled by a PACS module in Table 2.5.4-2 responds to the state requested by a test signal.	A test will be performed using test signals.	Equipment listed as being controlled by a PACS module in Table 2.5.4-2 responds to the state requested by the signal.
5.1	The EDG control power is provided by the EUPS system from the respective division.	A test will be performed on each EDG system by providing a test signal in only one division.	The test signal exists in only the EDG system under test when a test signal is applied in each EDG system.
5.2	~~Equipment loads listed~~ The components identified as Class 1E in Table 2.5.4-2 are powered from the Class 1E ~~power supplies~~division listed in Table 2.5.4-2.	A test will be performed ~~on~~ for components ~~designated~~ identified as Class 1E in Table 2.5.4-2 by providing a test signal in each division.	The test signal provided in ~~the~~ each division is present at the respective Class 1E components ~~loads~~ identified in Table 2.5.4-2.
5.3	Each EDG output rating is ~~sized to provide power to~~greater than the analyzed ~~the~~ loads assigned in the respective EPSS division and loads capable of being connected to the EPSS division through ~~an~~ the alternate feed.	An ~~test~~ analysis will be performed.	An analysis concludes ~~Each~~ each EDG output rating is ~~capable of supplying~~greater than the analyzed loads assigned in the respective EPSS division and loads capable of being connected to the EPSS division through ~~an~~ the alternate feed.
5.4	Valves listed in Table 2.5.4-2 fail to the position as shown in Table 2.5.4-2 on loss of power.	Testing will be performed for the valves listed in Table 2.5.4-2 to verify the position of valves on loss of power.	Following the loss of power, the valves listed in Table 2.5.4-2 fail to the position as shown in Table 2.5.4-2.

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Table 2.5.4-34—Emergency Diesel Generator Inspections, Tests, Analyses, and Acceptance Criteria (4 68 Sheets)

Commitment Wording		Inspection, Test or Analysis	Acceptance Criteria
6.3	Each EDG will start and connect to the respective EPSS division medium voltage bus in an undervoltage condition concurrent with a SIS actuation signal.	A test will be performed.	Each EDG starts and connects to the respective EPSS division medium voltage bus in an undervoltage condition concurrent with a SIS actuation signal. As loads are sequenced onto EPSS buses, EDG nominal output voltage and frequency remain ≥ 75 percent and 95 percent, respectively. Voltage and frequency are restored to within 10 percent and 2 percent nominal, respectively within 60 percent of each load sequence step.
6.4	The EDG lubricating oil system heat exchanger as listed in Table 2.5.4-1 have the capacity to transfer the design heat load to the essential service water system.	Analysis will be performed to demonstrate the capability of the EDG lubricating oil system heat exchangers as listed in Table 2.5.4-1 to transfer the design heat load to the essential service water system.	The EDG lubricating oil system has the capacity to remove the design heat load via the heat exchangers listed in Table 2.5.4-1.
6.5	Class 1E valves listed in Table 2.5.4-2 can perform the function listed in Table 2.5.4-1 under system design conditions.	Tests and analyses or a combination of tests and analyses will be performed to demonstrate the ability of the valves listed in Table 2.5.4-2 to change position as listed in Table 2.5.4-1 under system design conditions.	The as-installed valves change position as listed in Table 2.5.4-1 under system design conditions.

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Figure 2.5.4-2—Emergency Diesel Generator Lubricating Oil System Functional Arrangement
Sheet 1 of 4

