RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

9/18/2012

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 945-6452 REVISION 3**
SRP SECTION:	**14.03 – INSPECTIONS, TESTS, ANALYSES, AND ACCEPTANCE CRITERIA**
APPLICATION SECTION:	**14.3 AND TIER 1**
DATE OF RAI ISSUE:	**6/19/2012**

QUESTION NO.: 14.03-3

Generic comment.
The term “preoperational conditions” is not a defined term in Tier 1 and is used in a number of ITAAC. Define the term “preoperational conditions” in the Tier 1 definitions or specify the applicable preoperational conditions when used in the ITAAC.

ANSWER:

The term “preoperational conditions” does not need to be defined in Tier 1 and the specific preoperational test conditions do not need to be described in Tier 1 when the term is used in the ITAAC. The preoperational test program is described in Tier 1, Section 2.14 and in Tier 2 Section 14.2. DCD Tier 2 Section 14.2.12.1 states:

> “Specific testing performed and the applicable acceptance criteria for each preoperational test are documented in test procedures. Preoperational tests are prepared in accordance with the system and associated component specifications for the equipment in those systems provided by MHI and other major participants associated with the ITP. The tests demonstrate that the installed equipment and systems perform within the limits of the system and component specifications. To assure that the tests are conducted in accordance with established methods and appropriate acceptance criteria, the plant and system preoperational test information are made available to the NRC at least 60 days before their intended use.”

Typically, ITAAC that use the term “preoperational conditions” in the ITA verify the functional performance of the component in the integrated system operations. Additional ITAAC are provided when it is necessary to verify the component’s ability to function under design basis conditions (e.g., through type testing or analysis). Hence, the specific conditions under which the component is operated during the preoperational test are not critical to the purpose of the ITAAC verification.

The use of this term in ITAAC is reflected in the NRC example ITAAC (NUREG-0800, Section 14.3, page 14.3-60). Additionally, the ITAAC in recently approved DCDs, which have NRC final safety evaluations, use the term “preoperational conditions” in a similar manner as the US-APWR and neither DCD defines the term in Tier 1 nor provides the specific test conditions in the ITAAC.

No change is proposed to the ITAAC.

Impact on DCD

There is no impact on the DCD.

Impact on R-COLA

There is no impact on the R-COLA.

Impact on S-COLA

There is no impact on the S-COLA.

Impact on PRA

There is no impact on the PRA.

Impact on Technical / Topical Reports

There is no impact on the Technical / Topical Reports.

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QUESTION NO.: 14.03-4

Generic comment.
Numerous ITAAC verify the "Class 1E equipment identified in Table XXX, is powered from its respective Class 1E division." The acceptance criteria for these ITAAC should state: The simulated test signal exists **only** at the as-built Class 1E equipment identified in Table XXX under test.

ANSWER:

During the Tier 1 improvement activity that was included in DCD Revision 3, MHI considered including the term "only" in the acceptance criteria for ITAAC where the existence of a simulated test signal in one division of Class 1E equipment needed to be verified, as recommended by the RAI. However, MHI concluded that providing documentation that this test signal "only" existed in the division being tested and not in any other wiring would be nearly impossible since the verification effort would have to demonstrate that the test signal did not exist in any of the other wires in the entire plant. The verification that the test signal exists in the designated division is sufficient since separation between divisional wiring and between non-Class 1E and Class 1E wiring per Regulatory Guide 1.75 is verified in other ITAAC, such as Table 2.4.1-2, item #12. The word "only" is not included in the Acceptance Criteria as recommended by the RAI.

Impact on DCD

There is no impact on the DCD.

Impact on R-COLA

There is no impact on the R-COLA.

Impact on S-COLA

There is no impact on the S-COLA.

Impact on PRA

There is no impact on the PRA.

Impact on Technical / Topical Reports

There is no impact on the Technical / Topical Reports.

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QUESTION NO.: 14.03-5

Generic comment.
Numerous ITAAC verify – "Controls are provided in the MCR to open and close the remotely operated valves identified in Table XXX."
The ITAAC lacks specificity. What controls in the MCR are to be verified? Specifically, are the components to be operated from the operator's console, any other console, by the S-VDU, or non-safety VDU? Must each station be tested or just one? Provide specificity as to which controls in the MCR are to be used. This also applies to the ITAAC for starting and stopping pumps.

ANSWER:

The descriptions in all the DCD Tier1 ITAAC which identify MCR as location of "controls" for open and close of remotely operated valves or starting and stopping of pumps will be revised to identify the name of the display unit which controls are used for verification of the design commitment of the ITAAC.

For the remotely operated components such as valves or pumps whose manual controls are placed on the operational visual display unit (O-VDU) only in the MCR, the test will be performed using the O-VDU and the manual control location will be clarified in the ITA and AC of each ITAAC.

For the remotely operated valves or pumps whose controls are required to locate on the Safety Visual Display Unit (S-VDU) in the MCR, the verification of provision of controls will be conducted in two steps:

1) Verifying that plant safety and monitoring system (PSMS) generates control signals corresponding to manual controls from the S-VDU in accordance with the design (i.e., capability of manual controls from the S-VDU to generate a control signal at the PSMS output).
2) Verifying that the as-built components can actuate upon the receipt of signals from the PSMS output. (i.e., capability of component actuation from the PSMS output)

The first test focuses on verifying the MCR control function in the PSMS that does not include as-built components.

The second test focuses on verifying as-built component actuation upon receipt of signals from the PSMS output. This test can also verify that cabling and wiring are appropriately connected to the certain as-built components. In order to achieve these two step tests, the S-VDU is used for the first test to verify that the manual control capability in the PSMS. This test ensures that the as-built S-VDU has the capability to control each component by verification of control signals at the output of the PSMS.

The O-VDU is used for the second test to generate an actuation signal to each as-built component because the purpose of this test is to verify that the as-built components can actuate upon the receipt of the control signals from the as-built PSMS output. The command signals from the as-built O-VDU are transmitted to the as-built components through the as-built PSMS. Since the second test only verifies signals from the PSMS output to the actuating component, the initiation of the manual control signal within the PSMS can be performed from the O-VDU.

Thus, a combination of both tests can demonstrate the as-built S-VDU function to operate the valves and pumps via the as-built PSMS. Relevant ITA and AC will be revised to describe the two-step approach above.

Impact on DCD

DCD Tier 1 will be revised as shown in the attachment.

Impact on R-COLA

There is no impact on the R-COLA.

Impact on S-COLA

There is no impact on the S-COLA.

Impact on PRA

There is no impact on the PRA.

Impact on Technical / Topical Reports

There is no impact on the Technical / Topical Reports.

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APPLICATION SECTION:	**14.3 AND TIER 1**
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QUESTION NO.: 14.03-6

Generic comment.
Numerous ITAAC verify that “Alarms and displays identified in Table XXX are provided in the MCR.”
This ITAAC lacks specificity. Information is displayed in the MCR at several locations on various safety and operational video display units (S-VDU, VDU), on the Large Panel Display (LPD) and the Alarm VDU. Is this ITAAC meant to verify the information is retrievable on each display unit, the Safety VDUs, or the Alarm VDU. Should the LDP also be checked? Please specify the types of alarms (i.e. hi P, lo P, etc.).

ANSWER:

The descriptions in the DCD Tier1 ITAAC which identify “alarms” and/or “displays” in the MCR will be revised to identify the name of display unit which “alarms” and/or “displays” are used for verification of the design commitment of the ITAAC.

Alarms are provided on the Alarm Visual Display Unit (A-VDU), Large Display Panel (LDP) and the Operational Visual Display Unit (O-VDU). Verification of alarms will be conducted on the A-VDU because MCR operators primarily use the A-VDU as it has the functions to process confirmation of alarms, to reset the alarms and to suspend audio notification, all of which are not provided by LDP or by O-VDU.

For the equipment displays which are visualized both on the Safety Visual Display Unit (S-VDU) and on the O-VDU in the MCR, the verification of provision of the displays will be conducted using the displays on the S-VDU, except for the cases other-wise described in the relevant Tire 1 tables or in the design description, because verification by ITAAC should be focused on safety-related function.

For the displays which are designed to be visualized only on the O-VDU, the verification of provision of displays will be conducted on the O-VDU.

Displays on LDP will not be verified under this ITAAC because LDP with the HFE importance will be verified as part of HFE ITAAC such as Table 2.9-1, ITAAC 11.

Types of alarms will not be specified in DCD Tier 1 ITAAC. Because 1) alarms for credited operator actions are specified in Tier 1 Section 2.5.4 and will be verified under Table 2.5.4-2 ITAAC 1 and other alarms have less safety significance, 2) specific name of alarms, which appear on display units in the MCR are subject to change per design progress, and 3) SRP 14.3 does not specifically request to verify detail alarm information.

During the consistency review, MHI found some parameters that do not meet the Tier 1 screening criteria, or have discrepancy or error for the existing MCR/RSC Alarms/Displays/Controls entries. The following entries are deleted or revised to fix those issues:

MHI will delete following parameters for the respective table.

Location	Parameter Description
Table 2.4.5-4	CS/RHR Heat Exchanger Inlet Temperature, RHS-TE-012,022,032,042
Table 2.7.1.2-4	Turbine Inlet Pressure MSS-PT-555, 556, 557, 558

Reasons for the deletions are as follows.
In general, the MCR/RSC display and alarm, which should be included in Tier 1, meet one or more of the following screening criteria:
1) Parameters displayed on the S-VDU,
2) Alarms used for credited manual operator actions or
3) MCR/RSC display or alarm specifically required by any regulatory guidance

Regarding MSS-PT-555, 556, 557 and 558, MHI originally considered that the parameters meet the criteria and should be displayed on the S-VDU and be alarmed on A-VDU. However, MHI demonstrates that the equipment is not safety-related and is not used for interlocks important to safety. Furthermore, none of displays and alarms of the parameters meet the screening criteria and the parameters will be deleted from Table 2.4.5-4.

RHS-TE-012,022,032,042 will be deleted from Table 2.7.1.2-4 because those do not meet any of the criteria and are not displayed on the S-VDU nor alarmed on the A-VDU.

For revised parameters, see attached markups.

Impact on DCD

DCD Tier 1 will be revised as shown in the attachment.

Impact on R-COLA

There is no impact on the R-COLA.

Impact on S-COLA

There is no impact on the S-COLA.

Impact on PRA

There is no impact on the PRA.

Impact on Technical / Topical Reports

There is no impact on the Technical / Topical Reports.

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QUESTION NO.: 14.03-7

Generic comment.
Numerous ITAAC verify that “Controls are provided in the RSC to open and close the remotely operated valves identified in Table XXX.”
The ITAAC lacks specificity. What controls in the RSC are to be verified? Specifically, are the components to be operated from the operator’s console, any other console, by the S-VDU, or non-safety VDU? Must each station be tested or just one? Provide specificity as to which controls in the RSC are to be used. This also applies to the ITAAC for starting and stopping pumps.

ANSWER:
The descriptions in the DCD Tier1 ITAAC which identify RSC “controls” for opening and closing of remotely operated valves or starting and stopping of pumps will be revised to identify the name of the display unit which controls are used for verification of the design commitment of the ITAAC.

For the remotely operated valves or pumps which controls are located only on the Operational Visual Display Unit (O-VDU) in the RSC, the verification of provision of controls will be conducted by the ones on the as-built O-VDU in the as-built RSC.

For the remotely operated valves or pumps whose controls are required to locate on the Safety Visual Display Unit (S-VDU) in the RSC, the verification of provision of controls will be conducted in two steps:

1) Verifying that plant safety and monitoring system (PSMS) generates control signals in corresponding to manual controls from the S-VDU in accordance with the design (i.e., capability of manual controls from the S-VDU to the PSMS output).
2) Verifying that the as-built components can actuate upon the receipt of signals from the PSMS output. (i.e., capability of component actuation from the PSMS output)

See details in the response to Question No 14.03-5.

Impact on DCD

DCD Tier 1 will be revised as shown in the attachment.

Impact on R-COLA

There is no impact on the R-COLA.

Impact on S-COLA

There is no impact on the S-COLA.

Impact on PRA

There is no impact on the PRA.

Impact on Technical / Topical Reports

There is no impact on the Technical / Topical Reports.

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QUESTION NO.: 14.03-8

Generic comment.
Numerous ITAAC verify that “Alarms and displays identified in Table XXX are provided in the RSC.”
The ITAAC lacks specificity. Information is displayed in the RSC at several locations on various safety and operational video display units (S-VDU, VDU), on the Large Panel Display (LDP) and the Alarm VDU. Is this ITAAC meant to verify the information is retrievable on each display unit, the Safety VDUs, or the Alarm VDU. Should the LDP also be checked? Also, please specify the types of alarms (i.e. hi P, lo P, etc.).

ANSWER:

The descriptions in the DCD Tier1 ITAAC which identify “alarms” and/or “displays” in the RSC will be revised to identify the name of the display unit which “alarms” and/or “displays” are used for verification of the design commitment of the ITAAC.

In the RSC, all the alarms are provided on the Operational Visual Display Unit (O-VDU). Thus verification of all the alarms will be conducted on the O-VDU.

For the displays which are designed to be visualized both on the Safety Visual Display Unit (S-VDU) and on O-VDU in the RSC, the verification of provision of displays will be conducted using ones on the S-VDU, except for the cases other-wise described, because verification by ITAAC should be focused on safety-related equipment.

For the displays which are designed to appear only on the O-VDU, verification of provision of displays will be conducted using the O-VDU.

An LDP will not be installed in Remote Shutdown Room (RSR).

Types of alarms will not be specified in DCD Tier 1 ITAAC because 1) alarms for credited operator actions are specified in Tier 1 Section 2.5.4 and will be verified under Table 2.5.4-2 ITAAC 1 and other alarms have less safety significance, 2) specific name of alarms, which appear on display units in the RSC are subject to change per design progress, and 3) SRP 14.3 does not specifically request to verify detail alarm information.

Impact on DCD

DCD Tier 1 will be revised as shown in the attachment.

Impact on R-COLA

There is no impact on the R-COLA.

Impact on S-COLA

There is no impact on the S-COLA.

Impact on PRA

There is no impact on the PRA.

Impact on Technical / Topical Reports

There is no impact on the Technical / Topical Reports.

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QUESTION NO.: 14.03-9

Generic comment.
Numerous ITAAC verify that "The piping identified in Table XXX as designed for LBB meets LBB criteria, or an evaluation is performed of the protection from the dynamic effects of a rupture of the line."
The ITAAC is not clear as written, and implies the piping designed for LBB does not have to meet the LBB requirements. Clearly separate the two piping categories: a) piping designated for LBB and b) piping not designed for LBB, and their associated ITA and the AC. Inspection and analysis should appear in the ITA for the non LBB piping.

ANSWER:

The Tier 1 tables that identify systems and piping as Leak Before Break (LBB) are designating these systems and piping only as candidates for LBB evaluation. Following final design of the piping systems some of these systems and piping may not meet LBB criteria. For those systems and piping that do not meet the LBB criteria, a pipe break hazards analyses report exists and concludes that protection from the dynamic effects of a line break is provided. Hence, the ITAAC acceptance criteria provide for the situation where the piping meets LBB criteria or the pipe break hazards report exists. A clarification note will be added to each DCD Tier 1 LBB table stating that the LBB column identifies systems and piping that are candidates for LBB evaluation.

For additional information regarding this topic, also refer to DCD Tier 2, Appendix 3B, Section 3B.2.

Impact on DCD

DCD Tier 1 will be revised as shown in the attachment.

Impact on R-COLA

There is no impact on the R-COLA.

Impact on S-COLA

There is no impact on the S-COLA.

Impact on PRA

There is no impact on the PRA.

Impact on Technical / Topical Reports

There is no impact on the Technical / Topical Reports.

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QUESTION NO.: 14.03-10

Generic comment.
Numerous ITAAC verify that "Each mechanical division of the XXXX (Divisions A, B, C, & D) is physically separated from the other divisions, with the exception of inside the containment so as not to preclude accomplishment of the safety function."
What is the basis for excluding inside containment? This does not appear to be consistent with Tier 2 Chapter 3 section 3.6.1, which states: "Safety-related SSCs are protected from postulated piping failure in fluid systems inside and outside PCCV." This may also apply to other stated exceptions in similarly worded ITAAC.

The ITAAC (DC/ITA/AC) lacks specificity. It does not specify the reason(s) for the separation (i.e. fire, missiles, pipe whip, etc.) which affects the AC. This comment applies to other similarly worded ITAAC.

ANSWER:

MHI will revise the generic separation ITAAC acceptance criteria to specify that dynamic effects (i.e., missile and pipe break hazard) internal flooding and fire are considered for physical separation. Generic statements in ITAAC that exclude portions of systems inside containment from the physical separations requirements will be deleted. The physical separation ITAAC will be clarified regarding specific exceptions to the physical separation requirements by adding references in the ITAAC to existing Tier 1 figures and using the existing definition of "Division (for mechanical system)" described in Tier 1 Section 1.2 in order to define the scope of the ITAAC or specifically identifying the exceptions in the ITAAC text. Such exceptions include connections to intake and discharge common air volumes for Class 1E electrical room HVAC systems, portions of the core spray system spray header piping downstream of check valves, and the ECCS NaTB baskets and containers that may not be excluded by the reference to the figure and the definition. The site-specific portion of ESWS (i.e., mechanical divisional configuration within ESWPT and UHSRS) described in Section 2.7.3.1 is also excluded to be consistent with Tier 1 interface requirements.

Furthermore, Tier 1 Subsection 2.7.1.10.1 and ITAAC #9 of Table 2.7.1.10-4 will be revised to remove the requirement for physical separation of the steam generator blowdown system since physical separation is not required for this system.

Impact on DCD

DCD Tier 1 will be revised as shown in the attachment.

Impact on R-COLA

There is no impact on the R-COLA.

Impact on S-COLA

There is no impact on the S-COLA.

Impact on PRA

There is no impact on the PRA.

Impact on Technical / Topical Reports

There is no impact on the Technical / Topical Reports.

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APPLICATION SECTION: **14.3 AND TIER 1**

DATE OF RAI ISSUE: **6/19/2012**

QUESTION NO.: 14.03-11

Generic comment.

The scope of I&C logic testing within Tier 1 section 2.5 is not clearly defined in terms of the extent to which the output must be carried out, i.e. are the controlled components required to be manipulated for each test (i.e. breakers trip open, MOVs cycle, pumps start or stop, etc…). ITAAC in each system verify PSMS actuates the required pumps and valves using simulated signals. Based on the principal of overlapping testing, it would appear logic testing in section 2.5 would not require carrying out actuation of the controlled components with some exceptions (e.g. the reactor trip breakers). Clearly define the extent the I&C logic testing in section 2.5 must be carried out.

ANSWER:

Based on the investigation of Tier 1 Section 2.5 ITAAC which addresses I&C logic testing, ITA and AC of the following ITAAC in Tier 1 Section 2.5 will be revised to clarify the scope and extent of the testing.

Table 2.5.1-6 ITAAC 4, Table 2.5.1-6 ITAAC 11, Table 2.5.1-6 ITAAC 14.a,
Table 2.5.1-6 #14.b, Table 2.5.1-6 ITAAC 16, Table 2.5.1-6 ITAAC 17.b,
Table 2.5.1-6 ITAAC 18, Table 2.5.1-6 ITAAC 23, Table 2.5.1-6 ITAAC 25.a,
Table 2.5.1-6 ITAAC 25.b, Table 2.5.1-6 ITAAC 26, Table 2.5.1-6 ITAAC 27,
Table 2.5.1-6 ITAAC 29.b, Table 2.5.1-6 ITAAC 31.i, Table 2.5.1-6 ITAAC 31.ii,
Table 2.5.2-3 ITAAC 1, Table 2.5.2-3 ITAAC 7, Table 2.5.3-4 ITAAC 1.c,
Table 2.5.3-4 ITAAC 1.d, Table 2.5.5-1 ITAAC 4

The above ITAAC with underline have been addressed and will be revised as necessary in the response to DCD Tier 1 RAI 936-6466 which was submitted to NRC in a letter UAP-HF-12266.

Regarding Table 2.5.2-3 ITAAC 1, the DC will also be revised as most of the scope of existing ITAAC will be verified by other ITAAC as shown below:

1. Existing DC of Table 2.5.2-3 ITAAC 1;
The PSMS controls and monitors the systems required for the safe shutdown functions identified in Tables 2.5.2-1 and 2.5.2-2.

2. Revised DC of Table 2.5.2-3 ITAAC 1;
The PSMS provides capability of manual shutdown operating bypass of the ECCS actuation signal and the main steam line pressure signal.

Reason for reducing the scope
As shown in the tables below, all the functions listed in Tables 2.5.2-1 and 2.5.2-2 are verified by other existing ITAAC except for the function of “manually initiate appropriate ESF system(s) for shutdown operating bypasses (ECCS Actuation Signal Block, Main Steam Line Pressure signal Block).” Thus, the ITAAC can be focused on this function.

Table 2.5.2-1 Safe Shutdown Functions and Related Process Systems for Hot Standby

	Relevant ITAAC which the function is verified.
Trip the reactor which accomplishes the reactor shutdown condition (RT)	2.5.1-6 #14.a
RCS heat removal by the following measures:	---
Main steam release to atmosphere (MSS)	2.7.1.11-5 #8.a
Provide EFW to SGs (EFWS and MSS)	2.7.1.11-5 #8.a, 2.7.1.11-5 #18
Supply boric acid water to RCS (SIS)	2.4.4-5 #8
Component cooling by operating CCW and ESW (CCWS and ESWS)	2.7.3.1-5 #8, 2.7.3.1-5 #10.a, 2.7.3.3-5 #8.a, 2.7.3.3-5 #10.a
RCS pressure control (RCS)	2.4.2-4 #11.a, 2.4.2-4 #17
Provide HVAC functions to the required areas (MCR HVAC, ESFVS, ECWS)	2.7.5.1-3 #5.e, 2.7.5.1-3 #6.a, 2.7.5.2-3 #5.d, 2.7.5.2-3 #6.a, 2.7.3.5.5-5 #8
Utilize the emergency power source (EPS) for the above functions in the event of LOOP*1	2.6.4-1 #18

Table 2.5.2-2 Safe Shutdown Functions and Related Process Systems for Cold Shutdown through Hot Shutdown

	Relevant ITAAC which the function is verified.
Remove heat from the RCS by the following measures:	---
Main steam release to atmosphere	2.7.1.11-5 #8.a
Provide EFW to SGs (EFWS and MSS)	2.7.1.11-5 #8.a, 2.7.1.11-5 #18
Operate RHRS	2.4.5-5 #9, 2.4.5-5 #11
RCS pressure control (RCS)	2.4.2-4 #11.a, 2.4.2-4 #17
Supply boric acid water to RCS (SIS)	2.4.4-5 #8
Component cooling by operating CCW and ESW (CCWS and ESWS)	2.7.3.1-5 #8, 2.7.3.1-5 #10.a, 2.7.3.3-5 #8.a, 2.7.3.3-5 #10.a
Provide HVAC functions to the required areas (MCR HVAC, ESFVS, ECWS)	2.7.5.1-3 #5.e, 2.7.5.1-3 #6.a, 2.7.5.2-3 #5.d, 2.7.5.2-3 #6.a, 2.7.3.5.5-5 #8
Monitor neutron flux	2.4.1-2 #13
Manually initiate appropriate ESF system(s) for shutdown operating bypasses (ECCS Actuation Signal Block, Main Steam Line Pressure signal Block)	No existing ITAAC
Utilize the emergency power source (EPS) for the above functions in the event of LOOP	2.6.4-1 #18

Regarding Table 2.5.1-6 ITAAC 23, DCD Tier 1 Table 2.5.1-4, Interlocks Important to Safety and Monitored Variables, will be revised to clarify actuation signals and monitored variables for each interlock as shown in the attachment.

Along with this revision, DCD Tier 1 Tables 2.4.4-2, 2.4.5-2, 2.7.3.3-2, 2.7.3.5-2, and 2.11.3-2, which summarize equipment characteristics of each system, will be revised to use consistent terminology with the DCD Tier 1 Table 2.5.1-4 regarding name of interlock important to safety and to add RHS-AOV-024B and 024C, which are interlocked by the low pressure letdown line isolation signal, to the DCD Tier 1 Table 2.4.5-2. DCD Tier 2 Table 3.9-14 will also be revised to add the two valves into the table on inservice test requirements.