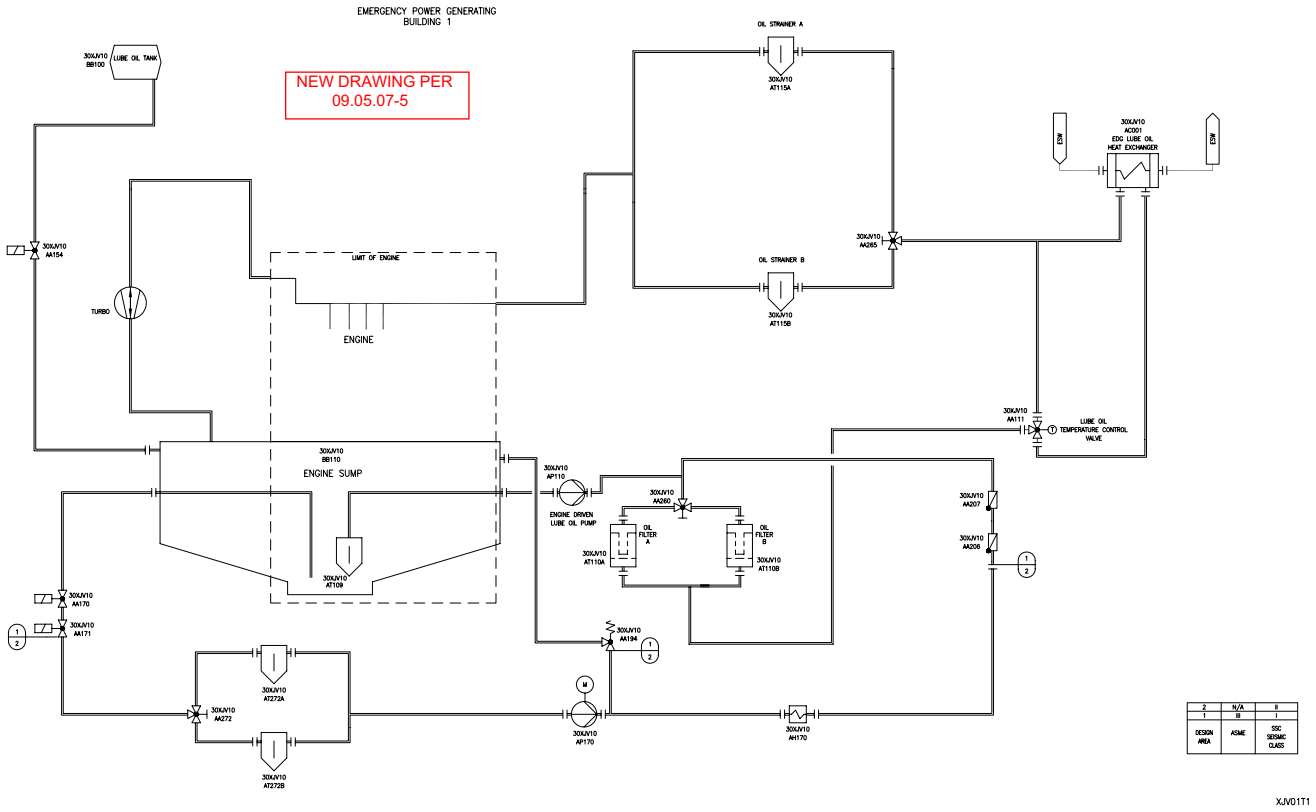


Figure 2.5.4-2—Emergency Diesel Generator Lubricating Oil System Functional Arrangement
Sheet 2 of 4

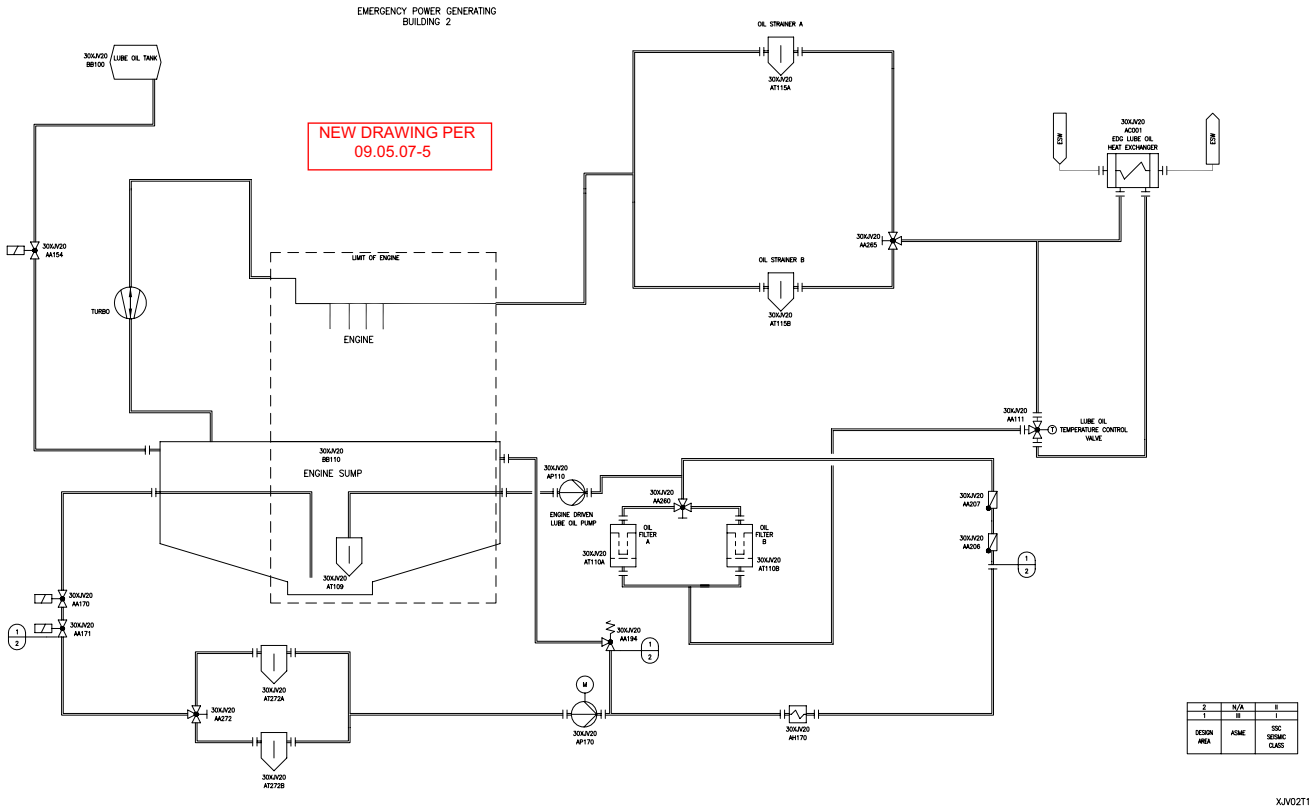


Figure 2.5.4-2—Emergency Diesel Generator Lubricating Oil System Functional Arrangement
Sheet 3 of 4