Impact on DCD

DCD Tier 1 and Tier 2 will be revised as shown in the attachment. Note that the mark-ups of DCD Tier 1 ITAAC which will be revised in response to DCD RAI 936-6466 are not attached to this response.

Impact on R-COLA

There is no impact on the R-COLA.

Impact on S-COLA

There is no impact on the S-COLA.

Impact on PRA

There is no impact on the PRA.

Impact on Technical / Topical Reports

There is no impact on the Technical / Topical Reports.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

9/18/2012

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 945-6452 REVISION 3**
SRP SECTION:	**14.03 – INSPECTIONS, TESTS, ANALYSES, AND ACCEPTANCE CRITERIA**
APPLICATION SECTION:	**14.3 AND TIER 1**
DATE OF RAI ISSUE:	**6/19/2012**

QUESTION NO.: 14.03-12

Generic comment.

I&C logic tests in Tier 1 section 2.5 do not consistently specify the use of simulated test signals. Ensure use of test signals is specified where their use is anticipated / desired.

ANSWER:

Based on the investigation of Tier 1 Section 2.5 ITAAC which addresses I&C logic testing, ITA and AC of the following ITAAC in Tier 1 Section 2.5 will be revised to clarify the use of simulated signals in the tests:

Table 2.5.1-6 ITAAC 14.a, Table 2.5.1-6 ITAAC 14.b, Table 2.5.1-6 ITAAC 17.a,
Table 2.5.1-6 ITAAC 17.b, Table 2.5.1-6 ITAAC 18, Table 2.5.1-6 ITAAC 23,
Table 2.5.1-6 ITAAC 25.a, Table 2.5.1-6 ITAAC 25.b, Table 2.5.1-6 ITAAC 26,
Table 2.5.1-6 ITAAC 27, Table 2.5.1-6 ITAAC 31.i, Table 2.5.2-3 ITAAC 1,
Table 2.5.3-4 ITAAC 1.d

The above ITAAC with underline have been addressed and will be revised as necessary in response to DCD Tier 1 RAI 936-6466 which was submitted to NRC in a letter UAP-HF-12226.

Impact on DCD

DCD Tier 1 will be revised as shown in the attachment. Note that the mark-ups of DCD Tier 1 ITAAC which will be revised in response to DCD RAI 936-6466 are not attached to this response.

Impact on R-COLA

There is no impact on the R-COLA.

Impact on S-COLA

There is no impact on the S-COLA.

Impact on PRA

There is no impact on the PRA.

Impact on Technical / Topical Reports

There is no impact on the Technical / Topical Reports.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

9/18/2012

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 945-6452 REVISION 3**
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APPLICATION SECTION:	**14.3 AND TIER 1**
DATE OF RAI ISSUE:	**6/19/2012**

QUESTION NO.: 14.03-13

Generic comment.
Several examples were identified where conflicts existed as to the EQ for harsh environmental conditions for components in the TIER 1 DCD equipment tables with the information provided in Tier 2, Appendix 3D.
One example is: “The Class 1E equipment identified in Table 2.4.6-2 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.” Table 2.4.6-2 appears to be inconsistent with Table 3D-2 in Tier 2 (e.g. Table 3D-2 identifies CVS-MOV-151 & 152 as being EQ for a harsh radiation environment yet Table 2.4.6-2 identifies them as not being qualified for a harsh environment.)

ANSWER:

DCD Tier 1 , Table 2.4.4-2, Table 2.4.5-2, Table 2.4.6-2, Table 2.7.1.11-2, Table 2.7.3.1-2, Table 2.7.3.3-2, Table 2.7.3.5-2, Table2.7.5.1-1, Table2.7.5.2-1, Table2.7.5.4-1, Table 2.7.6.3-1, Table 2.7.6.7-1, Table 2.11.2-1 and Table 2.11.3-2 will be revised to be consistent with the updated Tier 2 Table 3D-2, which has been submitted to the NRC as an attachment to the supplemental response to RAI 512-3893 (UAP-HF-12229).

In addition to the revision above, improvement of description in the column titled “Class 1E/Qual. For Harsh Envir.” in Table 2.4.1-1, Table 2.4.4-2, Table 2.7.1.11-2, Table 2.7.5.1-1, Table2.7.5.2-1, Table 2.11.2-1 and Table 2.11.3-2 of DCD Tier1 has also been incorporated for the equipment which is out of the scope of these qualifications.

Clarification will be made to VCS-PT-371,372 in Tier 1 Table 2.11.2-1 and CSS-PT-014 in Tier 1 Table 2.11.3-2 to clarify the scope of the entry to the table.

Impact on DCD

DCD Tier 1 will be revised as shown in the attachment.

Impact on R-COLA

There is no impact on the R-COLA.

Impact on S-COLA

There is no impact on the S-COLA.

Impact on PRA

There is no impact on the PRA.

Impact on Technical / Topical Reports

There is no impact on the Technical / Topical Reports.

This completes MHI's response to the NRC's question.

ACRONYMS AND ABBREVIATIONS

AAC	alternate alternating current
A/B	auxiliary building
ABVS	auxiliary building ventilation system
ac	alternating current
AC/B	access building
ALARA	as low as reasonably achievable
AOO	anticipated operational occurrence
APWR	advanced pressurized-water reactor
ARMS	area radiation monitoring system
ASME	American Society of Mechanical Engineers
ASSS	auxiliary steam supply system
ATWS	anticipated transient without scram
A-VDU	alarm visual display unit
BISI	bypassed and inoperable status indication
BTU	british thermal unit
C/V	containment vessel
CAGS	compressed air and gas system
CAS	central alarm station
CCF	common cause failure
CCW	component cooling water
CCWS	component cooling water system
CDS	condensate system
CFR	Code of Federal Regulations
CFS	condensate and feedwater system
CHS	containment hydrogen monitoring and control system
CIS	containment isolation system
CIV	containment isolation valve
COL	Combined License
CPS	condensate polishing system
CRDM	control rod drive mechanism
CRE	control room envelope

DCD_14.03-6

ACRONYMS AND ABBREVIATIONS (Continued)

NS	non-seismic
NSSS	nuclear steam supply system
OBE	operating-basis earthquake
OHLHS	overhead heavy load handling system
O-VDU	operational visual display unit
PA	postulated accident
PAM	post accident monitoring
PCCV	prestressed concrete containment vessel
PCMS	plant control and monitoring system
PERMS	process effluent radiation monitoring and sampling system
PMWP	probable maximum winter precipitation
PMWS	primary makeup water system
PRA	probabilistic risk assessment
PS/B	power source building
PSFSV	power source fuel storage vault
PSMS	protection and safety monitoring system
PSS	process and post-accident sampling system
PSWS	potable and sanitary water systems
QA	quality assurance
R/B	reactor building
RAT	reserve auxiliary transformer
RCA	radiological controlled area
RCCA	rod cluster control assembly
RCP	reactor coolant pump
RCPB	reactor coolant pressure boundary
RCS	reactor coolant system
RG	Regulatory Guide
RHR	residual heat removal
RHRS	residual heat removal system
RPS	reactor protection system
RSC	remote shutdown console
RSR	remote shutdown room

DCD_14.03-5, 6, 7, 8

ACRONYMS AND ABBREVIATIONS (Continued)

RSV	reheat stop valve
RT	reactor trip
RTB	reactor trip breaker
RV	reactor vessel
RWS	refueling water storage system
RWSAT	refueling water storage auxiliary tank
RWSP	refueling water storage pit
SAS	secondary alarm station
SBO	station blackout
SC	steel-concrete
SCIS	secondary side chemical injection system
SFP	spent fuel pit
SFPCS	spent fuel pit cooling and purification system
SG	steam generator
SGBDS	steam generator blowdown system
SGWFCV	steam generator water filling control valve
SIS	safety injection system
SLS	safety logic system
SPDS	safety parameter display system
SPTS	sound powered telephone system
SSA	signal selector algorithm
SSAS	station service air system
SSC	structure, system, and component
SSE	safe-shutdown earthquake
SST	station service transformer
S-VDU	safety visual display unit
SWMS	solid waste management system
T/B	turbine building
T/D	turbine driven
T/G	turbine generator
T_{avg}	average temperature
TBS	turbine bypass system

DCD_14.03-5, 6, 7, 8

Table 2.3-3
Systems with ASME Code Section III, Class 1, 2 and 3 Piping Systems and Components

Tier 1 Section	System Name	ASME Code Section III			LBB[1]
		1	2	3	
2.4.1	Reactor Systems	X	-	-	-
2.4.2	Reactor Coolant System	X	X	-	X
2.4.4	Emergency Core Cooling System	X	X	-	X
2.4.5	Residual Heat Removal System	X	X	X	X
2.4.6	Chemical and Volume Control System	X	X	X	-
2.6.4	Emergency Power Source	-	-	X	-
2.7.1.2	Main Steam Supply System	-	X	X	X
2.7.1.9	Condensate and Feedwater System	-	X	X	-
2.7.1.10	Steam Generator Blowdown System	-	X	X	-
2.7.1.11	Emergency Feedwater System	-	X	X	-
2.7.3.1	Essential Service Water System	-	-	X	-
2.7.3.3	Component Cooling Water System	-	X	X	-
2.7.3.5	Essential Chilled Water System	-	-	X	-
2.7.3.6	Non-Essential Chilled Water System	-	X	X	-
2.7.6.3	Spent Fuel Pit Cooling and Purification System	-	-	X	-
2.7.6.4	Light Load Handling System	-	X	-	-
2.7.6.7	Process and Post-accident Sampling System	-	X	-	-
2.7.6.8	Equipment and Floor Drainage System	-	-	X	-
2.11.2	Containment Isolation System	-	X	X	-
2.11.3	Containment Spray System	-	X	-	-

DCD_14.03-9

NOTE:

Dash (-) indicates not applicable.

1. An "X" in the LBB column indicates that the system is a candidate for LBB evaluation.

DCD_14.03-9

Table 2.4.1-1 Equipment Key Attributes

Equipment[1]	Tag #	ASME Code Section III Class	Seismic Category	Class 1E/ Qual. for Harsh Envir	S-VDU Display
Fuel assemblies (257)	—	None	I	-/- No	No
Rod cluster control assemblies (69)	—	None	I	-/- No	No
Core support structures	—	CS	I	-/- No	No
RCCA guide tubes (69)	—	None	I	-/- No	No
Reactor vessel, including all nozzles	—	1	I	-/- No	No
Reactor vessel head	—	1	I	-/- No	No
Reactor vessel head stud bolt assemblies (58)	—	1	I	-/- No	No
CRDM pressure housings (69)	—	1	I	-/- No	No
Core exit temperature	ICT-TE-001 thru ICT-TE-016	—	I	Yes/Yes	Yes
Reactor vessel water level (2)	RCS-LE-181 RCS-LE-182	—	I	Yes/Yes	Yes
Source Range Neutron Flux (2)	NIS-NE-031, 032	—	I	Yes/Yes[2]	Yes
Intermediate Range Neutron Flux (2)	NIS-NE-035, 036	—	I	Yes/Yes[2]	No
Power Range Neutron Flux (4)	NIS-NE-041, 042, 043, 044	—	I	Yes/Yes[2]	No
Wide Range Neutron Flux (2)	NIS-NE-033, 034	—	I	Yes/Yes	Yes

DCD_14.03-13

Legend: S-VDU = safety visual display unit (VDU)

Notes:

1. Figures 2.4.1-1, 2.4.1-2, and 2.4.1-3 show many of these components.
2. Qualification for harsh environment is not required for post-accident environmental condition.

Table 2.4.1-2 Reactor System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 4 of 5)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
10. The Class 1E equipment identified in Table 2.4.1-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.	10.i Type tests or a combination of type tests and analyses using the design environmental conditions, or under the conditions which bound the design environmental conditions, will be performed on Class 1E equipment identified in Table 2.4.1-1 as being qualified for a harsh environment.	10.i ~~A~~An equipment qualification data summary report exists and concludes that the Class 1E equipment identified in Table 2.4.1-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function. DCD_03.11-55
	10.ii Inspection will be performed of the as-built Class 1E equipment identified in Table 2.4.1-1 as being qualified for a harsh environment and the associated wiring, cables, and terminations located in a harsh environment.	10.ii The as-built Class 1E equipment and the associated wiring, cables, and terminations identified in Table 2.4.1-1 as being qualified for a harsh environment are bounded by type tests or a combination of type tests and analyses.
11. Class 1E equipment, identified in Table 2.4.1-1, is powered from its respective Class 1E division.	11. A test will be performed on each division of the as-built Class 1E equipment identified in Table 2.4.1-1 by providing a simulated test signal only in the Class 1E division under test.	11. The simulated test signal exists at the as-built Class 1E equipment identified in Table 2.4.1-1 under test.
12. Separation is provided between redundant divisions of reactor system Class 1E cables, and between Class 1E cables and non-Class 1E cables.	12. Inspections of the as-built Class 1E divisional cables will be performed.	12. Physical separation or electrical isolation is provided in accordance with RG 1.75, between the as-built cables of redundant reactor system Class 1E divisions and between Class 1E cables and non-Class 1E cables.
13. Displays identified in Table 2.4.1-1 are provided in the MCR.	13. Inspection will be performed on the as-built S-VDU in the MCR for retrievability of the displays identified in Table 2.4.1-1 in the ~~as-built~~ MCR. DCD_14.03-6	13. Displays identified in Table 2.4.1-1 can be retrieved on the as-built S-VDU in the ~~as-built~~ MCR. DCD_14.03-6

4.b.ii The ASME Code Section III piping of the RCS, including supports, identified in Table 2.4.2-3 is reconciled with the design requirements.

5.a Pressure boundary welds in ASME Code Section III components, identified in Table 2.4.2-2, meet ASME Code Section III requirements for non-destructive examination of welds.

5.b Pressure boundary welds in ASME Code Section III piping, identified in Table 2.4.2-3, meet ASME Code Section III requirements for non-destructive examination of welds.

6.a The ASME Code Section III components, identified in Table 2.4.2-2, retain their pressure boundary integrity at their design pressure.

6.b The ASME Code Section III piping, identified in Table 2.4.2-3, retains its pressure boundary integrity at its design pressure.

7. The seismic Category I equipment, identified in Table 2.4.2-2, can withstand seismic design basis loads without loss of safety function.

8. The seismic Category I piping, including supports, identified in Table 2.4.2-3 can withstand seismic design basis loads without a loss of its safety function.

9.a The Class 1E equipment identified in Table 2.4.2-2 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.

9.b Class 1E equipment, identified in Table 2.4.2-2, is powered from its respective Class 1E division.

9.c Separation is provided between redundant divisions of RCS Class 1E cables, and between Class 1E cables and non-Class 1E cables.

10.a The pressurizer safety valves identified in Table 2.4.2-2 provide overpressure protection in accordance with the ASME Code Section III.

10.b Each RCP flywheel assembly can withstand a design overspeed condition.

10.c RCPs have a rotating inertia to provide RCS flow coastdown on loss of power to the pumps.

10.d The RCS provides circulation of coolant through the reactor core.

10.e The RCS provides the means to control system pressure.

11.a Controls are provided in the MCR to open and close the remotely operated valves identified in Table 2.4.2-~~2~~4. DCD_14.03-5

Table 2.4.2-2 Reactor Coolant System Equipment Characteristics (Sheet 1 of 4)

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Valve	Class 1E/ Qual. for Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position
Reactor coolant pumps	RCS-MPP-001 A, B, C, D	1	Yes	—	No/No	ECCS Actuation coincident with RT (P-4)	Stop	—
Pressurizer	RCS-MTK-002	1	Yes	—	—/—	—	—	—
SG (primary side)	RCS-MHX-001 A, B, C, D	1	Yes	—	—/—	—	—	—
SG (secondary side)		2				—		—
Pressurizer safety valves	RCS-SRV-120,121,122,123	1	Yes	—	—/—	—	Transfer Open/ Transfer Closed	—
Safety depressurization valves	RCS-MOV-117 A, B	1	Yes	Yes	Yes/Yes	Remote Manual	Transfer Open/ Transfer Closed	As Is
SDV block Valves	RCS-MOV-116 A, B	1	Yes	Yes	Yes/Yes	Remote Manual	Transfer Open/ Transfer Closed	As Is
Depressurization valves	RCS-MOV-118	1	Yes	Yes	Yes/Yes	—	—	As Is
Depressurization valves	RCS-MOV-119	1	Yes	Yes	Yes/Yes	—	—	As Is

DCD_14.03-13

Table 2.4.2-3 Reactor Coolant System Piping Characteristics

Pipe Line Name	ASME Code Section III Class	Leak Before Break[1]	Seismic Category I
Pressurizer piping upstream of and including the pressurizer safety valves RCS-SRV-120,121,122,123, safety depressurization valves RCS-MOV-117A,B, and depressurization valves RCS-MOV-119	1	No	Yes
Reactor vessel head vent piping upstream of and including the reactor vessel head vent valves RCS-MOV-003A,B	1	No	Yes
Pressurizer piping downstream of and excluding pressurizer safety valves RCS-SRV-120,121,122,123	—	No	No
Pressurizer piping downstream of and excluding safety depressurization valves RCS-MOV-117A,B	—	No	No
Pressurizer piping downstream of and excluding depressurization valves RCS-MOV-119	—	No	No
Reactor vessel head vent line piping downstream of and excluding the reactor vessel head vent valves RCS-MOV-003A,B	—	No	No
Reactor coolant piping drain piping upstream of and including the second drain stop valve RCS-VLV-023A,B,C,D	1	No	Yes
Reactor coolant piping	1	Yes	Yes
Pressurizer surge line piping	1	Yes	Yes
Pressurizer spray line piping	1	No	Yes

DCD_14.03-9

Note: Dash (-) indicates not applicable

1. A "Yes" in the Leak Before Break column indicates that the pipe is a candidate for LBB evaluation.

DCD_14.03-9

Table 2.4.2-4 Reactor Coolant System Equipment Alarms, Displays, and Control Functions

Equipment/Instrument Name	MCR/RSC Alarm	MCR Display[1]	MCR/RSC Control Function	RSC Display[1]	
Reactor Coolant Pump	No	Yes	Yes	Yes	
Pressurizer Heaters	No	Yes	Yes	Yes	
Pressurizer Safety Valve	No	Yes[2]	No	Yes[2]	DCD_14.03-6, 8
Safety Depressurization Valve	No	Yes	Yes	Yes	
SDV block valve	No	Yes	Yes	Yes	
Depressurization Valve	No	Yes	Yes	Yes	
Reactor Vessel Head Vent Valve	No	Yes	Yes	Yes	
Reactor Coolant Flow RCS-FT-022,023,024,025, 032,033,034,035, 042,043,044,045, 052,053,054,055	Yes	~~No~~Yes[2]	No	~~No~~Yes[2]	DCD_14.03-6, 8
Reactor Coolant Pump Speed RCS-SE-028A, 038A, 048A, 058A	Yes	~~No~~Yes[2]	No	~~No~~Yes[2]	DCD_14.03-6, 8
Pressurizer Pressure RCS-PT-061,062,063,064	Yes	Yes[2]	No	Yes[2]	DCD_14.03-6, 8
Pressurizer Water Level RCS-LT-061,062,063,064	Yes	Yes	No	Yes	
Reactor Coolant Hot Leg Temperature (Wide Range) RCS-TE-020, 030, 040, 050	No	Yes	No	Yes	
Reactor Coolant Cold Leg Temperature (Wide Range) RCS-TE-025, 035, 045, 055	No	Yes	No	Yes	
Reactor Coolant Hot Leg Temperature (Narrow Range) RCS-TE-021A,B,C, 031A,B,C, 041A,B,C, 051A,B,C	—	—	—	—	
Reactor Coolant Cold Leg Temperature (Narrow Range) RCS-TE-021D, 031D, 041D, 051D	—	—	—	—	
Reactor Coolant Pressure RCS-PT-020, 030, 040, 050	No	Yes	No	Yes	
Reactor Vessel Water Level RCS-LE-181,182	No	Yes	No	Yes	

Note: Dash (-) indicates not applicable

Note (1): on S-VDU except for "Yes[2]" DCD_14.03-6, 8

Note (2): on O-VDU

Table 2.4.2-5 Reactor Coolant System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 6 of 10)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
10.e The RCS provides the means to control system pressure.	10.e Inspections will be performed to verify the rated capacity of the as-built pressurizer heater backup groups A, B, C, and D	10.e Each as-built pressurizer heater backup group (A, B, C, and D) has a rated capacity of at least 120 kW.
11.a Controls are provided in the MCR to open and close the remotely operated valves identified in Table 2.4.2-24.	11.a.i Tests will be performed for MCR control capability of the remotely operated valves, identified in Table 2.4.2-4, on the as-built S-VDU.	11.a.i MCR controls for the remotely operated valves, identified in Table 2.4.2-4, on the as-built S-VDU provide the necessary output from the PSMS to open and close the respective valves. DCD_14.03-5
	11.a.ii Tests will be performed on the as-built remotely operated valves identified in Table 2.4.2-24 using controls on the as-built O-VDU in the as-built MCR.	11.a.ii Controls on the as-built O-VDU in the as-built MCR open and close the as-built remotely operated valves identified in Table 2.4.2-24 with the MCR control function. DCD_14.03-5 DCD_14.03-5
11.b The remotely operated valves identified in Table 2.4.2-2 as having PSMS control perform an active safety function after receiving a signal from PSMS.	11.b Tests will be performed on the as-built remotely operated valves identified in Table 2.4.2-2 using simulated signals.	11.b The as-built remotely operated valves identified in Table 2.4.2-2 as having PSMS control perform the active function identified in the table after receiving a simulated signal.

Table 2.4.2-5 Reactor Coolant System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 7 of 10)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
12.a The motor-operated valves, identified in Table 2.4.2-2, as having an active safety function perform an active safety function to change position as indicated in the table.	12.a.i Type tests, or a combination of type tests and analyses, of the motor-operated valves identified in Table 2.4.2-2 will be performed that demonstrate the capability of the valve to operate under its design conditions.	12.a.i A report exists and concludes that each motor-operated valve changes position as indicated in Table 2.4.2-2 under design conditions.
	12.a.ii Tests of the as-built motor-operated valves identified in Table 2.4.2-2 will be performed under preoperational flow, differential pressure, and temperature conditions.	12.a.ii Each as-built motor-operated valve changes position as identified in Table 2.4.2-2 under preoperational test conditions.
	12.a.iii Inspections will be performed of the as-built motor-operated valves identified in Table 2.4.2-2.	12.a.iii Each as-built motor-operated valve identified in Table 2.4.2-2 is bounded by the type tests, or a combination of the type tests and analyses.
12.b After loss of motive power, the remotely operated valves, identified in Table 2.4.2-2, assume the indicated loss of motive power position.	12.b Tests of the as-built remotely operated valves identified in Table 2.4.2-2 will be performed under the conditions of loss of motive power.	12.b Upon loss of motive power, each as-built remotely operated valve identified in Table 2.4.2-2 assumes the indicated loss of motive power position.
13.a Controls are provided in the MCR to start and stop the reactor coolant pumps identified in Table 2.4.2-4.	13.a.i Tests will be performed for MCR control capability of the reactor coolant pumps, identified in Table 2.4.2-4, on the as-built S-VDU.	13.a.i MCR controls for the reactor coolant pumps, identified in Table 2.4.2-4, on the as-built S-VDU provide the necessary output from the PSMS to start and stop the respective pumps. DCD_14.03-5
	13.a.ii Tests will be performed on the as-built reactor coolant pumps identified in Table 2.4.2-4 using controls on the as-built O-VDU in the ~~as-built~~ MCR.	13.a.ii Controls on the as-built O-VDU in the ~~as-built~~ MCR start and stop the as-built reactor coolant pumps identified in Table 2.4.2-4. DCD_14.03-5 DCD_14.03-5

Table 2.4.2-5 Reactor Coolant System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 8 of 10)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
13.b The pumps identified in Table 2.4.2-2 as having PSMS control perform an active safety function after receiving a signal from PSMS.	13.b Tests will be performed on the as-built pumps identified in Table 2.4.2-2 using simulated signals.	13.b The as-built pumps identified in Table 2.4.2-2 as having PSMS control perform the active function identified in the table after receiving a simulated signal.
14. Alarms and displays identified in Table 2.4.2-4 are provided in the MCR.	14.i Inspection will be performed on the as-built A-VDU in the MCR for retrievability of the alarms and displays identified in Table 2.4.2-4 in the as-built MCR.	14.i Alarms and displays identified in Table 2.4.2-4 can be retrieved on the as-built A-VDU in the as-built MCR.
	14.ii An inspection will be performed on the as-built VDU in the MCR, as identified in Table 2.4.2-4, for retrievability of the displays identified in the table.	14.ii Displays identified in Table 2.4.2-4 can be retrieved on the as-built VDU in the MCR, as identified in the table.