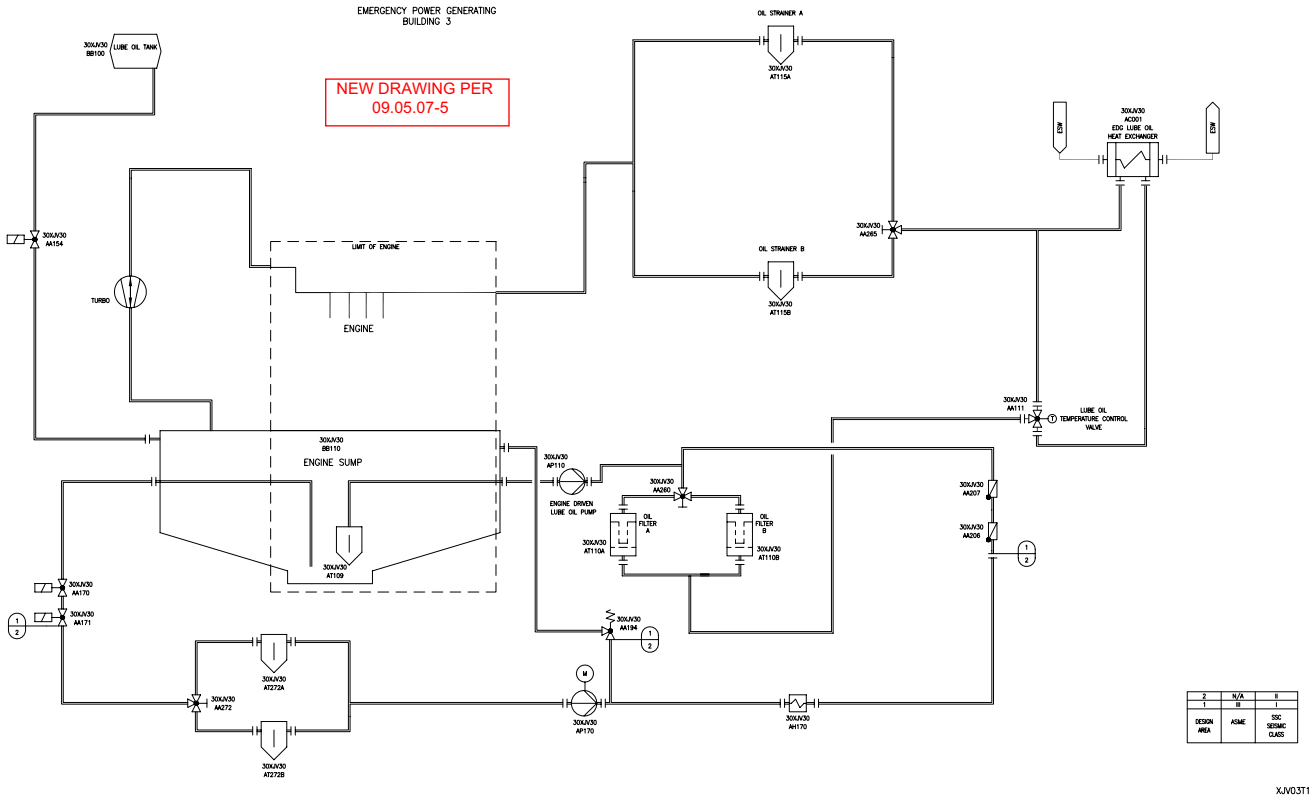
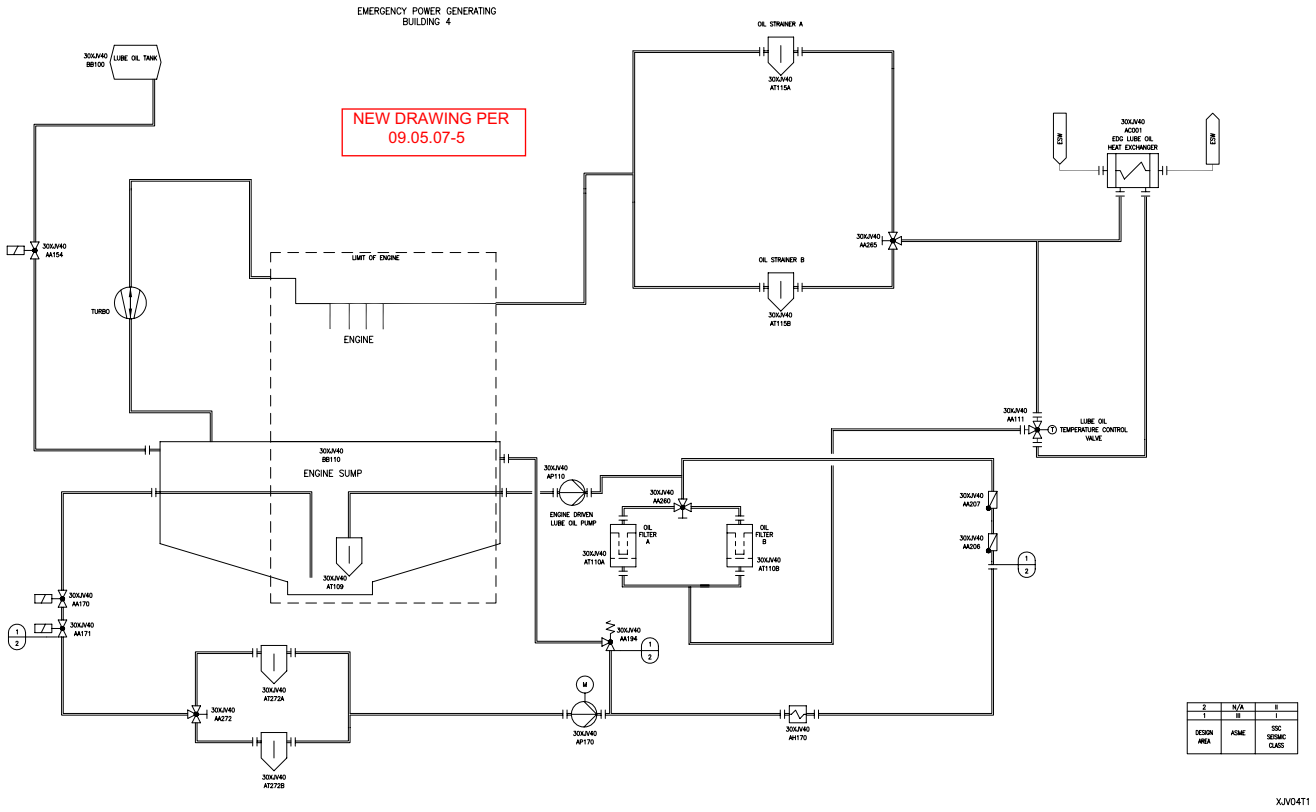


Figure 2.5.4-2—Emergency Diesel Generator Lubricating Oil System Functional Arrangement
Sheet 4 of 4



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9.5.7 Diesel Generator Lubricating Oil System

The diesel generator lubricating oil system (DGLS) stores and supplies the necessary clean lubricating oil to the engine bearings, crankshaft, turbocharger, and other moving parts of the engine for the operation of the EDGs. In standby mode, the system provides prelube to the diesel engine and maintains minimum lube oil temperature to facilitate quick starting, if required. Each EDG has a separate, independent engine lubricating oil system.

9.5.7.1 Design Basis

The DGLS, with the exception of the prelube and keep-warm portion, is safety related and is required to function following a DBA in order to place and maintain the plant in a safe shutdown condition.