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Table 2.4.2-5 Reactor Coolant System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 9 of 10)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria	
15. Alarms, displays and controls identified in Table 2.4.2-4 are provided in the RSC.	15.i Inspection will be performed on the as-built O-VDU in the RSC for retrievability of the alarms and displays identified in Table 2.4.2-4 in the as-built RSC.	15.i Alarms and displays identified in Table 2.4.2-4 can be retrieved on the as-built O-VDU in the as-built RSC.	DCD_14.03-7, 8
	15.ii Inspection will be performed on the as-built VDU, as identified in Table 2.4.2-4, in the RSC for retrievability of the displays identified in the table.	15.ii Displays identified in Table 2.4.2-4 can be retrieved on the as-built VDU, in the RSC, as identified in the table.	DCD_14.03-7, 8
	15.iii Tests of the as-built RSC control functions identified in Table 2.4.2-4 will be performed. Tests will be performed for RSC control capability of equipment, identified in Table 2.4.2-4, on the as-built S-VDU.	15.iii RSC controls for equipment, identified in Table 2.4.2-4, on the as-built S-VDU provide the necessary output from the PSMS to operate the respective equipment.	DCD_14.03-7, 8
	15.iv Tests will be performed on the as-built equipment, identified in Table 2.4.2-4, using controls on the as-built O-VDU in the RSC.	15.iv Controls on the as-built O-VDU in the as-built RSC operate the as-built equipment identified in Table 2.4.2-4 with an RSC control function.	DCD_14.03-7, 8

Table 2.4.2-5 Reactor Coolant System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 10 of 10)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria	
16. The piping identified in Table 2.4.2-3 as designed for leak-before-break (LBB) meets the LBB criteria, or an evaluation is performed of the protection from the dynamic effects of a rupture of the piping.	16. Inspections of the as-built piping identified in Table 2.4.2-3 will be performed based on the evaluation report for LBB or for the evaluation of the protection from dynamic effects of a pipe break, as specified in Section 2.3.	16. An LBB evaluation report exists and concludes that the LBB acceptance criteria are met by the as-built piping identified in Table 2.4.2-3 and piping materials, or a pipe break hazards analyses report exists and concludes that protection from the dynamic effects of a line break is provided.	
17. Controls are provided in the MCR to start and stop the pressurizer heaters identified in Table 2.4.2-4.	17.i Tests will be performed for MCR control capability of the pressurizer heaters, identified in Table 2.4.2-4, on the as-built S-VDU.	17.i MCR controls for the pressurizer heaters, identified in Table 2.4.2-4, on the as-built S-VDU provide the necessary output from the PSMS to start and stop the respective pressurizer heaters.	DCD_14.03-5
	17.ii Tests will be performed on the as-built pressurizer heaters identified in Table 2.4.2-4 using controls on the as-built O-VDU in the ~~as-built~~ MCR.	17.ii Controls on the as-built O-VDU in the ~~as-built~~ MCR start and stop the as-built pressurizer heaters identified in Table 2.4.2-4.	DCD_14.03-5 DCD_14.03-5

2.4.4 Emergency Core Cooling System (ECCS)

2.4.4.1 Design Description

The primary purpose of the ECCS is to remove stored energy and fission product decay heat from the reactor core following an accident. Four important functions of this safety-related system are to ensure that (1) fuel cladding temperature, oxidation and hydrogen production limits are not exceeded, (2) "coolable" core geometry is maintained, (3) long-term core cooling is available, and (4) the ECCS is capable of providing the containment isolation function, as described in Section 2.11.2, for piping penetrating the containment.

In combination with control rod insertion, the ECCS is designed to shut down and cool the reactor during the following accidents:

- LOCAs,
- Ejection of a control rod cluster assembly,
- Secondary steam system piping failure,
- Inadvertent operating of main steam relief or safety valve, and
- Steam generator tube failure.

The ECCS includes four 50%-capacity safety injection pump divisions.

The ECCS has the following functions:

Accumulator injection - The accumulator system stores borated water under pressure and automatically injects it into the RCS if the reactor coolant pressure decreases below the accumulator pressure.

High head injection - The high-head injection system takes suction from the RWSP and delivers borated water to the safety injection nozzles on the reactor vessel or to the hot legs of the RCS.

Emergency letdown - The emergency letdown system can be utilized to achieve a cold shutdown boration level in the RCS by directing reactor coolant to the RWSP and providing borated water from the RWSP to the RCS via the safety injection pumps.

Containment pH control - Sodium tetraborate decahydrate (NaTB) contained in baskets provides adjustment of the pH of the water in the containment following an accident. The pH adjustment maintains the desired post-accident pH conditions in the containment water, to enhance the iodine retention capacity in the containment and to avoid stress corrosion cracking of the austenitic stainless steel components.

1.a The functional arrangement of the ECCS is as described in the Design Description of Subsection 2.4.4.1 and in Table 2.4.4-1 and as shown in Figure 2.4.4-1.

1.b Each mechanical division of the ECCS as shown in Figure 2.4.4-1~~(Divisions A, B, C & D)~~ is physically separated from the other divisions, with the exception of ~~inside the~~ DCD_14.03-10 containmentNaTB baskets and containers, NaTB transfer piping and refueling cavity drain piping, so as not to preclude accomplishment of the safety function. DCD_14.03-10

2.a.i The ASME Code Section III components of the ECCS identified in Table 2.4.4-2 are fabricated, installed and inspected in accordance with ASME Code Section III requirements.

2.a.ii The ASME Code Section III components of the ECCS identified in Table 2.4.4-2 are reconciled with the design requirements.

2.b.i The ASME Code Section III piping of the ECCS, including supports and design features described in the design basis to limit potential gas accumulation, identified in Table 2.4.4-3, is fabricated, installed, and inspected in accordance with ASME Code Section III requirements. DCD_05.04.07-11

2.b.ii The ASME Code Section III piping of the ECCS, including supports and design features described in the design basis to limit potential gas accumulation, identified in Table 2.4.4-3, is reconciled with the design requirements. DCD_05.04.07-11

3.a Pressure boundary welds in ASME Code Section III components, identified in Table 2.4.4-2, meet ASME Code Section III requirements for non-destructive examination of welds.

3.b Pressure boundary welds in ASME Code Section III piping, identified in Table 2.4.4-3, meet ASME Code Section III requirements for non-destructive examination of welds.

4.a The ASME Code Section III components, identified in Table 2.4.4-2, retain their pressure boundary integrity at their design pressure.

4.b The ASME Code Section III piping, identified in Table 2.4.4-3, retains its pressure boundary integrity at its design pressure.

5.a The seismic Category I equipment, identified in Table 2.4.4-2, can withstand seismic design basis loads without loss of safety function.

5.b The seismic Category I piping, including supports, identified in Table 2.4.4-3 can withstand seismic design basis loads without a loss of its safety function.

6.a The Class 1E equipment identified in Table 2.4.4-2 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.

6.b Class 1E equipment, identified in Table 2.4.4-2, is powered from its respective Class 1E division.

6.c Separation is provided between redundant divisions of ECCS Class 1E cables, and between Class 1E cables and non-Class 1E cables.

7.a Deleted.

7.b The ECCS provides RCS makeup, boration, and safety injection during design basis events.

7.c The ECCS provides pH adjustment of water flooding the containment following design basis accidents.

7.d The safety injection pumps have sufficient net positive suction head (NPSH).

8. Controls are provided in the MCR to open and close the remotely operated valves identified in Table 2.4.4-~~2~~4. DCD_14.03-5

9.a The motor-operated, air-operated and check valves, identified in Table 2.4.4-2 as having an active safety function, perform an active safety function to change position as indicated in the table.

9.b After loss of motive power, the remotely operated valves, identified in Table 2.4.4-2, assume the indicated loss of motive power position.

10.a Controls are provided in the MCR to start and stop the safety injection pumps identified in Table 2.4.4-4.

10.b The pumps identified in Table 2.4.4-4 start after receiving an ECCS actuation signal.

10.c A confirmatory-open interlock is provided to automatically open the accumulator discharge valve upon the receipt of an ECCS actuation signal or an above low pressurizer pressure (P11) setpoint signal.

11. Alarms and displays identified in Table 2.4.4-4 are provided in the MCR.

12. Alarms, displays and controls identified in Table 2.4.4-4 are provided in the RSC.

13. The piping identified in Table 2.4.4-3 as designed for LBB meets the LBB criteria, or an evaluation is performed of the protection from the dynamic effects of a rupture of the line.

14.a Deleted.

14.b Deleted.

15. The pumps identified in Table 2.4.4-2 perform their safety functions under design conditions. DCD_03.09.06-69

2.4.4.2 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.4.4-5 describes the ITAAC for the ECCS.

The ITAAC associated with the ECCS equipment, components, and piping that comprise a portion of the CIS are described in Table 2.11.2-2.

Table 2.4.4-2 Emergency Core Cooling System Equipment Characteristics (Sheet 1 of 4)

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Valve	Class 1E/ Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position
ECC/CS Strainers	SIS-SST-001 A, B, C, D	-	Yes	-	-/-	-	-	-
Safety Injection Pumps	SIS-MPP-001 A, B, C, D	2	Yes	-	Yes/Yes ~~No~~	ECCS Actuation	Start	-
Accumulators	SIS-MTK-001 A, B, C, D	2	Yes	-	-/-	-	-	-
Refueling Storage Water Pit	RWS-MCT-001	-	Yes	-	-/-	-	-	-
NaTB Baskets	PHS-MEQ-001A~Y	-	Yes	-	-/-	-	-	-
NaTB Basket Containers	PHS-MTK-001A,B,C	2	Yes	-	-/-	-	-	-
Safety Injection Pump Suction Isolation Valves	SIS-MOV-001 A, B, C, D	2	Yes	Yes	Yes/ Yes	Remote Manual	Transfer Closed	As Is
Safety Injection Pump Discharge Containment Isolation Valves	SIS-MOV-009 A, B, C, D	2	Yes	Yes	Yes/Yes ~~No~~	Remote Manual	Transfer Closed	As Is
Safety Injection Pump Discharge Containment Isolation Check Valves	SIS-VLV-010 A, B, C, D	2	Yes	-	-/-	-	Transfer Open/ Transfer Closed	-

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Table 2.4.4-2 Emergency Core Cooling System Equipment Characteristics (Sheet 2 of 4)

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Valve	Class 1E/ Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position
Direct Vessel Safety Injection Line Isolation Valves	SIS-MOV-011 A, B, C, D	2	Yes	Yes	Yes/ Yes	Remote Manual	Transfer Open/ Transfer Closed	As Is
Hot Leg Injection Isolation Valves	SIS-MOV-014 A, B, C, D	1	Yes	Yes	Yes/ Yes	Remote Manual	Transfer Open	As Is
Hot Leg Injection Check Valves	SIS-VLV-015 A, B, C, D	1	Yes	-	-/-	-	Transfer Open	-
Accumulator Discharge Valves	SIS-MOV-101 A, B, C, D	2	Yes	Yes	Yes/ Yes	ECCS Actuation, ~~Above Low~~ Pressureizer Pressure (above P-11) Setpoint	Transfer Open	As Is
						Remote Manual	Transfer Closed	
Accumulator Nitrogen Supply Line Isolation Valves	SIS-MOV-125 A, B, C, D	2	Yes	Yes	Yes/ Yes	Remote Manual	Transfer Open	As Is
Accumulator Nitrogen Discharge Valves	SIS-MOV-121 A, B	2	Yes	Yes	Yes/ Yes	Remote Manual	Transfer Open	As Is
Accumulator Nitrogen Supply Containment Isolation Valve	SIS-AOV-114	2	Yes	Yes	Yes/Yes~~No~~	Containment Isolation Phase A	Transfer Closed	Closed

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Table 2.4.4-2 Emergency Core Cooling System Equipment Characteristics (Sheet 4 of 4)

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Valve	Class 1E/ Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position
Safety Injection Pump Discharge Check Valves	SIS-VLV-004 A,B,C,D	2	Yes	No	-/-—	—	Transfer Open	—
Safety Injection Pump Minimum Flow	SIS-FT-072, 073, 074, 075	—	Yes	—	Yes/YesNo	—	—	—
Accumulator Water Level	SIS-LT-010, 020, 030,040	—	Yes	—	Yes/Yes	—	—	—
Accumulator Pressure	SIS-PT-010, 020, 030, 040	—	Yes	—	Yes/Yes	—	—	—
Safety Injection Pump Suction Pressure	SIS-PT-060, 061, 062, 063	—	Yes	—	Yes/No	—	—	—
Safety Injection Pump Discharge Pressure	SIS-PT-064, 065, 066, 067	—	Yes	—	Yes/No	—	—	—
Refueling Water Storage Pit Water Level	RWS-LT-010, 011, 012, 013	—	Yes	—	Yes/Yes	—	—	—
Safety Injection Pump Discharge Flow	SIS-FT-062, 063, 064, 065	—	Yes	—	Yes/No	—	—	—
Debris Interceptors	SIS-SST-001-A, B, C, D, E, F, G	—	Yes	—	-/-—	—	—	—
RWSP Overflow Pipe Check Valves	RWS-VLV-078, 079	2	Yes	—	-/-—	—	—	—

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NOTE:
Dash (-) indicates not applicable

Table 2.4.4-3 Emergency Core Cooling System Piping Characteristics

Pipe Line Name	ASME Code Section III Class	Leak Before Break[1]	Seismic Category I
SI piping and valves between the DVI penetration and including the check valve SIS-VLV-012 A, B, C, D upstream of the DVI penetration	1	No	Yes
SI piping and valves upstream of and excluding the check valve SIS-VLV-012 A, B, C, D upstream of the DVI penetration	2	No	Yes
Hot leg injection piping downstream of and including the 4 motor operated valves SIS-MOV-014 A, B, C, D	1	No	Yes
Hot leg injection piping upstream of but excluding the 4 motor operated valves SIS-MOV-014 A, B, C, D	2	No	Yes
Accumulator piping and valves on the RCS side of and including the check valves SIS-VLV-102 A, B, C, D	1	Yes	Yes
Accumulator piping and valves on the accumulator side of but excluding the check valves SIS-VLV-102 A, B, C, D	2	No	Yes
Emergency letdown isolation valves SIS-MOV-031A, 031D, 032A, 032D and piping between valves	1	No	Yes
Accumulator nitrogen vent piping up and including valves SIS-AOV-114, SIS-MOV-121A,B	2	No	Yes
NaTB solution transfer piping	2	No	Yes
~~RWSP transfer piping~~	~~2~~	~~No~~	~~Yes~~
Refueling cavity drain piping	2	No	Yes
Reactor cavity overflow piping to the RWSP	2	No	Yes
Header compartment overflow piping to the RWSP	2	No	Yes
RWSP overflow piping to C/V drain pump room	2	No	Yes

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Note:
1. A "Yes" in the Leak Before Break column indicates that the pipe is a candidate for LBB evaluation.

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Table 2.4.4-5 Emergency Core Cooling System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 1 of 11)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1.a The functional arrangement of the ECCS is as described in the Design Description of Subsection 2.4.4.1 and in Table 2.4.4-1 and as shown in Figure 2.4.4-1.	1.a Inspection of the as-built ECCS will be performed.	1.a The as-built ECCS conforms to the functional arrangement as described in the Design Description of Subsection 2.4.4.1 and in Table 2.4.4-1 and as shown in Figure 2.4.4-1.
1.b Each mechanical division of the ECCS as shown in Figure 2.4.4-1~~(Divisions A, B, C & D)~~ is physically separated from the other divisions, with the exception of ~~inside the containment~~NaTB baskets and containers, NaTB transfer piping and refueling cavity drain piping, so as not to preclude accomplishment of the safety function.	1.b Inspections and analysis of the as-built ECCS will be performed.	1.b A report exists and concludes that each mechanical division of the as-built ECCS as shown in Figure 2.4.4-1 is physically separated from other mechanical divisions of the system by spatial separation, barriers, or enclosures, with the exception of ~~inside the containment~~NaTB baskets and containers, NaTB transfer piping and refueling cavity drain piping, so as to assure that the functions of the safety-related system are maintained considering postulated dynamic effects (i.e., missile and pipe break hazard), internal flooding and fire.
2.a.i The ASME Code Section III components of the ECCS, identified in Table 2.4.4-2 are fabricated, installed and inspected in accordance with ASME Code Section III requirements.	2.a.i Inspection of the as-built ASME Code Section III components of the ECCS, identified in Table 2.4.2-2, will be performed.	2.a.i The ASME Code Section III data report(s) (certified, when required by ASME Code) and inspection reports (including N-5 Data Reports where applicable) exist and conclude that the as-built ASME Code Section III components of the ECCS identified in Table 2.4.4-2 are fabricated, installed, and inspected in accordance with ASME Code Section III requirements.
2.a.ii The ASME Code Section III components of the ECCS identified in Table 2.4.4-2 are reconciled with the design requirements.	2.a.ii A reconciliation analysis of the components identified in Table 2.4.4-2 using as-designed and as-built information and ASME Code Section III design report(s) (NCA-3550) will be performed.	2.a.ii The ASME Code Section III design report(s) (certified, when required by ASME Code) exist and conclude that the design reconciliation has been completed in accordance with the ASME Code Section III for the as-built components of the ECCS identified in Table 2.4.4-2. The report documents the results of the reconciliation analysis.

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Table 2.4.4-5 Emergency Core Cooling System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 7 of 11)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
	7.b.vi Inspections and analyses of the as-built insulation used in the containment will be conducted.	7.b.vi A report exists and concludes that the as-built insulation in containment is consistent with design basis evaluations of suction strainer performance and downstream effects.
	7.b.vii Inspections of the as-built debris interceptors identified in Table 2.4.4-2 will be conducted.	7.b.vii Mesh size of each as-built debris interceptor identified in Table 2.4.4-2 is less than or equal to 8 in. x 8 in.
7.c The ECCS provides pH adjustment of water flooding the containment following design basis accidents.	7.c Inspections and analyses of the as-built NaTB baskets will be conducted.	7.c A report exists and concludes that the as-built NaTB baskets contain a total calculated weight of NaTB of ≥44,100 pounds. The tops of the as-built NaTB baskets are located below plant elevation 131 ft, 6 in.
7.d The safety injection pumps have sufficient net positive suction head (NPSH).	7.d Tests to measure the as-built safety injection pump suction pressure will be performed. Inspections and analysis to determine NPSH available to each safety injection pump will be performed. The analysis will consider vendor test results of required NPSH and the effects of: - pressure losses for pump inlet piping and components, - pressure losses for pump suction strainers due to debris blockage, - suction from the RWSP water level at the minimum value.	7.d A report exists and concludes that the as-built NPSH available to each safety injection pump is greater than the NPSH required.
8. Controls are provided in the MCR to open and close the remotely operated valves identified in Table 2.4.4-~~2~~4.	8.i Tests will be performed for MCR control capability of the remotely operated valves, identified in Table 2.4.4-4, on the as-built S-VDU.	8.i MCR controls for the remotely operated valves, identified in Table 2.4.4-4, on the as-built S-VDU provide the necessary output from the PSMS to open and close the respective valves.
	8.ii Tests will be performed on the as-built remotely operated valves identified in Table 2.4.4-~~2~~4 using controls on the as-built O-VDU in the ~~as-built~~ MCR.	8.ii Controls on the as-built O-VDU in the ~~as-built~~ MCR open and close the as-built remotely operated valves identified in Table 2.4.4-~~2~~4 with the MCR control function.

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Table 2.4.4-5 Emergency Core Cooling System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 9 of 11)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria	
10.a Controls are provided in the MCR to start and stop the safety injection pumps identified in Table 2.4.4-4.	10.a.i Tests will be performed for MCR control capability of the safety injection pumps, identified in Table 2.4.4-4, on the as-built S-VDU.	10.a.i MCR controls for the safety injection pumps, identified in Table 2.4.4-4, on the as-built S-VDU provide the necessary output from the PSMS to start and stop the respective pumps.	DCD_14.03-5
	10.a.ii Tests will be performed on the as-built safety injection pumps identified in Table 2.4.4-4 using controls on the as-built O-VDU in the ~~as-built~~ MCR.	10.a.ii Controls on the as-built O-VDU in the ~~as-built~~ MCR start and stop the as-built safety injection pumps identified in Table 2.4.4-4 with the MCR control function.	DCD_14.03-5 DCD_14.03-5
10.b The pumps identified in Table 2.4.4-4 start after receiving an ECCS actuation signal.	10.b Tests will be performed on the as-built pumps identified in Table 2.4.4-4 using simulated signals.	10.b The as-built pumps identified in Table 2.4.4-4 start after receiving a simulated ECCS actuation signal.	
10.c A confirmatory-open interlock is provided to automatically open the accumulator discharge valve upon the receipt of an ECCS actuation signal or an above low pressurizer pressure (P11) setpoint signal.	10.c Tests will be performed using simulated signals.	10.c The as-built accumulator discharge valves identified in Table 2.4.4-2 automatically opens upon either the receipt of simulated ECCS actuation or above low pressurizer pressure signal.	
11. Alarms and displays identified in Table 2.4.4-4 are provided in the MCR.	11. Inspection will be performed on the as-built A-VDU and on the as-built S-VDU in the MCR for retrievability of the alarms and displays respectively, as identified in Table 2.4.4-4 ~~in the as-built MCR~~.	11. Alarms and displays, identified in Table 2.4.4-4, can be retrieved on the as-built A-VDU and on the as-built S-VDU respectively in the ~~as-built~~ MCR.	DCD_14.03-6

Table 2.4.4-5 Emergency Core Cooling System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 10 of 11)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria	
12. Alarms, displays and controls identified in Table 2.4.4-4 are provided in the RSC.	12.i Inspection will be performed on the as-built O-VDU and on the as-built S-VDU in the RSC for retrievability of the alarms and displays identified respectively, as in Table 2.4.4-4 in the as-built RSC.	12.i Alarmsand displays, identified in Table 2.4.4-4, can be retrieved on the as-built O-VDU and on the as-built S-VDU respectively in the as-built RSC.	DCD_14.03-7, 8
	12.ii Tests will be performed for RSC control capability of equipment, identified in Table 2.4.4-4, on the as-built S-VDU.	12.ii RSC controls for equipment, identified in Table 2.4.4-4, on the as-built S-VDU provide the necessary output from the PSMS to operate the respective equipment.	DCD_14.03-7, 8
	12.iii Tests of the as-built RSC control functions identified in Table 2.4.4-4 will be performed. Tests will be performed on the as-built equipment, identified in Table 2.4.4-4, using controls on the as-built O-VDU in the RSC.	12.iii Controls on the as-built O-VDU in the as-built RSC operate the as-built equipment identified in Table 2.4.4-4 with an RSC control function.	DCD_14.03-7, 8
13. The piping identified in Table 2.4.4-3 as designed for LBB meets the LBB criteria, or an evaluation is performed of the protection from the dynamic effects of a rupture of the line.	13. Inspections of the as-built piping identified in Table 2.4.4-3 will be performed based on the evaluation report for LBB or for the evaluation of the protection from dynamic effects of a pipe break, as specified in Section 2.3.	13. An LBB evaluation report exists and concludes that the LBB acceptance criteria are met by the as-built piping identified in Table 2.4.4-3 and piping materials, or a pipe break hazards analysis report exists and concludes that protection is provided from the dynamic effects of a line break is provided.	