The design basis of DGLS must meet the following:

- Provide protection from the effects of natural phenomena, such as earthquakes, tornadoes, hurricanes, floods, and external missiles (GDC 2).
- Remain functional after an SSE and performs its intended function following the postulated hazards of internal missiles or pipe break (GDC 4).
- Provide the shared systems and components important to safety the ability to perform required safety functions (GDC 5).
- Provide a four independent division design to make sure that safety functions are performed, assuming a single active component failure coincident with the LOOP (GDC 17).
- Provide the capability for active components to be tested during plant operation. Provisions are made to allow the inservice inspection of components (GDC 45 and 46).
- To the extent practicable, the system is designed and fabricated to codes consistent with the quality group classification assigned by RG 1.26 and the seismic category assigned by RG 1.29. The power supply and control functions are in accordance with RG 1.32.
- Capability to isolate components or piping is provided to deal with leakage or malfunctions (GDC 44).
- The DGLS is designed to provide adequate lubrication and cooling for the various moving parts of the engine to permit it to be operated at continuous nameplate rating for a minimum of seven days without replenishing the system.
- The DGLS for the EDGs has a safety-related function to provide essential lubrication to the engine and turbocharger wearing parts during emergency starts

the potential for engine oil leakage. The system consists of an exhauster, an oil separator, piping, valves, and instrumentation. The exhauster discharge is piped to the engine exhaust system.

The layout of piping and main components (i.e., strainers, pumps, valves, coolers, and filters) provides the space required to permit inspection, cleaning, maintenance, and repair of the system.

9.5.7.2.2 Component Description

The major components of the DGLS are described in the following paragraphs. The safety classification and seismic design classification for these components, along with their design and fabrication code, are provided in Section 3.2. The safety-related portion of DGLS is designed and constructed in accordance with quality group C and Seismic Category I. The non-safety-related portion is designed and constructed in accordance with quality group E and Seismic Category NSC.

Main Suction Strainer

A full flow duplex strainer is installed in the lube oil flow path prior to the main engine-driven lube oil pump to prevent foreign material that may have accumulated in the sump from causing damage to the pump. Each element is 100 percent capacity to enable online maintenance. The strainer is monitored for differential pressure to alert operators when a degraded condition exists and the strainer needs to be switched over and cleaned. This strainer is safety-related.

Engine-Driven Pump

The safety-related main oil pump is a positive displacement, rotary pump, driven by the engine. The pump draws oil from the engine sump and delivers it under pressure to the lubricating oil system. A relief valve at the pump discharge provides the required overpressure protection. A failure of this pump constitutes an engine failure. The pump failure is detected by low lubricating oil pressure or by a rise in the bearing temperature. Suction and discharge pressure are monitored to provide indication of and pump performance. See Section 8.3 for the details of instrumentation.

Lubricating Oil Cooler

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The safety-related lube oil cooler is a single pass, counter-flow, shell and tube heat exchanger supplied by the plant ESWS. The lubricating oil heat exchanger has the capacity for cooling the total lubricating oil system flow to the required inlet temperature for engine operation at 110 percent rated load with an operating margin to allow fouling and tube plugging. The engine lube oil circulates through the shell side and the plant essential service water circulates through the tube side of the cooler.