2.4.5 Residual Heat Removal System (RHRS)

2.4.5.1 Design Description

The RHRS cools the reactor by removing decay heat and other residual heat from the reactor core and the reactor coolant system (RCS) during normal plant shutdown and cooldown conditions via the component cooling water system (CCWS). Any two of the four subsystems have a 100% capability for safe shutdown. The RHRS provides cooling for the in-containment RWSP during normal plant operation when required and can also provide a portion of the RCS flow to the chemical and volume control system (CVCS) during normal plant startup and cooldown operations to control RCS pressure. The RHRS can operate during mid-loop or drain down operation to allow maintenance or inspection of the reactor head, steam generator, and reactor coolant pump seals and can transfer borated water from the RWSP to the refueling cavity at the beginning of a refueling operation.

The RHRS is a safety-related system. Portions of the RHRS (i.e., heat exchangers and pumps) are shared with the containment spray system (CSS). The RHRS provides the containment isolation function, as described in Section 2.11.2, for the piping that penetrates the containment. The RHRS is used as an alternate for core cooling / injection in case all safety injection systems fail.

1.a The functional arrangement of RHRS is as described in the Design Description of Subsection 2.4.5.1 and in Table 2.4.5-1 and as shown in Figure 2.4.5-1.

1.b Each mechanical division of the RHRS as shown in Figure 2.4.5-1~~(Divisions A, B, C & D)~~ is physically separated from the other divisions ~~with the exception of inside the containment~~ so as not to preclude accomplishment of the safety function. DCD_14.03-10

2.a.i The ASME Code Section III components of the RHRS, identified in Table 2.4.5-2, are fabricated, installed and inspected in accordance with ASME Code Section III requirements.

2.a.ii The ASME Code Section III components of the RHRS identified in Table 2.4.5-2 are reconciled with the design requirements.

2.b.i The ASME Code Section III piping of the RHRS, including supports and design features described in the design basis to limit potential gas accumulation, identified in Table 2.4.5-3, is fabricated, installed, and inspected in accordance with ASME Code Section III requirements. DCD_05.04.07-11

2.b.ii The ASME Code Section III piping of the RHRS, including supports and design features described in the design basis to limit potential gas accumulation, identified in Table 2.4.5-3 is reconciled with the design requirements. DCD_05.04.07-11

9. Controls are provided in the MCR to open and close the remotely operated valves identified in Table 2.4.5-42. DCD_14.03-5

10.a The motor-operated and check valves identified in Table 2.4.5-2 as having an active safety function perform an active safety function to change position as indicated in the table.

10.b After loss of motive power, the remotely operated valves, identified in Table 2.4.5-2, assume the indicated loss of motive power position.

11. Controls are provided in the MCR to start and stop the CS/RHR pumps identified in Table 2.4.5-4.

12. Alarms and displays identified in Table 2.4.5-4 are provided in the MCR.

13. Alarms, displays and controls identified in Table 2.4.5-4 are provided in the RSC.

14. The piping identified in Table 2.4.5-3 as designed for LBB meets the LBB criteria, or an evaluation is performed of the protection from the dynamic effects of a rupture of the line.

15.a Deleted

15.b Deleted

16. The pumps identified in Table 2.4.5-2 perform their safety functions under design conditions. DCD_03.09.06-69

2.4.5.2 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.4.5-5 describes the ITAAC for the RHRS. The ITAAC associated with those components shared with the CSS performing their containment spray functions are provided in Subsection 2.11.3.

The ITAAC associated with the RHRS equipment, components, and piping that comprise a portion of the CIS are described in Table 2.11.2-2.

Table 2.4.5-2 Residual Heat Removal System Equipment Characteristics (Sheet 1 of 3)

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Valve	Class 1E/ Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position
CS/RHR Pumps	RHS-MPP-001 A, B, C, D	2	Yes	-	Yes/Yes-	Containment Spray Actuation	Start	-
CS/RHR Heat Exchangers - tube side	RHS-MHX-001 A, B, C, D	2	Yes	-	-/-	-	-	-
CS/RHR Heat Exchangers - CCW side		3	Yes	-	-/-	-	-	-
1st CS/RHR Pump Hot Leg Isolation Valves	RHS-MOV-001A, B, C, D	1	Yes	Yes	Yes/Yes	Remote Manual with CS/RHR Pump Hot Leg Isolation Valve Permissive Interlock and CS/RHR Valve Open Block	Transfer Closed/ Transfer Open	As Is
2nd CS/RHR Pump Hot Leg Isolation Valves	RHS-MOV-002A, B, C, D	1	Yes	Yes	Yes/Yes	Remote Manual with CS/RHR Pump Hot Leg Isolation Valve Permissive Interlock and CS/RHR Valve Open Block	Transfer Closed/ Transfer Open	As Is

DCD_14.03-13

DCD_14.03-11

DCD_14.03-11

Table 2.4.5-2 Residual Heat Removal System Equipment Characteristics (Sheet 2 of 3)

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Valve	Class 1E/ Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position
CS/RHR Pump Suction Relief Valves	RHS-SRV-003A, B, C, D	2	Yes	No	-/-	-	-	-
CS/RHR Pump Suction Check Valves	RHS-VLV-004A, B, C, D	2	Yes	No	-/-	-	Transfer Open	-
RHR Discharge Line Containment Isolation Valves outside containment	RHS-MOV-021A, B, C, D	2	Yes	Yes	Yes/YesNo	Remote Manual	Transfer Closed/ Transfer Open	As Is
RHR Discharge Line Containment Isolation Valves inside containment	RHS-VLV-022A, B, C, D	2	Yes	No	-/-	-	Transfer Open/ Transfer Closed	-
Low Pressure Letdown Isolation Valves	RHS-AOV-024B, C	2	Yes	Yes	Yes/Yes	Low Pressure Letdown Isolation	Transfer Closed	Closed
CS/RHR Pump Full-Flow Test Line Stop Valves	RHS-MOV-025A, B, C, D	2	Yes	Yes	Yes/Yes	Remote Manual	Transfer Open/ Transfer Closed	As Is
RHR Flow Control Valves	RHS-MOV-026A, B, C, D	2	Yes	Yes	Yes/Yes	Remote Manual	Transfer Open/ Transfer Closed	As Is
2nd RHR Discharge Line Check Valves	RHS-VLV-027A, B, C, D	1	Yes	No	-/-	-	Transfer Open	-

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DCD_14.03-11

Table 2.4.5-2 Residual Heat Removal System Equipment Characteristics (Sheet 3 of 3)

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Valve	Class 1E/ Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position
1st RHR Discharge Line Check Valves	RHS-VLV-028A, B, C, D	1	Yes	No	-/-	-	Transfer Open	-
Containment Spray / Residual Heat Removal Pump Discharge Flow	RHS-FT-011, 021, 031, 041	—	Yes	—	Yes/No	-	—	—
Containment Spray / Residual Heat Removal Pump Minimum Flow	RHS-FT-014, 024, 034, 044	—	Yes	—	Yes/No	-	—	—
Containment Spray / Residual Heat Removal Pump Suction Pressure	RHS-PT-010, 020, 030, 040	—	Yes	—	Yes/No	-	—	—
Containment Spray / Residual Heat Removal Pump Discharge Pressure	RHS-PT-011, 021, 031, 041	—	Yes	—	Yes/No	-	—	—
Containment Spray / Residual Heat Removal Heat Exchanger Outlet Temperature	RHS-TE-014, 024, 034, 044	—	Yes	—	Yes/YesNo	-	—	—

DCD_14.03-13

NOTE:
Dash (-) indicates not applicable

Table 2.4.5-3 Residual Heat Removal System Piping Characteristics

Pipe Line Name	ASME Code Section III Class	Leak Before Break[1]	Seismic Category I
RHRS suction piping and valves on the RCS side between the hot legs, up to and including the motor operated valves RHS-MOV-002 A, B, C, D	1	Yes	Yes
RHRS discharge piping and valves on the RCS side between the cold legs, up to and including the check valves RHS-VLV-027 A, B, C, D	1	Yes	Yes
RHRS piping and valves on the RHR side from and excluding the motor operated valves RHS-MOV-002 A, B, C, D to and excluding the second check valves	2	No	Yes
All RHRS piping and valves not mentioned above up to and including the valves interfacing with systems of a lower classification.	2	No	Yes

DCD_14.03-9

Note:
1. A "Yes" in the Leak Before Break column indicates that the pipe is a candidate for LBB evaluation.

DCD_14.03-9

Table 2.4.5-4 Residual Heat Removal System Equipment Alarms, Displays, and Control Functions

Equipment Name	MCR/RSC Alarm	MCR Display	MCR/RSC Control Function	RSC Display
CS/RHR Pumps RHS-MPP-001A, B, C, D	No	Yes	Yes	Yes
1st and 2nd CS/RHR Pump Hot Leg Isolation Valves RHS-MOV-001A, B, C, D and -002A, B, C, D	Yes	Yes	Yes	Yes
RHR Discharge Line Containment Isolation Valves RHS-MOV-021A, B, C, D	No	Yes	Yes	Yes
RHR Flow Control Valves RHS-MOV-026A, B, C, D	No	Yes	Yes	Yes
CS/RHR Pump Full-flow Test Line Stop Valves RHS-MOV-025A, B, C, D	No	Yes	Yes	Yes
~~CS/RHR Heat Exchanger Inlet Temperature~~ ~~RHS-TE-012, 022, 032, 042~~	~~No~~	~~Yes~~	~~No~~	~~Yes~~
CS/RHR Hx Outlet Temperature RHS-TE-014, 024, 034, 044	No	Yes	No	Yes
CS/RHR Pump Discharge Flow RHS-FT-011, 021, 031, 041	Yes	Yes	No	Yes
CS/RHR Pump Minimum Flow RHS-FT-014, 024, 034, 044	No	Yes	No	Yes
CS/RHR Pump Discharge Pressure RHS-PT-011, 021, 031, 041	Yes	Yes	No	Yes
CS/RHR Pump Suction Pressure RHS-PT-010, 020, 030, 040	No	Yes	No	Yes

DCD_14.03-5, 8

Table 2.4.5-5 Residual Heat Removal System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 1 of 10)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1.a The functional arrangement of the RHRS is as described in the Design Description of Subsection 2.4.5.1 and in Table 2.4.5-1 and as shown in Figure 2.4.5-1.	1.a Inspection of the as-built RHRS will be performed.	1.a The as-built RHRS conforms to the functional arrangement as described in the Design Description of Subsection 2.4.5.1 and in Table 2.4.5-1 and as shown in Figure 2.4.5-1.
1.b Each mechanical division of the RHRS as shown in Figure 2.4.5-1~~(Divisions A, B, C & D)~~ is physically separated from the other divisions ~~with the exception of inside the containment~~ so as not to preclude accomplishment of the safety function.	1.b Inspections and analysis of the as-built RHRS will be performed.	1.b A report exists and concludes that each mechanical division of the as-built RHRS as shown in Figure 2.4.5-1 is physically separated from other mechanical divisions of the system by spatial separation, barriers, or enclosures~~structural barriers with the exception of inside the containment~~ so as to assure that the functions of the safety-related system are maintained considering postulated dynamic effects (i.e., missile and pipe break hazard), internal flooding and fire.
2.a.i The ASME Code Section III components of the RHRS, identified in Table 2.4.5-2, are fabricated, installed and inspected in accordance with ASME Code Section III requirements.	2.a.i Inspection of the as-built ASME Code Section III components of the RHRS, identified in Table 2.4.5-2, will be performed.	2.a.i The ASME Code Section III data report(s) (certified, when required by ASME Code) and inspection reports (including N-5 Data Reports where applicable) exist and conclude that the as-built ASME Code Section III components of the RHRS identified in Table 2.4.5-2 are fabricated, installed, and inspected in accordance with ASME Code Section III requirements.
2.a.ii The ASME Code Section III components of the RHRS identified in Table 2.4.5-2 are reconciled with the design requirements.	2.a.ii A reconciliation analysis of the components in Table 2.4.5-2 using as-designed and as-built information and ASME Code Section III design report(s) (NCA-3550) will be performed.	2.a.ii The ASME Code Section III design report(s) (certified, when required by ASME Code) exist and conclude that design reconciliation has been completed in accordance with ASME Code, for the as-built ASME Code Section III components of the RHRS identified in Table 2.4.5-2. The report documents the results of the reconciliation analysis.

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DCD_14.03-10

Table 2.4.5-5 Residual Heat Removal System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 8 of 10)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria	
9. Controls are provided in the MCR to open and close the remotely operated valves identified in Table 2.4.5-4~~2~~.	9.i Tests will be performed for MCR control capability of the remotely operated valves, identified in Table 2.4.5-4, on the as-built S-VDU.	9.i MCR controls for the remotely operated valves, identified in Table 2.4.5-4, on the as-built S-VDU provide the necessary output from the PSMS to open and close the respective valves.	DCD_14.03-5
	9.ii Tests will be performed on the as-built remotely operated valves identified in Table 2.4.5-4~~2~~ using controls on the as-built O-VDU in the ~~as-built~~ MCR.	9.ii Controls on the as-built O-VDU in the ~~as-built~~ MCR open and close the as-built remotely operated valves identified in Table 2.4.5-4~~2~~ with the MCR control function.	DCD_14.03-5
10.a The motor-operated and check valves, identified in Table 2.4.5-2 as having an active safety function perform an active safety function to change position as indicated in the table.	10.a.i Type tests or a combination of type tests and analyses of the motor-operated valves identified in Table 2.4.5-2 as having an active safety function will be performed that demonstrate the capability of the valve to operate under its design conditions.	10.a.i A report exists and concludes that each motor-operated valve identified in Table 2.4.5-2 as having an active safety function changes position as indicated in Table 2.4.5-2 under design conditions.	
	10.a.ii Tests of the as-built motor-operated valves identified in Table 2.4.5-2 as having an active safety function will be performed under preoperational flow, differential pressure, and temperature conditions.	10.a.ii Each as-built motor-operated valve identified in Table 2.4.5-2 as having an active safety function changes position as indicated in Table 2.4.5-2 under preoperational test conditions.	
	10.a.iii Inspections will be performed of the as-built motor-operated and air-operated valves identified in Table 2.4.5-2 as having an active safety function.	10.a.iii Each as-built motor-operated and air-operated valve identified in Table 2.4.5-2 as having an active safety function is bounded by the type tests, or a combination of type tests and analyses.	
	10.a.iv Tests of the as-built check valves identified in Table 2.4.5-2 as having an active safety function will be performed under preoperational test pressure, temperature and fluid flow conditions.	10.a.iv Each as-built check valve identified in Table 2.4.5-2 as having an active safety function changes position as indicated in Table 2.4.5-2 under preoperational test conditions.	

Table 2.4.5-5 Residual Heat Removal System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 9 of 10)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria	
10.b After loss of motive power, the remotely operated valves, identified in Table 2.4.5-2, assume the indicated loss of motive power position.	10.b Tests of the as-built remotely operated valves identified in Table 2.4.5-2 will be performed under the conditions of loss of motive power.	10.b Upon loss of motive power, each as-built remotely operated valve identified in Table 2.4.5-2 assumes the indicated loss of motive power position.	
11. Controls are provided in the MCR to start and stop the CS/RHR pumps identified in Table 2.4.5-4.	11.i Tests will be performed for MCR control capability of the CS/RHR pumps, identified in Table 2.4.5-4, on the as-built S-VDU.	11.i MCR controls for the CS/RHR pumps, identified in Table 2.4.5-4, on the as-built S-VDU provide the necessary output from the PSMS to start and stop the respective pumps.	DCD_14.03-5
	11.ii Tests will be performed on the as-built CS/RHR pumps identified in Table 2.4.5-4 using controls on the as-built O-VDU in the ~~as-built~~ MCR.	11.ii Controls on the as-built O-VDU in the ~~as-built~~ MCR start and stop the as-built CS/RHR pumps identified in Table 2.4.5-4 with the MCR control function.	DCD_14.03-5
12. Alarms and displays identified in Table 2.4.5-4 are provided in the MCR.	12. Inspection will be performed on the as-built A-VDU and on the as-built S-VDU in the MCR for retrievability of the alarms and displays respectively, as identified in Table 2.4.5-4 ~~in the as-built MCR~~.	12. Alarms and displays, identified in Table 2.4.5-4, can be retrieved on the as-built A-VDU and on the as-built S-VDU respectively in the ~~as-built~~ MCR.	DCD_14.03-6
13. Alarms, displays and controls identified in Table 2.4.5-4 are provided in the RSC.	13.i Inspection will be performed on the as-built O-VDU and on the as-built S-VDU in the RSC for retreivability of the alarms and displays respectively, as identified in Table 2.4.5-4 ~~in the as-built RSC~~.	13.i Alarms and displays, identified in Table 2.4.5-4, can be retrieved on the as-built O-VDU and on the as-built S-VDU respectively in the ~~as-built~~ RSC.	DCD_14.03-7, 8
	13.ii ~~Tests of the as-built RSC control functions identified in Table 2.4.5-4 will be performed.~~ Tests will be performed for RSC control capability of equipment, identified in Table 2.4.5-4, on the as-built S-VDU.	13.ii RSC controls for equipment, identified in Table 2.4.5-4, on the as-built S-VDU provide the necessary output from the PSMS to operate the respective equipment.	DCD_14.03-7, 8
	13.iii Tests will be performed on the as-built equipment, identified in Table 2.4.5-4, using controls on the as-built O-VDU in the RSC.	13.iii Controls on the as-built O-VDU in the ~~as-built~~ RSC operate the as-built equipment identified in Table 2.4.5-4 with an RSC control function.	DCD_14.03-7, 8

4.a The ASME Code Section III components, identified in Table 2.4.6-2, retain their pressure boundary integrity at their design pressure.

4.b The ASME Code Section III piping, identified in Table 2.4.6-3, retains its pressure boundary integrity at its design pressure.

5.a The seismic Category I equipment identified in Table 2.4.6-2 can withstand seismic design basis loads without loss of safety function.

5.b The seismic Category I piping, including supports, identified in Table 2.4.6-3 can withstand seismic design basis loads without a loss of its safety function.

6.a The Class 1E equipment identified in Table 2.4.6-2 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.

6.b Class 1E equipment identified in Table 2.4.6-2 is powered from its respective Class 1E division.

6.c Separation is provided between redundant divisions of CVCS Class 1E cables, and between Class 1E cables and non-Class 1E cables.

7. Deleted.

8.a The CVCS provides makeup capability to maintain the RCS volume.

8.b Deleted.

8.c The CVCS supplies seal water to the RCP seals.

9. Controls are provided in the MCR to open and close the remotely operated valves identified in Table 2.4.6-42. DCD_14.03-5

10.a The motor-operated valves, air-operated valves and check valves identified in Table 2.4.6-2 as having an active safety function perform an active safety function to change position as indicated in the table.

10.b After loss of motive power, the remotely operated valves, identified in Table 2.4.6-2, assume the indicated loss of motive power position.

11. Controls are provided in the MCR to start and stop the charging pumps identified in Table 2.4.6-4.

12. Alarms and displays identified in Table 2.4.6-4 are provided in the MCR.

13. Alarms, displays and controls identified in Table 2.4.6-4 are provided in the RSC.

Table 2.4.6-2 Chemical and Volume Control System Equipment Characteristics (Sheet 1 of 6)

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Valve	Class 1E/ Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position
Charging pumps	CVS-MPP-001 A, B	3	Yes	—	Yes /Yes ~~No~~	Undervoltage Signal	Start	—
Regenerative heat exchanger	CVS-MHX-001	3	Yes	—	— / —	—	—	—
Letdown heat exchanger – Tube Side	CVS-MHX-002	3	Yes	—	— / —	—	—	—
Letdown heat exchanger – CCW Side		2	Yes	—	— / —	—	—	—
Excess letdown heat exchanger – Tube Side	CVS-MHX-003	3	Yes	—	— / —	—	—	—
Excess letdown heat exchanger – CCW side		2	Yes	—	— / —	—	—	—
Letdown Orifice Stop Valve	CVS-AOV-001 A, B, C	3	Yes	Yes	Yes/Yes	Containment Isolation Phase A	Transfer Closed	Closed
Letdown Containment Isolation Valve (First)	CVS-AOV-005	2	Yes	Yes	Yes/Yes	Containment Isolation Phase A	Transfer Closed	Closed
Letdown Containment Isolation Valve (Second)	CVS-AOV-006	2	Yes	Yes	Yes/Yes ~~No~~	Containment Isolation Phase A	Transfer Closed	Closed

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Table 2.4.6-2 Chemical and Volume Control System Equipment Characteristics (Sheet 2 of 6)

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Valve	Class 1E/ Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position	
Volume Control Tank Outlet Valve	CVS-LCV-031 B, C	3	Yes	Yes	Yes/Yes~~No~~	—	—	As Is	DCD_14.03-13
Charging Pump Alternate Makeup Valve	CVS-LCV-031 D, E,F,G	3	Yes	Yes	Yes/Yes~~No~~	—	—	As Is	DCD_14.03-13
Volume control tank outlet check Valve	CVS-VLV-125	3	Yes	No	— / —	—	—	—	
Charging pump minimum flow check Valve	CVS-VLV-129A, B	3	Yes	No	— / —	—	Transfer Closed/ Open	—	
Charging pump discharge check Valve	CVS-VLV-131A, B	3	Yes	No	— / —	—	Transfer Closed/ Open	—	
CVCS Charging Line Isolation Valve	CVS-MOV-151	3	Yes	Yes	Yes/Yes~~No~~	ECCS Actuation and CVCS isolation	Transfer Closed	As Is	DCD_14.03-13
CVCS Charging Line Containment Isolation Valve	CVS-MOV-152	2	Yes	Yes	Yes/Yes~~No~~	ECCS Actuation and CVCS isolation	Transfer Closed	As Is	DCD_14.03-13

Table 2.4.6-2 Chemical and Volume Control System Equipment Characteristics (Sheet 3 of 6)

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Valve	Class 1E/ Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position
CVCS Charging Line Isolation Check Valve	CVS-VLV-153	2	Yes	No	— / —	—	Transfer Closed	—
Auxiliary Pressurizer Spray Line Isolation Valve	CVS-AOV-155	1	Yes	Yes	Yes/Yes	Remote Manual	Transfer Closed	Closed
Auxiliary Pressurizer Spray Line Check Valve	CVS-VLV-156	1	Yes	No	— / —	—	Transfer Closed	—
Charging Line Check Valve	CVS-VLV-158	1	Yes	No	— / —	—	—	—
CVCS Charging Line Isolation Valve	CVS-AOV-159	1	Yes	Yes	Yes/Yes	Remote Manual	Transfer Closed/ Open	Open
CVCS Charging Line Check Valve	CVS-VLV-160, 161	1	Yes	No	— / —	—	Transfer Closed	—
RCP Seal Injection Line Containment Isolation	CVS-MOV-178 A, B, C, D	2	Yes	Yes	Yes/Yes~~No~~	Remote Manual	Transfer Closed	As Is
RCP Seal Injection Line Containment Isolation Check Valve	CVS-VLV-179 A, B, C, D	2	Yes	No	— / —	—	Transfer Closed/ Open	—
RCP Seal Water Injection Valve	CVS-VLV-180 A, B, C, D	1	Yes	No	— / —	—	—	—

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Table 2.4.6-2 Chemical and Volume Control System Equipment Characteristics (Sheet 4 of 6)

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Valve	Class 1E/ Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position
RCP Seal Injection Line Check Valve (First)	CVS-VLV-181 A, B, C, D	1	Yes	No	— / —	—	Transfer Closed/ Open	—
RCP Seal Injection Line Check Valve (Second)	CVS-VLV-182 A, B, C, D	1	Yes	No	— / —	—	Transfer Closed/ Open	—
Seal Water Return Line Isolation Valve (First)~~Air Operated Valve~~	CVS-AOV-192 A, B, C, D	2	Yes	Yes	Yes/Yes	Undervoltage Signal	Transfer Closed	Closed
RCP Seal Return Line Containment Isolation Valve	CVS-MOV-203	2	Yes	Yes	Yes/Yes	Containment Isolation Phase A with Undervoltage Signal Containment Isolation Phase B	Transfer Closed	As Is
Seal Water Return Line Isolation Valve (Second)~~Air Operated Valve~~	CVS-AOV-196 A, B, C, D	3	Yes	Yes	Yes/Yes	Undervoltage signal	Transfer Closed	Closed
RCP Seal Return Line Containment Isolation Check valve	CVS-VLV-202	2	Yes	No	— / —	—	Transfer Closed	—

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Table 2.4.6-2 Chemical and Volume Control System Equipment Characteristics (Sheet 5 of 6)

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Valve	Class 1E/ Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position
RCP Seal Return Line Containment Isolation Valve	CVS-MOV-204	2	Yes	Yes	Yes/YesNo	Containment Isolation Phase A with Undervoltage Signal Containment Isolation Phase B	Transfer Closed	As Is
Primary Makeup Water Supply Isolation Valves	CVS-FCV-128, 129	3	Yes	Yes	Yes/No	PrimaryReactor Makeup Water Line Isolation	Transfer Closed	As Is
Excess Letdown Isolation Valve	CVS-AOV-221, 222	1	Yes	Yes	Yes/Yes	Letdown Isolation	Transfer Closed	Closed
CVCS Letdown Line Isolation Valve	CVS-LCV-361	1	Yes	Yes	Yes/Yes	Letdown Isolation	Transfer Closed	Closed
CVCS Letdown Line Isolation Valve	CVS-LCV-362	1	Yes	Yes	Yes/Yes	Letdown Isolation	Transfer Closed	Closed
Charging pump alternate makeup line check	CVS-VLV-592	3	Yes	No	— / —	—	Transfer Open	—

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Table 2.4.6-2 Chemical and Volume Control System Equipment Characteristics (Sheet 6 of 6)

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Valve	Class 1E/ Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position
Charging pump alternate makeup line check valve	CVS-VLV-594	3	Yes	No	— / —	—	Transfer Open	—
Charging pump alternate makeup line check valve	CVS-VLV-595	3	Yes	No	— / —	—	Transfer Open	—
Primary Makeup Water Supply Flow	CVS-FT-128, 129	—	Yes	—	Yes/No	—	—	—

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DCD_14.03-13

NOTE:
Dash (—) indicates not applicable

Table 2.4.6-4 Chemical and Volume Control System Equipment, Alarms, Displays, and Control Functions (Sheet 1 of 2)

Equipment Name	MCR/RSC Alarm	MCR Display(1)	MCR/RSC Control Function	RSC Display(1)
Charging Pump (Run Status)	No	Yes	Yes	Yes
Primary Makeup Water Supply Flow	Yes	Yes(2)	No	Yes(2)
Letdown Containment Isolation Valves (CVS-AOV-005,006)	No	Yes	Yes	Yes
CVCS Charging Line Containment Isolation Valve (CVS-MOV-152)	No	Yes	Yes	Yes
RCP Seal Injection Line Containment Isolation (CVS-MOV-178 A, B, C, D)	No	Yes	Yes	Yes
RCP Seal Return Line Containment Isolation Valves (CVS-MOV-203,204)	No	Yes	Yes	Yes
Volume Control Tank Outlet Valves (CVS-LCV-031 B, C)	No	Yes	Yes	Yes
Charging Pump Alternate Makeup Valves (CVS-LCV-031 D,E,F,G)	No	Yes	Yes	Yes
CVCS Charging Line Isolation Valve (CVS-MOV-151)	No	Yes	Yes	Yes
Auxiliary Pressurizer Spray Line Isolation Valve (CVS-AOV-155)	No	Yes	Yes	Yes
CVCS Charging Line Isolation Valve (CVS-AOV-159)	No	Yes	Yes	Yes
Air Operated Valves (CVS-AOV-192 A, B, C, D)	No	Yes	Yes	Yes
Air Operated Valves (CVS-AOV-196 A, B, C, D)	No	Yes	Yes	Yes
Primary Makeup Water Supply Isolation (CVS-FCV-128, 129)	No	Yes	Yes	Yes

DCD_14.03-6, 8

DCD_14.03-6, 8

Table 2.4.6-4 Chemical and Volume Control System Equipment, Alarms, Displays, and Control Functions (Sheet 2 of 2)

Equipment Name	MCR/RSC Alarm	MCR Display(1)	MCR/RSC Control Function	RSC Display(1)
Excess Letdown Isolation Valve (CVS-AOV-221, 222)	No	Yes	Yes	Yes
CVCS Letdown Line Isolation Valve (CVS-LCV-361)	No	Yes	Yes	Yes
CVCS Letdown Line Isolation Valve (CVS-LCV-362)	No	Yes	Yes	Yes

DCD_14.03-6, 8

Note (1): on S-VDU except for "Yes(2)"
Note (2): on O-VDU

DCD_14.03-6, 8

Table 2.4.6-5 Chemical and Volume Control System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 5 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
7. Deleted.	7. Deleted.	7. Deleted.
8.a The CVCS provides makeup capability to maintain the RCS volume.	8.a A test of the as-built CVCS will be performed to measure the makeup flow rate.	8.a Each as-built CVCS charging pump delivers a flow rate to the RCS of greater than or equal to 160 gpm at normal operating pressure of RCS.
8.b Deleted.	8.b Deleted.	8.b Deleted.
8.c The CVCS supplies seal water to the RCP seals.	8.c A test of the as-built CVCS will be performed by aligning a flow path to each RCP.	8.c Each as-built CVCS charging pump provides a flow rate of greater than or equal to 8 gpm to each RCP.
9. Controls are provided in the MCR to open and close the remotely operated valves identified in Table 2.4.6-2.	9.i Tests will be performed for MCR control capability of the remotely operated valves, identified in Table 2.4.6-4, on the as-built S-VDU.	9.i MCR controls for the remotely operated valves, identified in Table 2.4.6-4, on the as-built S-VDU provide the necessary output from the PSMS to open and close the respective valves.
	9.ii Tests will be performed on the as-built remotely operated valves identified in Table 2.4.6-4~~2~~ using controls on the as-built O-VDU in the ~~as-built~~ MCR.	9.ii Controls on the as-built O-VDU in the ~~as-built~~ MCR open and close the as-built remotely operated valves identified in Table 2.4.6-4~~2~~ with the MCR control function.
10.a. The motor-operated valves, air-operated valves and check valves identified in Table 2.4.6-2 as having an active safety function perform an active safety function to change position as indicated in the table.	10.a.i Type tests or a combination of type tests and analyses of the motor-operated valves and air-operated valves identified in Table 2.4.6-2 as having an active safety function will be performed that demonstrate the capability of the valve to operate under its design conditions.	10.a.i A report exists and concludes that each motor-operated and air-operated valve identified in Table 2.4.6-2 as having an active safety function changes position as indicated in Table 2.4.6-2 under design conditions.
	10.a.ii Tests of the as-built motor-operated valves and air-operated valves identified in Table 2.4.6-2 as having an active safety function will be performed under preoperational flow, differential pressure, and temperature conditions.	10.a.ii Each as-built motor-operated and air-operated valve identified in Table 2.4.6-2 as having an active safety function changes position as indicated in Table 2.4.6-2 under preoperational test conditions.

DCD_14.03-5

DCD_14.03-5

DCD_14.03-5

Table 2.4.6-5 Chemical and Volume Control System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 6 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria	
	10.a.iii Inspections will be performed of the as-built motor-operated and air-operated valves identified in Table 2.4.6-2 as having an active safety function.	10.a.iii Each as-built motor-operated and air-operated valve identified in Table 2.4.6-2 as having an active safety function is bounded by the type tests, or a combination of type tests and analyses.	
	10.a.iv Tests of the as-built check valves identified in Table 2.4.6-2 as having an active safety function will be performed under preoperational test pressure, temperature, and fluid flow conditions.	10.a.iv Each as-built check valve identified in Table 2.4.6-2 as having an active safety function changes position as indicated in Table 2.4.6-2 under preoperational test conditions.	
10.b After loss of motive power, the remotely operated valves, identified in Table 2.4.6-2, assume the indicated loss of motive power position.	10.b Tests of the as-built remotely operated valves identified in Table 2.4.6-2 will be performed under the conditions of loss of motive power.	10.b Upon loss of motive power, each as-built remotely operated valve identified in Table 2.4.6-2 assumes the indicated loss of motive power position.	
11. Controls are provided in the MCR to start and stop the charging pumps identified in Table 2.4.6-4.	11.i Tests will be performed for MCR control capability of the charging pumps, identified in Table 2.4.6-4, on the as-built S-VDU.	11.i MCR controls for the charging pumps, identified in Table 2.4.6-4, on the as-built S-VDU provide the necessary output from the PSMS to start and stop the respective pumps.	DCD_14.03-5
	11.ii Tests will be performed on the as-built charging pumps identified in Table 2.4.6-4 using controls on the as-built O-VDU in the ~~as-built~~ MCR.	11.ii Controls on the as-built O-VDU in the ~~as-built~~ MCR start and stop the as-built charging pumps identified in Table 2.4.6-4 with the MCR control function.	DCD_14.03-5 DCD_14.03-5
12. Alarms and displays identified in Table 2.4.6-4 are provided in the MCR.	12.i Inspection will be performed on the as-built A-VDU in the MCR for retrievability of the alarms ~~and displays~~ identified in Table 2.4.6-4 ~~in the as-built MCR~~.	12.i Alarms ~~and displays~~ identified in Table 2.4.6-4 can be retrieved on the as-built A-VDU in the ~~as-built~~ MCR.	DCD_14.03-6
	12.ii An inspection will be performed on the as-built VDU in the MCR, as identified in Table 2.4.6-4, for retrievability of the displays identified in the table.	12.ii Displays identified in Table 2.4.6-4 can be retrieved on the as-built VDU in the MCR, as identified in the table.	DCD_14.03-6

Table 2.4.6-5 Chemical and Volume Control System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 7 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria	
13. Alarms, displays and controls identified in Table 2.4.6-4 are provided in the RSC.	13.i An Iinspection will be performed on the as-built O-VDU for retrievability of the alarms and displays identified in Table 2.4.6-4 in the as-built RSC.	13.i Alarms and displays identified in Table 2.4.6-4 can be retrieved on the as-built O-VDU in the as-built RSC.	DCD_14.03-7, 8
	13.ii Inspection will be performed on the as-built VDU, as identified in Table 2.4.6-4, in the RSC for retrievability of the displays identified in the table.	13.ii Displays identified in Table 2.4.6-4 can be retrieved on the as-built VDU in the RSC, as identified in the table.	DCD_14.03-7, 8
	13.iii Tests of the as-built RSC control functions identified in Table 2.4.6-4 will be performed. Tests will be performed for RSC control capability of equipment, identified in Table 2.4.6-4, on the as-built S-VDU.	13.iii RSC controls for equipment, identified in Table 2.4.6-4, on the as-built S-VDU provide the necessary output from the PSMS to operate the respective equipment.	DCD_14.03-7, 8
	13.iv Tests will be performed on the as-built equipment, identified in Table 2.4.6-4, using controls on the as-built O-VDU in the RSC.	13.ivi Controls on the as-built O-VDU in the as-built RSC operate the as-built equipment identified in Table 2.4.6-4 with an RSC control function.	DCD_14.03-7, 8
14.a Deleted.	14.a Deleted.	14.a Deleted.	
14.b Deleted.	14.b Deleted.	14.b Deleted.	
15. The pumps identified in Table 2.4.6-2 perform their safety functions under design conditions.	15. Type tests or a combination of type tests and analyses of each pump identified in Table 2.4.6-2 will be performed to demonstrate the ability of the pump to perform its safety function under design conditions.	15. An equipment qualification data summary report exists and concludes that the pumps identified in Table 2.4.6-2 perform their safety functions under design conditions.	DCD_03.09.06-69

Table 2.4.7-1 Reactor Coolant Pressure Boundary Leakage Detection System Inspections, Tests, Analyses, and Acceptance Criteria

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. Indications of unidentified coolant leakage into the containment are provided by an air cooler condensate flow rate monitoring system, a containment sump level monitoring system and containment airborne particulate radioactivity monitor. These leak detection system instruments provide alarms and displays in the MCR indicating reactor coolant pressure boundary leakage.	1.i.a An iInspection will be performed on the as-built A-VDU in the MCR for retrievability of the reactor coolant pressure boundary leakage detection alarms ~~and displays~~ from the as-built containment sump level LMS-LT-093A, B, the air cooler condensate standpipe level channel LMS-LT-092, and the containment airborne particulate radioactivity monitor RMS-RE-040 ~~in the as-built MCR~~.	1.i.a Alarms ~~and displays~~ from the as-built reactor coolant pressure boundary leakage detection containment sump level channels LMS-LT-093A, B, the air cooler condensate standpipe level channel LMS-LT-092, and the containment airborne particulate radioactivity monitor RMS-RE-040 can be retrieved on the as-built A-VDU in the ~~as-built~~ MCR. DCD_14.03-6
	1.i.b An inspection will be performed on the as-built VDU in the MCR for retrievability of the displays of LMS-LT-093 A, B, LMS-LT-092 and RMS-RE-040.	1.i.b Displays of LMS-LT-093 A, B, LMS-LT-092 and RMS-RE-040 can be retrieved on the as-built VDU in the MCR as below: LMS-LT-093 A, B: S-VDU LMS-LT-092: O-VDU RMS-RE-040: S-VDU DCD_14.03-6
	1.ii Testing, by adding water to the as-built containment sump, and analysis, will be performed.	1.ii A report exists and concludes that the as-built sump level channels LMS-LT-093A, B have the capability to detect a change in leakage rate of 0.5 gpm or greater within an hour.
	1.iii Testing, by adding water to the as-built condensate standpipe, and analysis, will be performed.	1.iii A report exists and concludes that the as-built standpipe level channel LMS-LT-092 has the capability to detect a change in leakage rate of 0.5 gpm or greater within an hour.
	1.iv Tests and analyses of the as-built containment airborne particulate radioactivity monitor RMS-RE-040 will be performed.	1.iv A report exists and concludes that the as-built containment airborne particulate radioactivity monitor RMS-RE-040 has the required sensitivity and response time, which corresponds to the capability for detecting a change in leakage rate of 0.5 gpm or greater within 1 hour.
2. Deleted.	2. Deleted.	2. Deleted.

DCD_14.03-6

DCD_14.03-6

Table 2.5.1-4 Interlocks Important to Safety and Monitored Variables

DCD_14.03-11, 12

Containment Spray/Residual Heat Removal Pump Hot Leg Isolation Valve Open Permissive Interlock
Simultaneous Open Block Interlock with Residual Heat Removal Discharge Line Containment Isolation Valve and Containment Spray Header Containment Isolation Valve
Simultaneous Open Block Interlock with Containment Spray/Residual Heat Removal Pump Hot Leg Isolation Valve and Containment Spray Header Containment Isolation Valve
Reactor Makeup Water Line Isolation Interlock
Accumulator Discharge Valve Open Interlock
Component Cooling Water Supply and Return Header Tie Line Isolation Interlock
RCP Thermal Barrier Heat Exchanger Component Cooling Water Return Line Isolation Interlock
Low Pressure Letdown Line Isolation Interlock

DCD_07.06-26

DCD_09.02.02-48

DCD_14.03-11, 12

Interlock Important to Safety	Actuation Signal	Monitored Variables
CS/RHR Pump Hot Leg Isolation Valve Open Permissive Interlock	Low Reactor Coolant Pressure	Reactor Coolant Pressure
CS/RHR Valve Open Block Interlock (1st CS/RHR Pump Hot Leg Isolation Valve and 2nd CS/RHR Pump Hot Leg Isolation Valve)	Containment Spray Header Containment Isolation Valve Full Close	Containment Spray Header Containment Isolation Valve Position
CS/RHR Valve Open Block Interlock (Containment Spray Header Containment Isolation Valve)	1st CS/RHR Pump Hot Leg Isolation Valve Full Close	1st CS/RHR Pump Hot Leg Isolation Valve Position
	2nd CS/RHR Pump Hot Leg Isolation Valve Full Close	2nd CS/RHR Pump Hot Leg Isolation Valve Position
Primary Makeup Water Line Isolation Interlock	High Primary Makeup Water Supply Flow	Primary Makeup Water Supply Flow
Accumulator Discharge Valve Open Interlock	Pressurizer Pressure above P-11 Setpoint	Pressurizer Pressure
A2 (C2) CCW Supply Line Isolation Interlock	Low-Low CCW Surge Tank Water Level	CCW Surge Tank Water Level
RCP Thermal Barrier HX CCW Return Line Isolation Interlock	High RCP Thermal Barrier Hx CCW Flow	RCP Thermal Barrier Hx CCW Flow
Low-Pressure Letdown Line Isolation Interlock	Low RCS Loop Water Level	RCS Loop Water Level

Table 2.5.1-6 RT System and ESF System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 8 of ~~9~~15)

MIC-03-07-00003
MIC-03-07-00004

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
16. ~~The PSMS signals are derived from direct measurements described in Table 2.5.1-2 and Table 2.5.1-3.~~The input signals of PSMS are derived from RT and ESF measurement instrumentation identified in Table 2.5.1-1.	16. ~~An inspection of the as-built PSMS will be performed to verify that input signals are from direct measurement of sensor output described in Table 2.5.1-2 and Table 2.5.1-3.~~Tests will be performed to verify the electrical continuity between the as-built PSMS and the as-built RT and ESF measurement instrumentation identified in Table 2.5.1-1.	16. ~~The input signals to the as-built PSMS are derived from direct measurements described in Table 2.5.1-2 and Table 2.5.1-3.~~The input signals of the as-built PSMS are derived from RT and ESF measurement instrumentation identified in Table 2.5.1-1.
17.a The PSMS ~~is designed~~has self-diagnostic functions to facilitate ~~the timely~~ recognition, location, replacement, repair and adjustment of malfunctioning components or modules.	17.a Type ~~T~~tests and analyses of the as-built PSMS will be performed using simulated failure condition.	17.a A report exists and concludes that the as-built PSMS ~~is designed to facilitate recognition and location of malfunctioning components or modules~~has the self-diagnostic functions to facilitate recognition, location, replacement, repair and adjustment of malfunctioning components or modules.
17.b A single channel or division of the PSMS can be bypassed to allow on-line testing, maintenance or repair and this capability does not prevent the PSMS from performing its safety function.	17.b.i ~~Tests will be performed to confirm the as-built channel or division bypass capabilities and to confirm the function of the bypass interlock logic.~~A test will be performed on the 2-out-of-4 voting logic in the as-built RPS by providing simulated process signals, identified in Tables 2.5.1-2 and 2.5.1-3, to at least two of three non-bypassed divisions of the as-built RPS input under the manual single division bypass operation from the as-built safety VDU in the MCR.	17.b.i ~~A single channel or division of the as-built PSMS can be bypassed to allow on-line testing, maintenance or repair and this capability does not prevent the PSMS from performing its safety function.~~When the 2-out-of-4 voting logic in the non-bypassed divisions of each as-built RPS receives at least two of three actuation signals, identified in Tables 2.5.1-2 and Table 2.5.1-3, from the respective non-bypassed divisions, the 2-out-of-4 voting logic in the non-bypassed divisions of each as-built RPS provides the actuation signal for the reactor trip and automatic ESF functions identified in the tables.

DCD_14.03.05-40
DCD_14.03.05-41
DCD_14.03-11, 12

Table 2.5.1-6 RT System and ESF System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 9 of 15)

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MIC-03-07-00004

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
	17.b.ii A test will be performed on each the 2-out-of-4 voting logic in the as-built RPS by providing simulated actuation signals, identified in Tables 2.5.1-2 and 2.5.1-3, to at least two of three non-bypassed channels of the as-built RPS input under the manual single channel bypass operation of the respective actuation signals from the as-built safety VDU in the MCR.	17.b.ii When the 2-out-of-4 voting logic of each as-built RPS receives at least two of three actuation signals, identified in Tables 2.5.1-2 and Table 2.5.1-3, from the respective non-bypassed channels, the 2-out-of-4 voting logic in each as-built RPS provides the actuation signal for the reactor trip and the ESF function identified in the tables.
	17.b.iii A test will be performed on the 2-out-of-4 voting logic in each as-built RPS by providing simulated process signals, identified in Tables 2.5.1-2 and 2.5.1-3, to the bypassed channel and to any one of other three non-bypassed channels in each as-built RPS under the manual single channel bypass operation from the as-built safety VDU in the MCR.	17.b.iii When the 2-out-of-4 voting logic in each as-built RPS receives actuation signals, identified in Tables 2.5.1-2 and Table 2.5.1-3, from the bypassed channel and in any one of the non-bypassed channels, the 2-out-of-4 voting logic in each as-built RPS does not provide any actuation signal for the reactor trip and automatic ESF functions identified in the tables.
18. The PSMS automatically removes the operating bypasses listed in Table 2.5.1-7 when permissive conditions are not met.	18. ~~A test of the as-built PSMS will be performed.~~A test of the as-built PSMS will be performed by using simulated plant process signals corresponding to the operating bypasses listed in Table 2.5.1-7.	18. ~~The as-built PSMS automatically removes the operating bypasses listed in Table 2.5.1-7 when permissive conditions are not met.~~The operating bypass indications, listed in Table 2.5.1-7, on the as-built safety VDU in the MCR are automatically removed when permissive conditions are not met.
19. Deleted.	19. Deleted.	19. Deleted.
20. Deleted.	20. Deleted.	20. Deleted.

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DCD_14.03-11, 12
DCD_14.03.05-42
DCD_14.03-11, 12

Table 2.5.1-6 RT System and ESF System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 10 of ~~9~~15)

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MIC-03-07-00004

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
21. The RT logic of the PSMS is designed to fail to a safe state such that loss of electrical power to a division of PSMS results in a trip condition for that division. Loss of electrical power to a division of the PSMS ESF logic does not result in ESF actuation.	21. A test will be performed by disconnecting the electrical power to each division of the as-built PSMS.	21. Each division of the as-built RT logic of the as-built PSMS fails to a safe state upon loss of electrical power to the division (i.e., results in a trip condition for that division), and loss of electric power to a division of the as-built PSMS ESF logic does not result in ESF actuation.
22. The RT and ESF actuation instrumentation that is required to function during normal operation, anticipated operational occurrence (AOO) and postulated accident (PA) conditions is provided with adequate range to monitor normal operating, AOO and PA events. The monitored variables are listed in Tables 2.5.1-2 and 2.5.1-3.	22. An inspection of the as-built RT and ESF actuation instrumentation ranges will be performed.	22. The ranges of the as-built PSMS RT and ESF actuation instrumentation that is required to function during normal operation, anticipated operational occurrences (AOO) and postulated accident (PA) conditions, and that is listed in Tables 2.5.1-2 and 2.5.1-3, meet design requirements.
23. The PSMS provides the interlocks important to safety identified in Table 2.5.1-4.	23. ~~A test of the as-built PSMS will be performed.~~A test will be performed on the as-built PSMS by using simulated signals which initiate the interlocks important to safety identified in Table 2.5.1-4 when exceeding predetermined limits.	23. ~~The as-built PSMS provides the interlocks important to safety identified in Table 2.5.1-4 when the simulated plant process signals reach a predetermined limit.~~The as-built PSMS generates the signals of the interlocks important to safety identified in Table 2.5.1-4 when the simulated signals reach the predetermined limits.
~~24. The PSMS hardware and software are developed and managed by the Basic and Application Software Program Manuals that meet the regulatory requirements for Class 1E safety systems, and which encompasses the entire product life cycle including software V&V and configuration management.~~	~~24. Inspections of the as-built hardware and software life cycle documentation of the PSMS will be performed.~~	~~24. The as-built PSMS hardware and software are developed and managed by the Basic and Application Software Program Manuals that meet the regulatory requirements for Class 1E safety systems, and which encompasses the entire product life cycle including software V&V and configuration management.~~

DCD_14.03-11, 12

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Table 2.5.1-6 RT System and ESF System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 12 of 915)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
	24.vi An inspection will be performed for the installation phase result summary report of PSMS software in accordance with the SPM.	24.vi The installation phase result summary report exists and concludes that the installation phase activities of PSMS software are performed in accordance with the US-APWR SPM.
25.a Manual controls from the operational VDU are blocked from the safety VDU and can be disabled manually from the safety VDU. The logic in the SLS blocks non-safety signals from the PCMS when any safety function signal is present, such as a safety interlock or ESF actuation signal.Manual control signals from the safety VDU override and can disable manual control signals from the operational VDU to the PSMS by the priority logic in the PSMS.	25.a Tests of the as-built PSMS will be performed.A test of the as-built PSMS will be performed using manual controls from the as-built safety VDU in the MCR and simulated manual control signals or manual controls from the as-built operational VDU in the MCR.	25.a Manual controls from the operational VDU are blocked from the as-built safety VDU and can be disabled manually from the as-built safety VDU. The logic in the as-built SLS blocks non-safety signals from the PCMS when any safety function signal is present, such as a safety interlock or ESF actuation signal.The as-built PSMS generates output signals corresponding to the manual control signals, from the as-built safety VDU in the MCR, even when the as-built PSMS receives simulated manual control signals or manual controls from the as-built operational VDU in the MCR.