Figure 9.5.7-1—Emergency Diesel Generator Lubricating Oil System

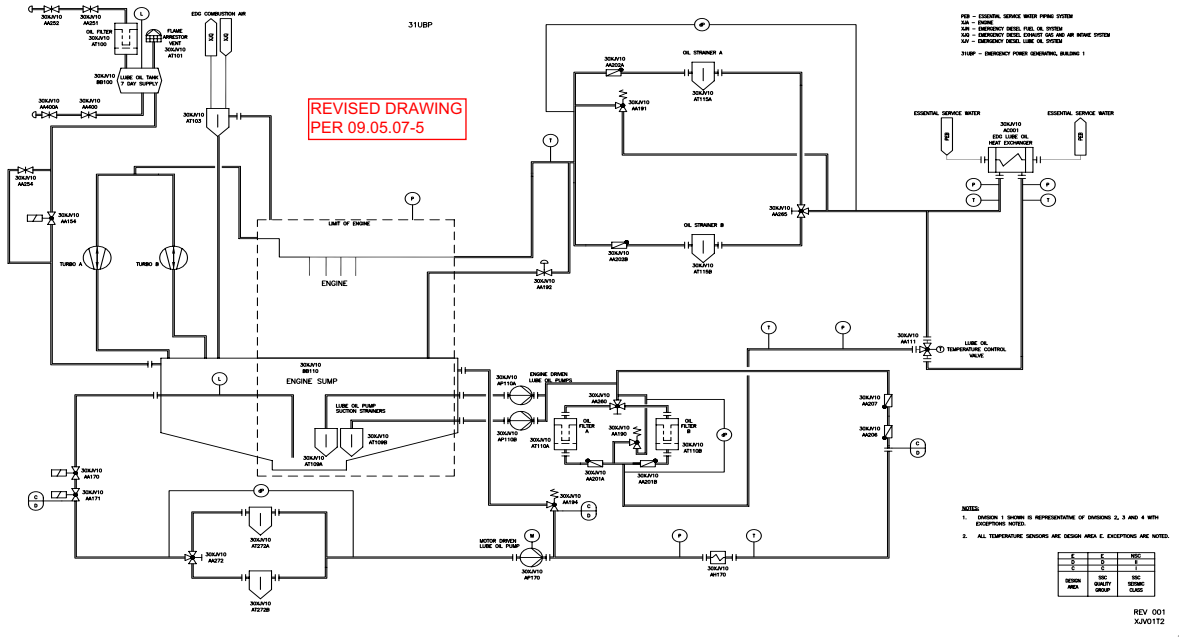

Table 9.1.3-1—Fuel Pool Cooling and Purification System Component Design Data
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FPPS Mixed Bed Ion Exchanger	
Resin Volume	106 ft^3
Design Pressure	175 psig
Design Temperature	140°F
Sieve Tray Gap Width	0.008 in
Material	Austenitic stainless steel
Resin Trap for Mixed Bed Ion Exchanger	
Type	Sieve basket
Mesh Size	200 micron
Design Pressure	175 psig
Design Temperature	140°F
Material	Austenitic stainless steel
Cartridge Pre-filter	
Type	Cartridge type filter
Retention Rate	~~1~~10 micron
Design Pressure	175 psig
Design Temperature	140°F
Material	Austenitic stainless steel
Cartridge Post Filter	
Type	Cartridge type filter
Retention Rate	~~10~~ 1 micron
Design Pressure	175 psig
Design Temperature	140°F
Material	Austenitic stainless steel

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- The sequential schedule for individual startup tests should establish, insofar as practicable, that test requirements should be completed prior to exceeding 25 percent power for SSC that are relied on to prevent, limit, or mitigate the consequences of postulated accidents.

- Approved test procedures should be in a form suitable for review by regulatory inspectors at least 60 days prior to their intended use or at least 60 days prior to fuel loading for fuel loading and startup test procedures.

~~The EPR startup schedule is as provided in Figure 14.2-1—Figure DeletedU.S. EPR Commissioning Milestones.~~

14.2.12 Individual Test Descriptions

The individual preoperational test abstracts identified in this section contain test descriptions that form one part of the bases for defining the minimum testing requirements.

In these abstracts:

- References to design or design requirements generally mean functional design or functional design requirements. For example, ~~actual~~ SSC may have higher design capacity than what is functionally required.

- Acceptance criteria are based on system design parameters that are used in the safety analysis and on programmatic requirements. For example, programmatic testing requirements for the pump and valve testing are described in Section 3.9.6.

Detailed EPR preoperational test procedures:

- Accomplish the testing described in the test abstracts via multiple test procedures that may be executed at different times.

- Establishes the prerequisite conditions per individual test requirements. For example, heating, ventilation, air conditioning (HVAC) testing will be done at current environmental conditions, not extremes of design-assumed temperatures.

- Include data requirements for individual tests in more detail (as necessary for verifying test objectives).

14.2.12.1 NSSS Support Systems

14.2.12.1.1 Fuel Pool Cooling and Purification System (Test #001)

1.0 OBJECTIVE

1.1 To demonstrate proper operation of the fuel pool cooling and purification system (FPCPS).~~the capability to remove decay heat from the spent fuel pool.~~

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1.2 To ~~demonstrate the capability to purify the~~identify any spent fuel pool leakage.

1.3 To demonstrate electrical independence and redundancy of power supplies.

2.0 PREREQUISITES

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2.1 Construction activities on the ~~fuel pool cooling and purification system (~~FPCPS~~)~~ have been completed.

2.2 FPCPS system instrumentation has been calibrated and is functional for performance of the following test.

2.3 Test instrumentation available and calibrated per site procedures.

2.4 Component cooling water system (CCWS) water is available to the fuel pool cooling heat exchanger.

2.5 Support systems required for the operation of the FPCPS are complete and functional.~~The leak tests on the following subsystems have been completed.~~

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2.5.1 ~~Fuel pool.~~

2.5.2 ~~Refueling cavity.~~

2.5.3 ~~IRWST.~~

2.5.4 ~~Reactor vessel to refueling cavity seal.~~

2.6 ~~Support systems required for the operation of the FPCPS are complete and functional.~~The following have been filled to normal level, or shall be during the performance of this test:

2.6.1 Spent fuel pool.

2.6.2 Refueling cavity.

2.6.3 IRWST.

3.0 TEST METHOD

3.1 ~~Verify~~Measure the head versus flow curves for pumps.