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MIC-03-07-00004
MIC-03-07-00003
DCD_07-14_BTP-45
MIC-03-07-00004
DCD_14.03-11, 12

Table 2.5.1-6 RT System and ESF System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 13 of 15)

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MIC-03-07-00004
DCD_14.03-11, 12

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
25.b Automatic ESFAS actuation signals identified in Table 2.5.1-3 and the interlocks important to safety identified in Table 2.5.1-4 override the manual and automatic control signals from the PCMS control signalsto the safety-related components by the priority logic in the PSMS.	25.b.i A test of the as-built PSMS will be performed to confirm that simulated ESFAS actuation signals identified in Table 2.5.1-3 and the interlocks important to safety identified in Table 2.5.1-4 override as-built PCMS control signals.A test will be performed on the as-built PSMS by using simulated PSMS input signals that generate the automatic ESFAS actuations identified in Table 2.5.1-3 and by using simulated PCMS automatic control signals and simulated manual control signals or manual controls from the as-built operational VDU in the MCR to components that receive the corresponding automatic ESFAS actuation signals.	25.b.i As-built PCMS control signals are overridden by simulated automatic ESFAS actuation signals identified in Table 2.5.1-3 and theinterlocksimportant to safety identified in Table 2.5.1-4 in the as-built PSMS.The as-built PSMS generates output signals corresponding to automatic ESFAS actuation signals, identified in Table 2.5.1-3, upon receiving the simulated PSMS input signals that reach the predetermined limits, even when the as-built PSMS receives the simulated manual control signals or manual controls or automatic control signals from the as-built PCMS to the safety-related components.
	25.b.ii A test will be performed on the as-built PSMS by using simulated PSMS input signals that generate the automatic interlock signals important to safety identified in Table 2.5.1-4 and by using simulated PCMS automatic control signals, and simulated manual control signals or manual controls from the as-built operational VDU in the MCR to components that receive the corresponding interlock signals.	25.b.ii The as-built PSMS generates output signals corresponding to the automatic interlock signals important to safety, identified in Table 2.5.1-4, upon receiving the simulated PSMS input signals that reach the predetermined limits, even when the as-built PSMS receives the simulated manual control signals or the manual controls or automatic control signals from the as-built PCMS to the safety-related components.

Table 2.5.1-6 RT System and ESF System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 14 of 15)

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MIC-03-07-00004

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria	
26. A signal selection algorithm (SSA) is provided in the PCMS for the monitoring variables as listed in Table 2.5.1-5 to ensure the PCMS does not take control action that results in a condition which requires RT or ESF action based on a single instrument channel failure or a single RPS division failure.	26. ~~A test of the as-built PCMS SSA functions will be performed using simulated signals.~~A test will be performed on the SSA in the as-built PCMS by providing a signal which simulates a single RPS division failure and a single instrument channel failure of each variable identified in Table 2.5.1-5 at the input of PCMS, while the simulated plant process signals of the same variable are provided at other three channels of as-built PCMS input.	26. ~~The as-built PCMS SSA functions to ensure the PCMS does not take control action that results in a condition which requires RT or ESF action based on a single instrument channel failure or a single RPS division failure, for the monitored variables listed in Table 2.5.1-5.~~When a signal which simulates a single RPS division failure and a single instrument channel failure of each variable identified in Table 2.5.1-5 is provided at the input of the as-built PCMS and simulated plant process signals of the same variable are provided at the other three channels of as-built PSMS input, the SSA output in the as-built PCMS is generated only from the three non-failed channels.	DCD_14.03-11, 12
27. Input sensors from each division of the PSMS as identified in Table 2.5.1-2 and Table 2.5.1-3 are compared continuously in the PCMS to allow detection of out-of-tolerance sensors.	27. ~~A test of the as-built PCMS function will be performed utilizing simulated signals.~~A test of the as-built PCMS will be performed by providing simulated input signals for each monitored variable identified in Tables 2.5.1-2 and 2.5.1-3, which includes one out-of-tolerance signal, at the as-built PSMS input.	27. ~~Input sensors as identified in Table 2.5.1-2 and Table 2.5.1-3 from each division of the as-built PSMS that are out-of-tolerance can be detected by the PCMS.~~An alarm for the out-of-tolerance sensor detection is displayed on the as-built alarm VDU in the MCR when the PCMS receives simulated input signals for each monitored variable identified in Tables 2.5.1-2 and 2.5.1-3, which includes one out-of-tolerance signal.	DCD_14.03-11, 12
28. Deleted.	28. Deleted.	28. Deleted.	
29.a ~~ESF systems are automatically initiated from signals that originate in the RPS as described in Table 2.5.1-3.~~Deleted.	29.a ~~A test of the as-built PSMS will be performed.~~Deleted.	29.a ~~As-built ESF systems are automatically initiated from signals that originate in the as-built RPS as described in Table 2.5.1-3.~~Deleted.	DCD_14.03.05-39 DCD_14.03.05-42

Table 2.5.1-6 RT System and ESF System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 15 of ~~9~~15)

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DCD_14.03.05-43

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
29.b ~~Manual actuation of ESF systems is carried out through a diverse signal path that bypasses the RPS.~~Manual actuation of ESF functions identified in Table 2.5.1-3 is carried out through diverse signal paths that bypass the RPS.	29.b ~~A test of the as-built PSMS will be performed.~~Tests will be performed to verify that the as-built PSMS generates output signals for the ESF functions identified in Table 2.5.1-3 using the conventional ESF manual actuation switches on the as-built operator console, under the condition of the as-built RPS being offline.	29.b ~~Manual actuation of the as-built ESF systems is carried out through a diverse signal path that bypasses the as-built RPS.~~As-built PSMS generates outputs signals for the ESF functions identified in Table 2.5.1-3 upon receipt of the signals from the conventional ESF manual actuation switches on the as-built operator console, under the condition of the as-built RPS being offline.
30.a Deleted.	30.a Deleted.	30.a Deleted.
30.b Deleted.	30.b Deleted.	30.b Deleted.
31. The RT system and ESF system provide actuation signals within required response time for monitored variables identified in Tables 2.5.1-2 and 2.5.1-3. On-line diagnostics do not interrupt plant control.	31.i.a Type tests and analyses will be performed on PSMS to verify that the PSMS can initiate RT and the ESF functions identified in Tables 2.5.1-2 and 2.5.1-3 within response time requirements described in the design basis. The analysis will consider the effect of the on-line diagnostics function.	31.i.a A report exists and concludes that the PSMS can initiate the RT and the ESF functions identified in Tables 2.5.1-2 and 2.5.1-3 within the response time requirements as described in the design basis considering the effect of on-line diagnostics.
	31.i.b An inspection of as-built PSMS will be performed.	31.i.b The as-built PSMS are bounded by the type tests and the analyses.
	31.ii.a Type tests or a combination of type tests and analyses will be performed to determine the response time of RT system and ESF system equipment identified as monitored variables with response time requirements in Tables 2.5.1-2 and 2.5.1-3 and the RTB.	31.ii.a Reports exist and conclude that the response time of RT system and ESF system equipment identified as monitored variables with response time requirements in Tables 2.5.1-2 and 2.5.1-3 and the RTB are within the design basis requirements.
	31.ii.b Inspections will be performed on the as-built RT system and ESF system equipment identified as monitored variables with response time requirements in Tables 2.5.1-2 and 2.5.1-3 and the as-built RTBs.	31.ii.b The as-built RT system and ESF system equipment identified as monitored variables with response time requirements in Tables 2.5.1-2 and 2.5.1-3 and the as-built RTBs are bounded by type tests or a combination of type tests and analyses.

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DCD_14.03-11, 12

2.5.2 Systems Required for Safe Shutdown

2.5.2.1 Design Description

Safe shutdown can be achieved from the MCR or the remote shutdown room (RSR) using redundant safety-related instrumentation and control (I&C) systems of the PSMS, including the RPS, ESFAS, SLS and safety VDUs. The operational VDUs may also be used for monitoring safety-related instrumentation and manually controlling safety-related components. Normal shutdown can also be achieved from the MCR or RSR using non-safety instrumentation and non-safety component controls via the PCMS, including the operational VDUs, in addition to the above safety-related I&C systems.

There are no plant systems specifically and solely dedicated as safe shutdown or normal shutdown systems.

The systems required for safe shutdown perform two basic functions. First, they provide the necessary reactivity control to maintain the core in a sub-critical condition. Second, the systems provide the RHR capability to maintain adequate core cooling. A boration capability is provided to compensate for xenon decay and to maintain the required core shutdown margin.

Manual controls through the safety VDUs or the operational VDUs in the MCR or the RSR, allow operators to transition to and maintain hot standby, and transition to and maintain cold shutdown through hot shutdown. If the MCR is uninhabitable, the same control and monitoring of the safe shutdown and the normal shutdown functions can be performed from the RSR. DCD_14.03.05-31

1. ~~The PSMS controls and monitors the systems required for the safe shutdown functions identified in Tables 2.5.2-1 and 2.5.2-2.~~The PSMS provides capability of manual operating bypass of the ECCS actuation signal and the main steam line pressure signal. DCD_14.03-11, 12

2.a The MCR/RSR transfer switches provide the capability to transfer PSMS controls between the MCR and the RSR. Separate transfer switches are provided for each of the four PSMS divisions.

2.b The MCR/RSR transfer switches provide the capability to transfer PCMS controls between the MCR and the RSR.

2.c Deleted.

3. Electrical isolation is provided between the MCR and the RSR.

4. The RSR and the MCR/RSR transfer switch cabinet outside the MCR can be locked to prevent unauthorized access. Alarms indicating access to the MCR/RSR transfer switch locations are provided in the MCR.

5. Redundant safety-related equipment of the safe shutdown systems identified in Tables 2.5.2-1 and 2.5.2-2, and the MCR/RSR transfer switches, are provided with a clear means of identification.

Table 2.5.2-3 Systems Required for Safe Shutdown Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 1 of 3)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. ~~The PSMS controls and monitors the systems required for the safe shutdown functions identified in Tables 2.5.2-1 and 2.5.2-2.~~The PSMS provides capability of manual shutdown operating bypass of the ECCS actuation signal and the main steam line pressure signal.	1. ~~Inspections and tests of the as-built systems required for the safe shutdown functions identified in Tables 2.5.2-1 and 2.5.2-2, will be performed.~~Tests will be performed on the manual shutdown operating bypass logic in the each division of the as-built RPS by using manual shutdown operating bypass controls for the ECCS actuation signal and the main steam line pressure signal respectively from the as-built safety VDU in the MCR and by providing simulated plant process signals of pressurizer pressure, main steam line pressure and main steam line pressure negative rate as identified in Table 2.5.1-3 at the PSMS input.	1. ~~The as-built systems required for the safe shutdown functions identified in Tables 2.5.2-1 and 2.5.2-2, can be controlled and monitored by the as-built PSMS.~~The manual shutdown operating bypass logic in each division of the as-built RPS blocks the signals, which actuate the ECCS actuation and main steam line isolation, from the simulated plant process signals of pressurizer pressure, main steam line pressure and main steam line pressure negative rate identified in Table 2.5.1-3 by the manual shutdown operating bypass controls from the as-built safety VDU in the MCR. DCD_14.03-11, 12
2.a The MCR/RSR transfer switches provide the capability to transfer PSMS controls between the MCR and the RSR. Separate transfer switches are provided for each of the four PSMS divisions.	2.a A test of the as-built PSMS transfer capability will be performed to demonstrate the disabling of the MCR controls and enabling of the RSR controls. This test can be conducted on a sample basis for at least one set of controls within each of the four PSMS divisions.	2.a The as-built MCR/RSR transfer switches transfer controls between the MCR and the RSR separately for each as-built PSMS safety division, as follows: 1. Controls at the RSR are disabled when controls are active in the MCR for each respective as-built PSMS division. 2. Controls at the MCR are disabled when controls are active in the RSR for each respective as-built PSMS division.

Table 2.5.5-1 Control Systems Not Required for Safety Inspections, Tests, Analyses, and Acceptance Criteria

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the PCMS is as described in the Design Description of Subsection 2.5.5.1 and in Table 2.5.5-2.Deleted.	1. Inspection of the as-built PCMS will be performed.Deleted.	1. The as-built PCMS conforms to the functional arrangement as described in the Design Description of Subsection 2.5.5.1 and in Table 2.5.5-2. Deleted.
2. Deleted.	2. Deleted.	2. Deleted.
3. Deleted.	3. Deleted.	3. Deleted.
4. For a control command to be generated from the PCMS Operational VDUs for safety-related components, two distinct operator actions, at a minimum, are required.	4. Type test of the PCMS will be performed for each type of soft control command.Type tests or a combination of type tests and analyses will be performed on each standard type of component control face plates on the as-built operational VDU in the PCMS for safety-related components.	4. A minimum of two distinct operator actions are required to generate safety-related component control commands from a PCMS Operational VDU.A report exists and concludes that each standard type of component control face plates on the as-built operational VDU in the PCMS provides manual control signals for safety-related components via the PSMS by taking a minimum of two distinct operator actions for the command, but does not generate the manual control signals for safety-related components via the PSMS by one operator action.

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Table 2.6.1-2 AC Electric Power Systems Equipment Displays and Control Functions

Equipment Name	MCR Display(1)	MCR Control Function
A-Class 1E 6.9kV Switchgear	Yes	Yes (Breaker open/close)
B-Class 1E 6.9kV Switchgear	Yes	Yes (Breaker open/close)
C-Class 1E 6.9kV Switchgear	Yes	Yes (Breaker open/close)
D-Class 1E 6.9kV Switchgear	Yes	Yes (Breaker open/close)
A-RCP Trip Switchgear	Yes	Yes (Breaker open/close)
B-RCP Trip Switchgear	Yes	Yes (Breaker open/close)
C-RCP Trip Switchgear	Yes	Yes (Breaker open/close)
D-RCP Trip Switchgear	Yes	Yes (Breaker open/close)
A-Class 1E 480V Load Center	Yes	Yes (Breaker open/close)
A1-Class 1E 480V Load Center	Yes	Yes (Breaker open/close)
B-Class 1E 480V Load Center	Yes	Yes (Breaker open/close)
C-Class 1E 480V Load Center	Yes	Yes (Breaker open/close)
D-Class 1E 480V Load Center	Yes	Yes (Breaker open/close)
D1-Class 1E 480V Load Center	Yes	Yes (Breaker open/close)
A-Class 1E Motor Control Center	Yes	No
A1-Class 1E Motor Control Center	Yes	No
B-Class 1E Motor Control Center	Yes	No
C-Class 1E Motor Control Center	Yes	No
D-Class 1E Motor Control Center	Yes	No
D1-Class 1E Motor Control Center	Yes	No
Unit Auxiliary Transformer (UAT 1, 2, 3, 4)	Yes(2)	No
Reserve Auxiliary Transformer (RAT 1, 2, 3, 4)	Yes(2)	No

DCD_14.03-6

Note (1): on S-VDU except for "Yes(2)"
Note (2): on O-VDU

DCD_14.03-6

Table 2.6.1-3 AC Electric Power Systems Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 6 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria	
20.a Displays of voltage and current of the Class 1E medium voltage buses are provided in the MCR.	20.a Inspection will be performed on the as-built S-VDU in the MCR for retrievability of the voltage and current displays of Class 1E medium voltage buses ~~in the as-built MCR~~.	20.a Displays of voltage and current of the Class 1E medium voltage buses can be retrieved on the as-built S-VDU in the ~~as-built~~ MCR.	DCD_14.03-6
20.b Controls are provided in the MCR and locally to open and close the Class 1E 6.9kV switchgear and 480V load center buses incoming circuit breakers identified in Table 2.6.1-2.	20.b.i Tests will be performed for control capability to open and close Class 1E 6.9kV switchgear and 480V load center buses incoming circuit breakers identified in Table 2.6.1-2 on the as-built S-VDU in the MCR.	20.b.i Controls on the as-built S-VDU in the MCR provide the necessary output from the PSMS to open and close Class 1E 6.9kV switchgear and 480V load center buses incoming circuit breakers identified in Table 2.6.1-2.	DCD_14.03-5
	20.b.ii Tests will be performed on the as-built Class 1E 6.9kV switchgear and 480V load center buses incoming circuit breakers identified in Table 2.6.1-2 using controls on the as-built O-VDU in the ~~as-built~~ MCR and locally.	20.b.ii Controls on the as-built O-VDU in the ~~as-built~~ MCR and locally open and close the as-built Class 1E 6.9kV switchgear and 480V load center buses incoming circuit breakers identified in Table 2.6.1-2.	DCD_14.03-5 DCD_14.03-5
20.c Displays of the Class 1E 6.9kV switchgear and 480V load center buses incoming circuit breakers identified in Table 2.6.1-2 are provided in the MCR.	20.c Inspection will be performed on the as-built S-VDU in the MCR for retrievability of displays of Class 1E 6.9kV switchgear and 480V load center buses incoming circuit breakers identified in Table 2.6.1-2 ~~in the as-built MCR~~.	20.c Displays of Class 1E 6.9kV switchgear and 480V load center buses incoming circuit breakers identified in Table 2.6.1-2 can be retrieved on the as-built S-VDU in the MCR~~in the as-built MCR~~.	DCD_14.03-6 DCD_14.03-6
21. Class 1E ac electric distribution system overcurrent protection is set for proper coordination.	21.i Analyses of Class 1E ac electrical distribution system overcurrent protection will be performed to verify proper coordination.	21.i A report exists and concludes that the as-built Class 1E ac electric distribution system overcurrent protection is set for proper coordination.	
	21.ii Inspection and test will be performed of the Class 1E ac electrical distribution system to verify that the as-built overcurrent protection system bounds the results of the analysis for proper coordination.	21.ii The as-built Class 1E ac electrical distribution system overcurrent protection system bounds the results of the analysis for proper coordination.	

Table 2.6.2-2 DC Power Systems Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 3 of 5)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
6. Each Class 1E battery charger has enough capacity to supply the normal dc loads of the associated 125V dc switchboard bus and charge the associated battery from the design minimum charge to 95% of its full capacity within twenty-four hours.	6.i Analysis will be performed to verify each Class 1E battery charger has enough capacity to supply the normal dc loads of the associated 125V dc switchboard bus and charge the associated battery from the design minimum charge to 95% of its full capacity within twenty-four hours.	6.i A report exists and concludes that each Class 1E battery charger has enough capacity to supply the normal dc loads of the associated 125V dc switchboard bus and charge the associated battery from the design minimum charge to 95% of its full capacity within twenty-four hours.
	6.ii ~~Inspection will be performed to verify that the ratings of the as-built Class 1E battery chargers bound the ratings of the analysis.~~A test of each as-built Class 1E battery charger will be performed.	6.ii ~~The ratings of the as-built Class 1E battery chargers bound the ratings of the analysis.~~Each as-built Class 1E battery charger can supply greater than or equal to the analyzed load determined in 6.i.
7. Alarms and displays identified in Subsection 2.6.2.1 are provided in the MCR.	7. Inspection will be performed on the as-built A-VDU and on the as-built S-VDU in the MCR for retrievability of alarms and displays respectively, as identified in Subsection 2.6.2.1 ~~in the as-built MCR~~.	7. Alarms and displays, identified in Subsection 2.6.2.1, can be retrieved on the as-built O-VDU and on the as-built S-VDU respectively in the ~~as-built~~ MCR.

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DCD_14.03-6

11. The Class 1E I&C power supply system circuit breakers and fuses are rated adequately to interrupt the fault currents.

12. The equipment and circuits of each Class 1E I&C power supply system division are uniquely identified.

13. The Class 1E I&C power supply system cables are routed in raceway systems for Class 1E I&C power supply cables within their respective division.

14. ~~Alarms and d~~Displays identified in Subsection 2.6.3.1 and Table 2.6.3-2 are provided in the MCR. DCD_14.03-6

15. The raceway systems for Class 1E I&C power supply cables meet seismic Category I requirements.

2.6.3.2 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.6.3-3 describes the ITAAC for the Class 1E I&C power supply systems.

Table 2.6.3-3 I&C Power Supply Systems Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 3 of 4)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
9. When ac input power to the Class 1E UPS unit is lost, input to the Class 1E UPS unit is provided by the Class 1E battery without interruption of power supply to the loads.	9. A test will be performed to verify that when ac input power to the as-built Class 1E UPS unit is lost, input to the Class 1E UPS unit is provided by the Class 1E battery without interruption of power supply to the loads.	9. When ac input power to the as-built Class 1E UPS unit is lost, input to the Class 1E UPS unit is provided by the Class 1E battery without interruption of power supply to the loads.
10. Deleted	10. Deleted	10. Deleted
11. The Class 1E I&C power supply system circuit breakers and fuses are rated adequately to interrupt the fault currents.	11.i Analysis will be performed to verify the Class 1E I&C power supply system breakers and fuses are rated adequately to interrupt the fault currents.	11.i A report exists and concludes that the Class 1E I&C power supply system breakers and fuses are rated adequately to interrupt the fault currents.
	11.ii Inspection will be performed to verify the interrupting ratings of as-built Class 1E I&C power supply system breakers and fuses bound the requirements of the analysis.	11.ii The interrupting ratings of as-built Class 1E I&C power supply system breakers and fuses bound the requirements of the analysis.
12. The equipment and circuits of each Class 1E I&C power supply system division are uniquely identified.	12. Inspection of each as-built Class 1E I&C equipment and circuits of each Class 1E I&C power supply system division will be performed.	12. The equipment and circuits of each as-built Class 1E I&C power supply system division are uniquely identified.
13. The Class 1E I&C power supply system cables are routed in raceway systems for Class 1E I&C power supply cables within their respective division.	13. Inspection of the as-built Class 1E I&C power supply system cables routing will be performed.	13. The as-built Class 1E I&C power supply system cables are routed in raceway systems for Class 1E I&C power supply cables within their respective division.
14. ~~Alarms and d~~Displays identified in Subsection 2.6.3.1 and Table 2.6.3-2 are provided in the MCR.	14. Inspection will be performed on the as-built S-VDU in the MCR for retrievability of the ~~alarms and~~ displays identified in Subsection 2.6.3.1 and Table 2.6.3-2~~ in the as-built MCR~~.	14. ~~Alarms and d~~Displays identified in Subsection 2.6.3.1 and Table 2.6.3-2 can be retrieved on the as-built S-VDU in the ~~as-built~~ MCR.
15. The raceway systems for Class 1E I&C power supply cables meet seismic Category I requirements.	15.i Inspections will be performed to verify that the as-built raceway systems for Class 1E I&C power supply cables are supported by a seismic Category I structure(s).	15.i The as-built raceway systems for Class 1E I&C power supply cables are supported by a seismic Category I structure(s).