3.2 Operate each FPC train when aligned for one and two pump operation and measure flow to the SFP.

3.3 Observe the operation of each FPC train isolation valve during FPC pump start and stop.

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3.4 Measure each FPC heat exchanger differential pressure at design flows.

3.5 ~~Verify that~~Observe operation of instrument and controls (manual and automatic), including setpoints, actuations, instrument interlocks and alarms using actual or simulated inputs over the full range of the SFP instrumentation operation.

3.6 ~~Verify~~Check the functionality of the spent fuel pool gates and quantify gate leakage.

DELETED MATERIAL
Old Steps:

3.6 Verify no leakage of the refueling cavity by checking the LDS.

3.7 Verify no leakage of the IRWST by checking the LDS.

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3.7 ~~Verify~~Check to determine if the anti-siphon~~s~~ pipes and holes on the FPCPS ~~suction~~ lines are free of obstructions.

3.8 ~~Verify no~~Quantify leakage of the spent fuel pool by checking the spent fuel pool leak detection system ~~(LDS)~~.

3.9 Operate the Fuel Building purification pump and then the Reactor Building purification pump and measure flow when the system is aligned to the purification ion exchanger, filtering the following:~~Verify that the purification system meets the design flowrate and filtration capacity when aligned to the following:~~

3.9.1 Spent fuel pool.

3.9.2 Refueling cavity.

3.9.3 IRWST.

3.10 Measure differential pressure across the FPP ion exchanger, pre-filter, and post filter.

3.11 Measure the performance characteristics of power-operated valves (e.g., thrust, stroke time, fail position upon loss of motive power) as designed. ~~(Refer to Section 9.1.3).~~

3.12 Operate control valves remotely while:

a. Observing each valve operation and position indication.

b. Measuring valve performance data (e.g., thrust, opening and closing times).

3.13 Check electrical independence and redundancy of power supplies for safety-related functions by selectively removing power and determining loss of function.

4.0 DATA REQUIRED

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4.1 Pump head versus flow and operating data for each pump.

4.2 FPC pump flows for tested alignments.

4.3 FPC isolation valve performance results.

4.4 FPC heat exchanger pressure drop results.

4.5 FPP pump flows for tested alignments.

4.6 FPP ion exchanger, pre-filter, and post filter pressure drop results.

4.7 Setpoints of alarms interlocks and controls.

4.8 ~~Flow data through various system flow paths~~Anti-siphon device inspection report.

4.9 Spent f~~F~~uel pool gate leakage data.

4.10 Valve performance data.

4.11 Control valve operation and position.

5.0 ACCEPTANCE CRITERIA

5.1 The FPCPS meets design requirements (refer to Section 9.1.2 and ~~performs as described in~~ Section 9.1.3).

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5.1.1 FPCS pump performance within limits.

5.1.2 FPCS instrument and controls, interlocks, and alarms function as designed.

5.1.3 Design flows are achieved for both one FPC pump and two FPC pump system operation.

5.1.4 FPC isolation valves operate as designed (valve open on pump start and close on pump stop).

5.1.5 The pressure drop for each heat exchanger is within design limits.

5.1.6 The FPC anti-siphon lines and holes are free of obstructions.

5.1.7 FPP pump performance within limits.

5.1.8 FPP controls, interlocks, and alarms function as designed.

5.1.9 Spent fuel pool leakage within design limits.

5.1.10 Valve performance within design limits.

5.1.11 Gate performance within design limits.

5.2 Verify that safety-related components meet electrical independence and redundancy requirements.

14.2.12.1.2 CVCS Volume Control Tank (Test #002)

1.0 OBJECTIVE

1.1 To ~~verify~~demonstrate proper operation of the volume control tank (VCT) subsystem of the chemical and volume control system (CVCS).

2.0 PREREQUISITES

2.1 Construction activities on the VCT subsystem have been completed.

2.2 The VCT subsystem instrumentation has been calibrated and is operating satisfactorily prior to performing the following test.

2.3 Water makeup system is available to the VCT.

2.4 Support systems required for operation of the VCT are complete and functional.

3.0 TEST METHOD

3.1 Operate motor operated valves remotely while:

a. Observing each valve operation and position indication.

4.6 Applicable chemistry results.

5.0 ACCEPTANCE CRITERIA

5.1 The EFW storage pool meets design criteria (refer to~~described in~~ Section 10.4.9).

5.1.1 Verify operation of EFW pool controls, interlocks, and alarms.

5.1.2 Verify that EFW pool valves function as designed.

5.1.3 Verify that EFW pool capacity is within design limits.

5.2 Verify that safety-related components meet electrical independence and redundancy requirements.

14.2.12.2.10 In-Containment Refueling Water Storage Tank System (Test #022)

1.0 OBJECTIVE

1.1 To demonstrate the proper operation of the following subsystems:

1.1.1 IRWST.

1.1.2 ~~Containment~~Severe accident heat removal system (~~CHRS~~SAHRS) supply header.

1.1.3 MHSI supply header.

1.1.4 LHSI supply header.

1.1.5 CVCS supply header.

1.2 To demonstrate electrical independence and redundancy of safety-related power supplies.

1.3 Identify any leakage from the IRWST liner plate.

2.0 PREREQUISITES

2.1 Construction activities on the IRWST are complete.

2.2 Plant systems required to support testing are functional or temporary systems are installed and functional.

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2.3 Permanently installed instrumentation is functional and calibrated.

2.4 Test instrumentation is available and calibrated.

2.5 Refueling cavity integrity can be established.

2.6 The core spreading area can receive water from the IRWST.

2.7 Verify that the minimum IRWST capacity is within design limits.

2.7.1 FSAR Table 14.3-1 Item 1-20.

3.0 TEST METHOD

3.1 Operate control valves remotely while:

3.1.1 Observing each valve operation and position indication.

3.1.2 Measuring valve performance data (e.g., thrust, opening and closing times).

3.2 Fill the IRWST with reactor makeup water and record volume versus indicated level. Observe level indication and alarms.

3.3 Simulate the full range of IRWST temperatures and observe indications and alarms.

3.4 ~~Verify~~Check design flow path from IRWST to the ~~CHRS and to~~SAHRS including the core spreading area (e.g., sump, strainers, and other debris retention devices).

3.5 ~~Verify~~Check design flow path from IRWST to the safety injection systems (MHSI and LHSI) ~~and to~~including the refueling cavity (e.g., sump, strainers, and other debris retention devices).

3.6 Check design flow path from IRWST to the CVCS suction (e.g., sump, strainers, and other debris retention devices).

3.7 Verify operation of the level alarms and indication of the reactor cavity.

3.8 ~~Verify the~~ Demonstrate functionality and adequacy of range of the IRWST pressure instrumentation.

3.9 ~~Verify~~Demonstrate the operation and configuration of the IRWST return screens.

3.10 Check electrical independence and redundancy of power supplies for safety-related functions by selectively removing power and determining loss of function.

3.11 Quantify leakage from the IRWST liner plate.

4.0 DATA REQUIRED

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4.1 Valve position indications.

4.2 Valve opening and closing time, where required.

4.3 Setpoint at which alarms occur.

4.4 IRWST leakage.

5.0 ACCEPTANCE CRITERIA

5.1 The IRWST ~~performs as~~ meets design requirements ~~described in~~(refer to Section 6.3 and Section 19.2).

5.1.1 Verify that the CVCS suction path meets design requirements.

5.1.2 Verify that the safety injection suction path meets design requirements.

5.1.3 Verify that the SAHRS suction path meets design requirements

5.1.4 Verify alarm, interlock, and controls function as designed.

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5.1.5 Verify that IRWST valves function as designed.

5.1.6 IRWST leakage meets design requirements.

5.2 Verify that safety-related components meet electrical independence and redundancy requirements.

14.2.12.2.11 Core Melt Stabilization System (Test #023)

1.0 OBJECTIVE

1.1 To demonstrate proper construction of the core melt stabilization system (CMSS).

2.0 PREREQUISITES

2.1 Construction activities on the CMSS are complete.

2.2 Plant systems required to support testing are functional or temporary systems are installed and functional.

2.3 Permanently installed instrumentation is functional and calibrated and is operating satisfactorily prior to performing the following test.

2.4 Test instrumentation is available and calibrated.

3.0 TEST METHOD

3.1 ~~Verify~~Determine acceptability by visual examination system constructed as described in design documents.

3.2 ~~Verify~~Measure the acceptability of the cooling system, as described in design documents.

4.0 DATA REQUIRED

4.1 Punch list of deficiencies at time of acceptance walkdown have been corrected.

4.2 Cooling system ~~flowrate~~flow rate.

5.0 ACCEPTANCE CRITERIA

5.1 All deficiencies noted during the walkdown have been corrected.

5.2 The configuration, including the cooling system ~~flowrate~~flow rate, is as ~~described~~designed (refer to ~~in~~ Section 19.0).

14.2.12.3 Engineered Components

14.2.12.3.1 Containment Equipment Hatch Functional and Leak Test (Test #024)

1.0 OBJECTIVE

1.1 To verify the measured leakage through the containment equipment hatch when summed with the total of other Type B and C leak rate