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Table 2.6.4-1 EPS Systems Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 5 of 10)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria	
15.a A loss of power to a Class1E bus initiates an automatic start of the respective Class 1E EPS, load shedding of connected loads, and closing of the Class 1E EPS circuit breaker.	15.a A test will be performed to verify operation of the respective Class 1E EPS upon a loss of power to the as-built Class 1E bus.	15.a A loss of power to the as-built Class 1E bus initiates an automatic start of the respective as-built Class 1E EPS, load shedding of connected loads, and closing of the as-built Class 1E EPS circuit breaker.	
15.b After the closing of the Class 1E EPS circuit breaker, the LOOP sequencer sequentially starts the required safety-related loads.	15.b A test will be performed to verify operation of the LOOP sequencer after the closing of the as-built Class 1E EPS circuit breaker.	15.b After the closing of the as-built Class 1E EPS circuit breaker, the LOOP sequencer sequentially starts the required safety-related loads.	
16. All Class 1E EPS protection systems, except for overspeed, generator differential current, and high exhaust gas temperature, are automatically bypassed when the Class 1E EPS is started by an ECCS actuation signal.	16. A test will be performed to verify that the as-built Class 1E EPS protection systems, except for overspeed, generator differential current, and high exhaust gas temperature, are automatically bypassed when the Class 1E EPS is started by an ECCS actuation signal.	16. The as-built Class 1E EPS protection systems, except for overspeed, generator differential current, and high exhaust gas temperature, are automatically bypassed when the Class 1E EPS is started by an ECCS actuation signal.	DCD_14.03. 06-23
17. The Class 1E EPSs are capable of responding to an automatic start signal ~~when running for test purposes~~while in the test mode.	17. A test will be performed to verify that the as-built Class 1E EPSs are capable of responding to an automatic start signal while in the test mode.	17. The as-built Class 1E EPSs are capable of responding to an automatic start signal ~~when running for test purposes~~while in the test mode.	DCD_14.03. 06-37
18. Controls are provided in the MCR and the Class 1E EPS room to start and stop each Class 1E EPS.	18.i Tests will be performed for control capability of each Class 1E EPS on the as-built S-VDU in the MCR.	18.i Controls on the as-built S-VDU in the MCR provide the necessary output from the PSMS to start and stop the respective Class 1E EPS.	DCD_14.03-5
	18.ii Tests will be performed on each as-built Class 1E EPS using the controls on the as-built O-VDU in the as-built MCR and the Class 1E EPS room.	18.ii Controls on the as-built O-VDU in the as-built MCR and the Class 1E EPS room start and stop each Class 1E EPS.	DCD_14.03-5 DCD_14.03-5

Table 2.6.4-1 EPS Systems Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 7 of 10)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria	
22. Each Class 1E EPS FOS day tank's capacity is sufficient to provide fuel oil for 1.5 hours of EPS operation at rated load.	22.i Analyses of each Class 1E EPS FOS will be performed to determine the required day tank capacity to provide fuel oil for 1.5 hours of EPS operation at rated load.	22.i A report exists and concludes that each Class 1E EPS FOS day tank's capacity is sufficient to provide fuel oil for 1.5 hours of EPS operation at rated load.	
	22.ii Inspection of the as-built FOS day tank will be performed to verify that the tank capacity bounds the analysis.	22.ii The as-built FOS day tank's capacity bounds the analyses.	
23. Alarms identified in Subsection 2.6.4.2 are provided in the MCR.	23. Inspection will be performed on the as-built A-VDU in the MCR for retrievability of the alarms identified in Subsection 2.6.4.2~~ in as-built the MCR~~.	23. Alarms identified in Subsection 2.6.4.2 can be retrieved on the as-built A-VDU in the ~~as-built~~ MCR.	DCD_14.03-6
24. The fuel oil transfer pump starts automatically on a fuel oil day tank low level signal and stops automatically on a fuel oil day tank high-level signal.	24. A test will be performed on the as-built fuel oil storage and transfer system by providing a simulated fuel oil day tank level test signal testing the fuel oil transfer pump.	24. The as-built fuel oil transfer pump starts automatically on a fuel oil day tank low level signal and stops automatically on a fuel oil day tank high-level signal.	
25. ~~The~~Class 1E EPS fuel oil transfer pumps and ventilation fans are powered from their respective Class 1E division.	25. A test will be performed on ~~the~~each as-built Class 1E EPS fuel transfer pump~~s~~ and ventilation fan by providing a simulated test signal only in ~~each~~the Class 1E division under test.	25. The ~~results of the test conclude that a~~ simulated test signal exists at ~~the~~each as-built Class 1E EPS fuel oil transfer pump~~s~~ and ventilation fan under test~~ when the assigned Class 1E division is provided a test signal~~.	DCD_14.03.06-25
26.a.i The ASME Code Section III components of the EPS support systems, identified in Table 2.6.4-2, are fabricated, installed, and inspected in accordance with ASME Code Section III requirements.	26.a.i Inspection of the as-built ASME Code Section III components of the EPS support systems, identified in Table 2.6.4-2, will be performed.	26.a.i The ASME Code Section III data report(s) (certified, when required by ASME Code) and inspection reports (including N-5 Data Reports where applicable) exist and conclude that the as-built ASME Code Section III components of the EPS support systems, identified in Table 2.6.4-2, are fabricated, installed, and inspected in accordance with ASME Code Section III requirements.	

2.6.5 Alternate AC (AAC) Power Source

2.6.5.1 AAC Design Description

Two AAC power sources are provided to supply ac power in case there is a complete loss of offsite power (LOOP) and loss of Class 1E EPSs. AAC power sources supply power to loads required to bring and maintain the plant in a safe shutdown condition for a station blackout (SBO) condition. AAC power sources also provide power to the 6.9kV permanent buses during a LOOP condition. The AAC sources and their connections to Class 1E 6.9kV buses and to non-Class 1E 6.9kV permanent buses are shown on Figure 2.6.1-1. These AAC power sources are non-Class 1E and non-seismic. The two AAC power sources are redundant in that only one AAC power source is required to meet SBO requirements.

1. The functional arrangement of the AAC power sources is as described in the Design Description of Subsection 2.6.5.1.

2. The AAC power sources are located in separate dedicated rooms.

3. Each AAC power source is isolated from the Class 1E power supply systems by a non-Class 1E disconnect switch and a Class 1E circuit breaker connected in series.

4. The Class 1E circuit breakers for the AAC power sources in Class 1E medium voltage switchgear are connected to disconnect switches (non-Class 1E) in selector circuits.

5. Separate and independent fuel supply systems and onsite fuel storage tanks are provided for Class 1E EPSs and AAC power sources.

6. The AAC power sources can be started and connected manually to onsite Class 1E medium voltage buses within 60 minutes during SBO conditions.

7. The AAC power sources fuel oil storage tanks have enough fuel capacity to supply power to the required SBO loads for 8 hours.

8. Controls exist in the MCR to start, stop and synchronize the AAC power sources.

9. Each AAC power source is capable of providing power at the set voltage and frequency to the non-Class 1E 6.9kV buses after receiving a start signal.

10. Displays for e~~E~~ach AAC power source status and the breaker status of each Class 1E 6.9kV breaker for the AAC power sources are provided ~~displayed~~ in the MCR. DCD_14.03-6

11. The functional arrangement of the AAC fuel oil storage and transfer system is as described in the Design Description of Subsection 2.6.5.2.

12. Deleted

13. The two AAC power sources are each sized to meet load requirements for SBO and LOOP conditions. ~~The size of the AAC power source is different than the Class 1E EPSs.~~ DCD_08.03.01-38

Table 2.6.5-1 AAC Systems Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 2 of 3)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
	7.ii Inspection of each as-built AAC power source fuel oil storage tank will be performed to verify that the fuel capacity bounds the analyses.	7.ii Each as-built AAC power source fuel oil storage tank has fuel capacity that bounds the analyses.
8. Controls exist in the MCR to start, stop and synchronize the AAC power sources.	8. A Ttest will be performed on the as-built AAC power sources using the controls on the as-built O-VDU in the as-built MCR.	8. Controls on the as-built O-VDU in the as-built MCR start, stop and synchronize the as-built AAC power sources.
9. Each AAC power source is capable of providing power at the set voltage and frequency to the non-Class 1E 6.9kV buses after receiving a start signal.	9. A test will be performed to verify that the as-built AAC power source can provide power at the set voltage and frequency to the non-Class 1E 6.9kV buses.	9. Each as-built AAC power source can provide power at the set voltage and frequency to the non-Class 1E 6.9kV buses after receiving a start signal.
10. Displays for eEach AAC power source status and the breaker status of each Class 1E 6.9kV breaker for the AAC power sources are displayedprovided in the MCR.	10. Inspection of the AAC power source status indications in the as-built MCR will be performed.An inspection will be performed on the as-built VDU in the MCR for retrievability of the displays of each AAC power source status and the breaker status of each Class 1E 6.9kV breaker for the AAC power sources.	10. Each as-built AAC power source status and the breaker status of each Class 1E 6.9kV breaker for the AAC power sources are displayed in the as-built MCRThe displays of each AAC power source status and the breaker status of each Class 1E 6.9kV breaker for the AAC power sources can be retrieved on the as-built VDU in the MCR as below: AAC power source status: O-VDU Breaker status of Class 1E 6.9kV breaker for the AAC power sources: S-VDU.
11. The functional arrangement of the AAC fuel oil storage and transfer system is as described in the Design Description of Subsection 2.6.5.2.	11. Inspection of the functional arrangement of the as-built AAC fuel oil storage and transfer system will be performed.	11. The as-built AAC fuel oil storage and transfer system conforms to the functional arrangement as described in the Design Description of Subsection 2.6.5.2.
12. Deleted	12. Deleted	12. Deleted

DCD_14.03-5

DCD_14.03-6

Table 2.7.1.1-1 Turbine Generator Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 1 of 2)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the turbine generator is as described in the Design Description of Subsection 2.7.1.1.1.	1. Inspection of the as-built turbine generator system will be performed.	1. The as-built turbine generator conforms to the functional arrangement as described in the Design Description of Subsection 2.7.1.1.1.
2. The LPT rotor integrity is ensured by the combination of design, fracture toughness, tests, and inspections of the rotor to minimize the probability of turbine missile generation.	2. An inspection of the as-built LPT rotor material properties, turbine rotor and blade designs, pre-service inspection and testing results, and in-service inspection requirements will be performed.	2. The as-built LPT rotor material properties, turbine rotor and blade designs, pre-service inspection and testing results, and in-service inspection requirements meet the requirements of the Turbine Missile Generation Probability Analysis.
3.a The main turbine is equipped with a mechanical overspeed trip (MOST) system device which can be used to locally initiate a manual turbine trip.	3.a A Test will be performed on the as-built main turbine MOST system to verify the manual turbine trip function of the MOST system by using the local turbine trip lever.	3.a The as-built MTSVs, MTCVs, RSVs and IVs close in response to shifting of the local turbine trip lever of the MOST system to trip position.
3.b The electrical overspeed trip (EOST) protection system trips the turbine generator in response to an EOST signal.	3.b A test will be performed on the as-built main turbine EOST system using an actual or simulated EOST signal.	3.b The as-built MTSVs, MTCVs, RSVs and IVs close in response to an actual or simulated EOST signal.
4. Controls are provided in the MCR to trip the turbine generator.	4. Tests will be performed on the as-built turbine generator using controls on the as-built O-VDU in the ~~as-built~~ MCR.	4. Controls on the as-built O-VDU in the ~~as-built~~ MCR close the MTSVs, MTCVs, RSVs and IVs.
5. The MTSVs, MTCVs, RSVs and IVs close in response to a turbine trip signal.	5. Tests will be performed on the as-built MTSVs, MTCVs, RSVs and IVs using an actual or simulated turbine trip signal.	5. Each MTSV, MTCV, RSV and IV closes within 0.3 seconds of receiving an actual or simulated turbine trip signal.

DCD_14.03-5

2.7.1.2 Main Steam Supply System (MSS)

2.7.1.2.1 Design Description

The MSS transports steam from the steam generators (SGs) to the main turbine. The MSS also supplies steam to the emergency feedwater pump turbines. The system can dissipate heat generated by the SGs to atmosphere through air-operated main steam relief valves (MSRVs), motor-operated main steam depressurization valves (MSDVs) or spring-loaded main steam safety valves (MSSVs).

The MSS is provided with safety-related main steam isolation valves (MSIVs) and associated main steam bypass isolation valves (MSBIVs) in each main steam line. These valves isolate the secondary side of the SGs to prevent the uncontrolled blowdown of more than one SG and isolate non safety-related portions of the system.

The MSS provides a containment isolation function, as described in Section 2.11.2, of the MSS lines penetrating the containment.

1.a The functional arrangement of the MSS is as described in the Design Description of Subsection 2.7.1.2.1 and in Table 2.7.1.2-1, and as shown in Figure 2.7.1.2-1.

1.b Each mechanical division of the MSS as shown in Figure 2.7.1.2-1 ~~except for piping (Division A&B and C&D pairs)~~ is physically separated from the other divisions ~~with the exception of the MSS in the reactor building exterior and inside the containment~~ so as not to preclude accomplishment of the safety function. DCD_14.03-10

2.a.i The ASME Code Section III components of the MSS, identified in Table 2.7.1.2-2, are fabricated, installed, and inspected in accordance with ASME Code Section III requirements.

2.a.ii The ASME Code Section III components of the MSS identified in Table 2.7.1.2-2 are reconciled with the design requirements.

2.b.i The ASME Code Section III piping of the MSS, including supports, identified in Table 2.7.1.2-3, is fabricated, installed, and inspected in accordance with ASME Code Section III requirements.

2.b.ii The ASME Code Section III piping of the MSS, including supports, identified in Table 2.7.1.2-3 is reconciled with the design requirements.

3.a Pressure boundary welds in ASME Code Section III components, identified in Table 2.7.1.2-2, meet ASME Code Section III requirements for non-destructive examination of welds.

3.b Pressure boundary welds in ASME Code Section III piping, identified in Table 2.7.1.2-3, meet ASME Code Section III requirements for non-destructive examination of welds.

4.a The ASME Code Section III components, identified in Table 2.7.1.2-2, retain their pressure boundary integrity at their design pressure.

4.b The ASME Code Section III piping, identified in Table 2.7.1.2-3, retains its pressure boundary integrity at its design pressure.

5.a The seismic Category I equipment, identified in Table 2.7.1.2-2, can withstand seismic design basis loads without loss of safety function.

5.b The seismic Category I piping, including supports, identified in Table 2.7.1.2-3, can withstand seismic design basis loads without a loss of its safety function.

6.a The Class 1E equipment identified in Table 2.7.1.2-2 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.

6.b Class 1E equipment, identified in Table 2.7.1.2-2, is powered from its respective Class 1E division.

6.c Separation is provided between redundant divisions of MSS Class 1E cables, and between Class 1E cables and non-Class 1E cables.

7. Deleted.

8.a Controls are provided in the MCR to open and close the remotely operated valves identified in Table 2.7.1.2-~~2~~4. DCD_14.03-5

8.b The remotely operated valves identified in Table 2.7.1.2-2 as having PSMS control perform an active safety function after receiving a signal from PSMS.

9.a The motor-operated valves identified in Table 2.7.1.2-2 as having an active safety function perform an active safety function to change position as indicated in the table.

9.b The air-operated valves identified in Table 2.7.1.2-2 as having an active safety function perform an active safety function to change position as indicated in the table.

9.c The check valves, identified in Table 2.7.1.2-2 as having an active safety function perform an active safety function to change position as indicated in the table.

9.d After loss of motive power, the remotely operated valves, identified in Table 2.7.1.2-2, assume the indicated loss of motive power position.

9.e The MSIVs identified in Table 2.7.1.2-2 perform an active safety function to change position as indicated in the table.

10. Alarms and displays identified in Table 2.7.1.2-4 are provided in the MCR.

11. Alarms, displays, and controls identified in Table 2.7.1.2-4 are provided in the RSC.

Table 2.7.1.2-3 Main Steam Supply System Piping Characteristics

Pipe Line Name	ASME Code Section III Class	Leak Before Break[1]	Seismic Category I
Main steam piping in the PCCV	2	Yes	Yes
Piping in the reactor building including branch piping from main steam piping up to and including the following valves; MSIV, MSBIV, MSSV, MSRV, MSDV, MSRVBV, MSDIV	2	No	Yes
Branch lines from the main steam piping to the emergency feedwater pump turbine steam isolation valve excluding this valve	2	No	Yes
Main steam drain piping located in the reactor building downstream MSDIV and excluding the MSDIV	3	No	Yes
MSS piping downstream of MSIV and MSBIV up to and including the first restraint located between the reactor building and the turbine building	3	No	Yes
Discharge piping of the MSSV in the reactor building	3	No	Yes
Discharge piping of the MSRV and MSDV in the reactor building	3	No	Yes

DCD_14.03-9

Note:

1. A "Yes" in the Leak Before Break column indicates that the pipe is a candidate for LBB evaluation.

DCD_14.03-9

Table 2.7.1.2-4 Main Steam Supply System Equipment Alarms, Displays, and Control Functions

Equipment/Instrument Name	MCR/RSC Alarm	MCR Display	MCR/RSC Control Function	RSC Display
Main Steam Isolation Valves (MSS-SMV-515A, B, C, D)	No	Yes	Yes	Yes
Main Steam Bypass Isolation Valve (MSS-HCV-565, 575, 585, 595)	No	Yes	Yes	Yes
Main Steam Safety Valve (Position Indication) (MSS-SRV-509A,B,C,D MSS-SRV-510A,B,C,D MSS-SRV-511A,B,C,D MSS-SRV-512A,B,C,D MSS-SRV-513A,B,C,D MSS-SRV-514A,B,C,D)	No	Yes	No	Yes
Main Steam Relief Valve (MSS-PCV-515, 525, 535, 545)	No	Yes	Yes	Yes
Main Steam Depressurization Valves (MSS-MOV-508A. B, C, D)	No	Yes	Yes	Yes
Main Steam Relief Valve Block Valves (MSS-MOV-507A, B, C, D)	No	Yes	Yes	Yes
Main Steam Drain Line Isolation Valve (MSS-MOV-701A, B, C, D)	No	Yes	Yes	Yes
Main Steam Line Pressure (MSS-PT-515, 516, 517, 518, 525, 526, 527, 528, 535, 536, 537, 538, 545, 546, 547, 548)	Yes	Yes	No	Yes
~~Turbine Inlet Pressure~~ ~~(MSS-PT-555, 556, 557, 558)~~	~~Yes~~	~~Yes~~	~~No~~	~~Yes~~

DCD_14.03-6, 8

Table 2.7.1.2-5 Main Steam Supply System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 1 of 11)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1.a The functional arrangement of the MSS is as described in the Design Description of Subsection 2.7.1.2.1 and in Table 2.7.1.2-1, and as shown in Figure 2.7.1.2-1.	1.a Inspection of the as-built MSS system will be performed.	1.a The as-built MSS system conforms to the functional arrangement as described in the Design Description of Subsection 2.7.1.2.1 and in Table 2.7.1.2-1, and as shown in Figure 2.7.1.2-1.
1.b Each mechanical division of the MSS as shown in Figure 2.7.1.2-1 ~~except for piping (Division A&B and C&D pairs)~~ is physically separated from the other divisions ~~with the exception of the MSS in the reactor building exterior and inside the containment~~ so as not to preclude accomplishment of the safety function.	1.b Inspection and analysis of the as-built MSS will be performed.	1.b A report exists and concludes that each mechanical division of the as-built MSS as shown in Figure 2.7.1.2-1~~, except for piping (Division A&B and C&D pairs),~~ is physically separated from other mechanical divisions of the system by spatial separation, barriers, or enclosures ~~with the exception of the MSS in the reactor building exterior and inside the containment,~~ so as to assure that the functions of the safety-related system are maintained considering postulated dynamic effects (i.e., missile and pipe break hazard), internal flooding and fire. DCD_14.03-10 DCD_14.03-10
2.a.i The ASME Code Section III components of the MSS, identified in Table 2.7.1.2-2, are fabricated, installed, and inspected in accordance with ASME Code Section III requirements.	2.a.i Inspection of the as-built ASME Code Section III components of the MSS, identified in Table 2.7.1.2-2, will be performed.	2.a.i The ASME Code Section III data report(s) (certified, when required by ASME Code) and inspection reports (including N-5 Data Reports where applicable) exist and conclude that the as-built ASME Code Section III components of the MSS identified in Table 2.7.1.2-2 are fabricated, installed, and inspected in accordance with ASME Code Section III requirements.

Table 2.7.1.2-5 Main Steam Supply System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 6 of 11)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria	
6.b Class 1E equipment, identified in Table 2.7.1.2-2, is powered from its respective Class 1E division.	6.b A test will be performed on each division of the as-built Class 1E equipment identified in Table 2.7.1.2-2 by providing a simulated test signal only in the Class 1E division under test.	6.b The simulated test signal exists at the as-built Class 1E equipment identified in Table 2.7.1.2-2 under test.	
6.c Separation is provided between redundant divisions of MSS Class 1E cables, and between Class 1E cables and non-Class 1E cables.	6.c Inspections of the as-built Class 1E divisional cables will be performed.	6.c Physical separation or electrical isolation is provided in accordance with RG 1.75, between the as-built cables of redundant MSS Class 1E divisions and between Class 1E cables and non-Class 1E cables.	
7. Deleted.	7. Deleted.	7. Deleted.	
8.a Controls are provided in the MCR to open and close the remotely operated valves identified in Table 2.7.1.2-~~2~~4.	8.a.i Tests will be performed for MCR control capability of the remotely operated valves, identified in Table 2.7.1.2-4, on the as-built S-VDU.	8.a.i MCR controls for the remotely operated valves, identified in Table 2.7.1.2-4, on the as-built S-VDU provide the necessary output from the PSMS to open and close the respective valves.	DCD_14.03-5
	8.a.ii Tests will be performed on the as-built remotely operated valves identified in Table 2.7.1.2-~~2~~4 using controls on the as-built O-VDU in the ~~as-built~~ MCR.	8.a.ii Controls on the as-built O-VDU in the ~~as-built~~ MCR open and close the as-built remotely operated valves identified in Table 2.7.1.2-~~2~~4 with the MCR control function.	DCD_14.03-5
8.b The remotely operated valves identified in Table 2.7.1.2-2 as having PSMS control perform an active safety function after receiving a signal from PSMS.	8.b Tests will be performed on the as-built remotely operated valves identified in Table 2.7.1.2-2 as having PSMS control using simulated signals.	8.b The as-built remotely operated valves identified in Table 2.7.1.2-2 as having PSMS control perform the active function identified in the table after receiving a simulated signal.	
9.a The motor-operated valves identified in Table 2.7.1.2-2 as having an active safety function perform an active safety function to change position as indicated in the table.	9.a.i Type tests or a combination of type tests and analyses of the motor-operated valves identified in Table 2.7.1.2-2 as having an active safety function will be performed that demonstrate the capability of the valve to operate under its design conditions.	9.a.i A report exists and concludes that each motor-operated valve identified in Table 2.7.1.2-2 as having an active safety function changes position as identified in Table 2.7.1.2-2 under design conditions.	

Table 2.7.1.2-5 Main Steam Supply System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 8 of 11)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
9.c The check valves, identified in Table 2.7.1.2-2 as having an active safety function perform an active safety function to change position as indicated in the table.	9.c Tests of the as-built check valves identified in Table 2.7.1.2-2 as having an active safety function will be performed under preoperational test pressure, temperature, and fluid flow conditions.	9.c Each as-built check valve identified in Table 2.7.1.2-2 as having an active safety function changes position as identified in Table 2.7.1.2-2 under preoperational test conditions.
9.d After loss of motive power, the remotely operated valves, identified in Table 2.7.1.2-2, assume the indicated loss of motive power position.	9.d Tests of the as-built remotely operated valves identified in Table 2.7.1.2-2 will be performed under the conditions of loss of motive power.	9.d Upon loss of motive power, each as-built remotely operated valve identified in Table 2.7.1.2-2 assumes the indicated loss of motive power position.
9.e The MSIVs identified in Table 2.7.1.2-2 perform an active safety function to change position as indicated in the table.	9.e.i Type tests or a combination of type tests and analyses of the MSIVs identified in Table 2.7.1.2-2 will be performed that demonstrate the capability of the valve to operate under its design conditions.	9.e.i A report exists and concludes that each MSIV identified in Table 2.7.1.2-2 changes position as identified in Table 2.7.1.2-2 under design conditions.
	9.e.ii Tests of the as-built MSIVs identified in Table 2.7.1.2-2 will be performed under preoperational flow, differential pressure, and temperature conditions.	9.e.ii Each as-built MSIV identified in Table 2.7.1.2-2 changes position as identified in Table 2.7.1.2-2 under preoperational test conditions.
	9.e.iii Inspections will be performed of the as-built MSIVs identified in Table 2.7.1.2-2.	9.e.iii Each as-built MSIV identified in Table 2.7.1.2-2 is bounded by the type tests, or a combination of type tests and analyses.
10. Alarms and displays identified in Table 2.7.1.2-4 are provided in the MCR.	10. Inspection will be performed on the as-built A-VDU and on the as-built S-VDU in the MCR for retrievability of the alarms and displays respectively, as identified in Table 2.7.1.2-4 ~~in the as-built MCR~~.	10. Alarms and displays, identified in Table 2.7.1.2-4, can be retrieved on the as-built A-VDU and on the as-built S-VDU respectively in the ~~as-built~~ MCR.

DCD_14.03-6

Table 2.7.1.2-5 Main Steam Supply System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 9 of 11)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
11. Alarms, displays, and controls identified in Table 2.7.1.2-4 are provided in the RSC.	11.i Inspection will be performed on the as-built O-VDU and on the as-built S-VDU in the RSC for retrievability of the alarms and displays respectively, as identified in Table 2.7.1.2-4 ~~in the as-built RSC~~.	11.i Alarms and displays, identified in Table 2.7.1.2-4, can be retrieved on the as-built O-VDU and on the as-built S-VDU respectively in the ~~as-built~~ RSC.
	11.ii ~~Tests of the as-built RSC control functions identified in Table 2.7.1.2-4 will be performed.~~ Tests will be performed for RSC control capability of the equipment, identified in Table 2.7.1.2-4, on the as-built S-VDU.	11.ii RSC controls for the equipment, identified in Table 2.7.1.2-4, on the as-built S-VDU provide the necessary output from the PSMS to operate the respective equipment.
	11.iii Tests will be performed on the as-built equipment, identified in Table 2.7.1.2-4, using controls on the as-built O-VDU in the RSC.	11.iii Controls on the as-built O-VDU in the ~~as-built~~ RSC operate each as-built component identified in Table 2.7.1.2-4 with an RSC control function.
12. The piping identified in Table 2.7.1.2-3 as designed for leak before break (LBB) meets the LBB criteria, or an evaluation is performed of the protection from the dynamic effects of a rupture of the line.	12. Inspections of the as-built piping identified in Table 2.7.1.2-3 will be performed based on the evaluation report for LBB or for the evaluation of protection from dynamic effects of a pipe break, as specified in Section 2.3.	12. An LBB evaluation report exists and concludes that the LBB acceptance criteria are met by the as-built piping identified in Table 2.7.1.2-3 and piping materials, or a pipe break hazards analysis report exists and concludes that protection from the dynamic effects of a line break is provided.

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2.7.1.9 Condensate and Feedwater System (CFS)

2.7.1.9.1 Design Description

The safety-related function of the CFS is to provide containment and feedwater isolation following design basis accidents and after receipt of an isolation signal. The containment isolation function is described in Section 2.11.2. The CFS provides feedwater to the SGs during startup, during shutdown from power, at power levels up to the rated power, and during plant transients.

CFS equipment and piping are located in the containment, the reactor building and the turbine building. Figure 2.7.1.9-1 illustrates the main feedwater lines, showing the arrangement of the safety-related CFS components. Table 2.7.1.9-1 also provides a tabulation of the location of CFS equipment. The CFS includes both the condensate system (CDS) and the feedwater system (FWS).

1.a The functional arrangement of the CFS is as described in the Design Description of Subsection 2.7.1.9.1 and in Table 2.7.1.9-1 and as shown in Figure 2.7.1.9-1.

1.b ~~Except for piping, the Division A & B pair~~Each mechanical division of the CFS as shown in Figure 2.7.1.9-1 is physically separated from the other divisions~~Division C&D pair of the CFS with the exception of outside of the reactor building and inside the containment~~ so as not to preclude accomplishment of the safety function. DCD_14.03-10

2.a.i The ASME Code Section III components of the CFS, identified in Table 2.7.1.9-2, are fabricated, installed and inspected in accordance with ASME Code Section III requirements.

2.a.ii The ASME Code Section III components of the CFS identified in Table 2.7.1.9-2 are reconciled with the design requirements.

2.b.i The ASME Code Section III piping of the CFS, including supports, identified in Table 2.7.1.9-3 is fabricated, installed, and inspected in accordance with ASME Code Section III requirements.

2.b.ii The ASME Code Section III piping of the CFS, including supports, identified in Table 2.7.1.9-3 is reconciled with the design requirements.

3.a Pressure boundary welds in ASME Code Section III components, identified in Table 2.7.1.9-2, meet ASME Code Section III requirements for non-destructive examination of welds.

3.b Pressure boundary welds in ASME Code Section III piping, identified in Table 2.7.1.9-3, meet ASME Code Section III requirements for non-destructive examination of welds.

4.a The ASME Code Section III components, identified in Table 2.7.1.9-2, retain their pressure boundary integrity at their design pressure.

4.b The ASME Code Section III piping, identified in Table 2.7.1.9-3, retains its pressure boundary integrity at its design pressure.

5.a The seismic Category I equipment identified in Table 2.7.1.9-2 can withstand seismic design basis loads without loss of safety function.

5.b The seismic Category I piping, including supports, identified in Table 2.7.1.9-3 can withstand seismic design basis loads without a loss of its safety function.

6.a The Class 1E equipment identified in Table 2.7.1.9-2 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.

6.b Class 1E equipment, identified in Table 2.7.1.9-2, is powered from its respective Class 1E division.

6.c Separation is provided between redundant divisions of CFS Class 1E cables and between Class 1E cables and non-Class 1E cables.

7. Deleted

8.a Controls are provided in the MCR to open and close the remotely operated valves identified in Table 2.7.1.9-~~2~~4. DCD_14.03-5

8.b The remotely operated valves identified in Table 2.7.1.9-2 as having PSMS control perform an active safety function after receiving a signal from PSMS.

8.c Main feedwater isolation valves (MFIVs), main feedwater regulation valves (MFRVs), main feedwater bypass regulation valves (MFBRVs), and steam generator water filling control valves (SGWFCVs), identified in Table 2.7.1.9-2, isolate feedwater to limit the mass and energy release to containment.

9.a The valves, identified in Table 2.7.1.9-2 as having an active safety function perform an active safety function to change position as indicated in the table.

9.b After loss of motive power, the remotely operated valves, identified in Table 2.7.1.9-2, assume the indicated loss of motive power position.

10. Alarms and displays identified in Table 2.7.1.9-4 are provided in the MCR.

11. Alarms, displays and controls identified in Table 2.7.1.9-4 are provided in the RSC.

2.7.1.9.2 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.7.1.9-5 describes the ITAAC for the CFS.

The ITAAC associated with the CFS equipment, components and piping that comprise a portion of the CIS are described in Table 2.11.2-2.

Table 2.7.1.9-5 Condensate and Feedwater System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 1 of 8)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1.a The functional arrangement of the CFS is as described in the Design Description of Subsection 2.7.1.9.1 and in Table 2.7.1.9-1 and as shown in Figure 2.7.1.9-1.	1.a Inspection of the as-built CFS will be performed.	1.a The as-built CFS conforms to the functional arrangement as described in the Design Description of Subsection 2.7.1.9.1 and in Table 2.7.1.9-1 and as shown in Figure 2.7.1.9-1.
1.b ~~Except for piping, the Division A&B pair~~Each mechanical division of the CFS as shown in Figure 2.7.1.9-1 is physically separated from the other division~~Division C&D pair of the CFS with the exception of outside of the reactor building and inside the containment~~ so as not to preclude accomplishment of the safety function.	1.b Inspections and analysis of the as-built CFS will be performed.	1.b A report exists and concludes that~~,~~ ~~except for piping, the Division A&B pair~~ each mechanical division of the as-built CFS as shown in Figure 2.7.1.9-1 is physically separated from ~~the~~other mechanical divisions of the system ~~Division C&D pair of the as-built CFS~~ by spatial separation, barriers, or enclosures~~,~~ ~~with the exception of outside of the reactor building and inside the containment~~ so as to assure that the functions of the safety-related system are maintained considering postulated dynamic effects (i.e., missile and pipe break hazard), internal flooding and fire~~.~~. DCD_14.03-10 DCD_14.03-10
2.a.i The ASME Code Section III components of the CFS, identified in Table 2.7.1.9-2, are fabricated, installed and inspected in accordance with ASME Code Section III requirements.	2.a.i Inspection of the as-built ASME Code Section III components of the CFS identified in Table 2.7.1.9-2, will be performed.	2.a.i The ASME Code Section III data report(s) (certified, when required by ASME Code) and inspection reports (including N-5 Data Reports where applicable) exist and conclude that the as-built ASME Code Section III components of the CFS identified in Table 2.7.1.9-2 are fabricated, installed, and inspected in accordance with ASME Code Section III requirements.

Table 2.7.1.9-5 Condensate and Feedwater System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 6 of 8)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria	
6.c Separation is provided between redundant divisions of CFS Class 1E cables, and between Class 1E cables and non-Class 1E cables.	6.c Inspections of the as-built Class 1E divisional cables will be performed.	6.c Physical separation or electrical isolation is provided in accordance with RG 1.75, between the as-built cables of redundant CFS Class 1E divisions and between Class 1E cables and non-Class 1E cables.	
7. Deleted.	7. Deleted.	7. Deleted.	
8.a Controls are provided in the MCR to open and close the remotely operated valves identified in Table 2.7.1.9-~~2~~4.	8.a.i Tests will be performed for MCR control capability of the remotely operated valves, identified in Table 2.7.1.9-4, on the as-built S-VDU.	8.a.i MCR controls for the remotely operated valves, identified in Table 2.7.1.9-4, on the as-built S-VDU provide the necessary output from the PSMS to open and close the respective valves.	DCD_14.03-5
	8.a.ii Tests will be performed on the as-built remotely operated valves identified in Table 2.7.1.9-~~2~~4 using controls on the as-built O-VDU in the ~~as-built~~ MCR.	8.a.ii Controls on the as-built O-VDU in the ~~as-built~~ MCR open and close the as-built remotely operated valves identified in Table 2.7.1.9-~~2~~4 with the MCR control function.	DCD_14.03-5
8.b The remotely operated valves identified in Table 2.7.1.9-2 as having PSMS control perform an active safety function after receiving a signal from PSMS.	8.b Tests will be performed on the as-built remotely operated valves identified in Table 2.7.1.9-2 as having PSMS control using simulated signals.	8.b The as-built remotely operated valves identified in Table 2.7.1.9-2 as having PSMS control perform the active function identified in the table after receiving a simulated signal.	
8.c Main feedwater isolation valves (MFIVs), main feedwater regulation valves (MFRVs), main feedwater bypass regulation valves(MFBRVs), and steam generator water filling control valves (SGWFCVs), identified in Table 2.7.1.9-2, isolate feedwater to limit the mass and energy release to containment.	8.c Tests will be performed to verify as-built MFIVs, MFRVs, MFBRVs and SGWFCVs identified in Table 2.7.1.9-2 close within the required response time using simulated signals.	8.c The as-built MFIVs, MFRVs, MFBRVs and SGWFCVs identified in Table 2.7.1.9-2 close within 5 seconds after receiving a simulated signal.	

Table 2.7.1.9-5 Condensate and Feedwater System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 8 of 8)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria	
10. Alarms and displays identified in Table 2.7.1.9-4 are provided in the MCR.	10. Inspection will be performed on the as-built A-VDU and on the as-built S-VDU in the MCR for retrievability of the alarms and displays respectively, as identified in Table 2.7.1.9-4~~ in the as-built MCR~~.	10. Alarms and displays, identified in Table 2.7.1.9-4, can be retrieved on the as-built O-VDU and on the as-built S-VDU respectively in the~~ as-built~~ MCR.	DCD_14.03-6
11. Alarms, displays and controls identified in Table 2.7.1.9-4 are provided in the RSC.	11.i Inspection will be performed on the as-built O-VDU and on the as-built S-VDU in the RSC for retrievability of the alarms and displays respectively, as identified in Table 2.7.1.9-4~~ in the as-built RSC~~.	11.i Alarms and displays, identified in Table 2.7.1.9-4, can be retrieved on the as-built O-VDU and on the as-built S-VDU respectively in the~~ as-built~~ RSC.	DCD_14.03-7, 8
	11.ii ~~Tests of the as-built RSC control functions identified in Table 2.7.1.9-4 will be performed.~~Tests will be performed for RSC control capability of the equipment, identified in Table 2.7.1.9-4, on the as-built S-VDU.	11.ii RSC controls for the equipment, identified in Table 2.7.1.9-4, on the as-built S-VDU provide the necessary output from the PSMS to operate the respective equipment.	DCD_14.03-7, 8
	11.iii Tests will be performed on the as-built equipment, identified in Table 2.7.1.9-4, using controls on the as-built O-VDU in the RSC.	11.iii Controls on the as-built O-VDU in the~~ as-built~~ RSC operate the as-built equipment identified in Table 2.7.1.9-4 with an RSC control function.	DCD_14.03-7, 8

5.b The seismic Category I piping, including supports, identified in Table 2.7.1.10-2 can withstand seismic design basis loads without a loss of its safety function.

6. Class 1E equipment, identified in Table 2.7.1.10-1, is powered from its respective Class 1E division.

7. Separation is provided between redundant divisions of SGBDS Class 1E cables and between Class 1E cables and non-Class 1E cables.

8. After loss of motive power, the remotely operated valves, identified in Table 2.7.1.10-1, assume the indicated loss of motive power position.

9. ~~Each mechanical division of the SGBDS (Divisions A, B, C & D) is physically separated from the other divisions with the exception of inside the containment so as not to preclude accomplishment of the safety function~~Deleted. DCD_14.03-10

10. Displays identified in Table 2.7.1.10-3 are provided in the MCR.

11. Displays and controls identified in Table 2.7.1.10-3 are provided in the RSC.

12. The Class 1E equipment identified in Table 2.7.1.10-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.

13.a Controls are provided in the MCR to open and close the remotely operated valves identified in Table 2.7.1.10-3.

13.b The remotely operated valves identified in Table 2.7.1.10-1 as having PSMS control perform an active safety function after receiving a signal from PSMS.

14. The air-operated valves, identified in Table 2.7.1.10-1, as having an active safety function perform an active safety function to change position as indicated in the table.

2.7.1.10.2 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.7.1.10-4 describes the ITAAC for the SGBDS.

Additional ITAAC associated with the SGBDS equipment, components, and piping that comprise a portion of the CIS are described in Table 2.11.2-2.

Table 2.7.1.10-4 Steam Generator Blowdown System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 5 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria	
9. ~~Each mechanical division of the SGBDS (Divisions A, B, C & D) is physically separated from the other divisions with the exception of inside the containment so as not to preclude accomplishment of the safety function.~~Deleted.	9. ~~Inspections and analysis of the as-built SGBDS will be performed.~~Deleted.	9. ~~A report exists and concludes that each mechanical division of the as-built SGBDS is physically separated from other mechanical divisions of the system by spatial separation, barriers, or enclosures with the exception of inside the containment so as to assure that the functions of the safety related system are maintained.~~Deleted.	DCD_14.03-10
10. Displays identified in Table 2.7.1.10-3 are provided in the MCR.	10. Inspection will be performed on the as-built S-VDU in the MCR for retrievability of the displays identified in Table 2.7.1.10-3 ~~in the as-built MCR~~.	10. Displays identified in Table 2.7.1.10-3 on the as-built S-VDU in the ~~as-built~~ MCR.	DCD_14.03-6
11. Displays and controls identified in Table 2.7.1.10-3 are provided in the RSC.	11.i Inspection will be performed on the as-built S-VDU in the RSC for retrievability of the displays identified in Table 2.7.1.10-3 ~~in the as-built RSC~~.	11.i Displays identified in Table 2.7.1.10-3 can be retrieved on the as-built S-VDU in the ~~as-built~~ RSC.	DCD_14.03-7, 8
	11.ii ~~Tests of the as-built RSC control functions identified in Table 2.7.1.10-3 will be performed.~~Tests will be performed for RSC control capability of the equipment, identified in Table 2.7.1.10-3, on the as-built S-VDU.	11.ii RSC controls for the equipment, identified in Table 2.7.1.10-3, on the as-built S-VDU provide the necessary output from the PSMS to operate the respective equipment.	DCD_14.03-7, 8
	11.iii Tests will be performed on the as-built equipment, identified in Table 2.7.1.10-3, using controls on the as-built O-VDU in the RSC.	11.iii Controls on the as-built O-VDU in the ~~as-built~~ RSC operate the as-built equipment identified in Table 2.7.1.10-3 with an RSC control function.	DCD_14.03-7, 8

Table 2.7.1.10-4 Steam Generator Blowdown System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 7 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria	
13.a Controls are provided in the MCR to open and close the remotely operated valves identified in Table 2.7.1.10-3.	13.a.i Tests will be performed for MCR control capability of the remotely operated valves, identified in Table 2.7.1.10-3, on the as-built S-VDU.	13.a.i MCR controls for the remotely operated valves, identified in Table 2.7.1.10-3, on the as-built S-VDU provide the necessary output from the PSMS to open and close the respective valves.	DCD_14.03-5
	13.a.ii Tests will be performed on the as-built remotely operated valves identified in Table 2.7.1.10-3 using controls on the as-built O-VDU in the ~~as-built~~ MCR.	13.a.ii Controls on the as-built O-VDU in the ~~as-built~~ MCR open and close the as-built remotely operated valves identified in Table 2.7.1.10-3 with the MCR control function.	DCD_14.03-5 DCD_14.03-5
13.b The remotely operated valves identified in Table 2.7.1.10-1 as having PSMS control perform an active safety function after receiving a signal from PSMS.	13.b Tests will be performed on the as-built remotely operated valves identified in Table 2.7.1.10-1 as having PSMS control using simulated signals.	13.b The as-built remotely operated valves identified in Table 2.7.1.10-1 as having PSMS control perform the active safety function identified in the table after receiving a simulated signal.	DCD_14.03-5
14. The air-operated valves, identified in Table 2.7.1.10-1, as having an active safety function perform an active safety function to change position as indicated in the table.	14.i Type tests or a combination of type tests and analyses of the air-operated valves identified in Table 2.7.1.10-1 as having an active safety function will be performed that demonstrate the capability of the valve to operate under its design conditions.	14.i A report exists and concludes that each air-operated valve identified in Table 2.7.1.10-1 as having an active safety function changes position as identified in Table 2.7.1.10-1 under design conditions.	
	14.ii Tests of the as-built air-operated valves identified in Table 2.7.1.10-1 as having an active safety function will be performed under preoperational flow, differential pressure, and temperature conditions.	14.ii Each as-built air-operated valve ~~changes~~ identified in Table 2.7.1.10-1 as having an active safety function changes position as identified in Table 2.7.1.10-1 under preoperational test conditions.	DCD_14.03.07-65 DCD_14.03.07-65
	14.iii Inspections will be performed of the as-built air-operated valves identified in Table 2.7.1.10-1 as having an active safety function.	14.iii Each as-built air-operated valve identified in Table 2.7.1.10-1 as having an active safety function is bounded by the type tests, or a combination of type tests and analyses.	

2.7.1.11 Emergency Feedwater System (EFWS)

2.7.1.11.1 Design Description

The EFWS is a safety-related system. The EFWS supplies feedwater to the steam generators (SGs) when the main feedwater system is not in operation for transient conditions or postulated accidents.

The EFWS provides the containment isolation function, as described in Section 2.11.2, of the EFWS lines penetrating the containment.

The EFWS consists of two motor-driven (M/D) emergency feedwater (EFW) pumps, two turbine-driven (T/D) EFW pumps, two EFW pits, piping, valves and associated instrumentation. Each EFW pump has 50 percent capacity.

Each EFW pump discharge line connects to a tie line with motor-operated isolation valves. During normal plant operation, all the isolation valves are closed to provide separation of the four divisions.

The common suction line from each EFW pit is connected by a tie line with two normally closed manual valves.

The EFWS removes reactor core decay heat and sensible heat of the reactor coolant system through the SGs following transient conditions or postulated accidents.

The EFWS automatically terminates EFW flow to a depressurized (faulty) SG and to automatically provide feedwater to the intact SGs.

1.a The functional arrangement of the EFWS is as described in the Design Description of Subsection 2.7.1.11.1 and in Table 2.7.1.11-1, and as shown in Figure 2.7.1.11-1.

1.b Each mechanical division of the EFWS pump(A, B, C and D)as shown in Figure 2.7.1.11-1 is physically separated from the other divisions pumps so as not to preclude accomplishment of the safety function. DCD_14.03-10

1.c The A&B EFW isolation valves and EFW control valves are physically separated from the C&D EFW isolation valves and EFW control valves so as not to preclude accomplishment of the safety function.Deleted. DCD_14.03-10

1.d The A EFW pump actuation valve and EFW pump main steam isolation valve are physically separated from the D EFW pump actuation valve and EFW pump main steam isolation valve so as not to preclude accomplishment of the safety function.Deleted.

2.a.i The ASME Code Section III components of the EFWS, identified in Table 2.7.1.11-2, are fabricated, installed, and inspected in accordance with ASME Code Section III requirements.

2.a.ii The ASME Code Section III components of the EFWS identified in Table 2.7.1.11-2 are reconciled with the design requirements.

2.b.i The ASME Code Section III piping of the EFWS, including supports, identified in Table 2.7.1.11-3, is fabricated, installed, and inspected in accordance with ASME Code Section III requirements.

2.b.ii The ASME Code Section III piping of the EFWS, including supports, identified in Table 2.7.1.11-3, is reconciled with the design requirements.

3.a Pressure boundary welds in ASME Code Section III components, identified in Table 2.7.1.11-2, meet ASME Code Section III requirements for non-destructive examination of welds.

3.b Pressure boundary welds in ASME Code Section III piping, identified in Table 2.7.1.11-3, meet ASME Code Section III requirements for non-destructive examination of welds.

4.a The ASME Code Section III components, identified in Table 2.7.1.11-2, retain their pressure boundary integrity at their design pressure.

4.b The ASME Code Section III piping, identified in Table 2.7.1.11-3, retains its pressure boundary integrity at its design pressure.

5.a The seismic Category I equipment identified in Table 2.7.1.11-2 can withstand seismic design basis loads without loss of safety function.

5.b The seismic Category I piping, including supports, identified in Table 2.7.1.11-3 can withstand seismic design basis loads without a loss of its safety function.

6.a The Class 1E equipment identified in Table 2.7.1.11-2 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.

6.b Class 1E equipment, identified in Table 2.7.1.11-2, is powered from its respective Class 1E division.

6.c Separation is provided between redundant divisions of EFWS Class 1E divisions, and between Class 1E cables and non-Class 1E cables.

7. Deleted.

8.a Controls are provided in the MCR to open and close the remotely operated valves identified in Table 2.7.1.11-~~2~~4. DCD_14.03-5

8.b The remotely operated valves identified in Table 2.7.1.11-2 as having PSMS control perform an active safety function after receiving a signal from PSMS.

9.a The motor-operated valves and check valves, identified in Table 2.7.1.11-2, as having an active safety function perform an active safety function to change position as indicated in the table.

Table 2.7.1.11-2 Emergency Feedwater System Equipment Characteristics (Sheet 1 of 11)

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Valve	Class 1E/Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position
A-emergency feedwater pump (turbine driven, for inside electrical components)	EFS-MPP-001A	3	Yes	-	Yes/~~No~~Yes	Emergency Feedwater Actuation Remote Manual	Start	-
B-emergency feedwater pump (motor driven)	EFS-MPP-001B	3	Yes	-	Yes/~~No~~Yes	Emergency Feedwater Actuation Remote Manual	Start	-
C-emergency feedwater pump (motor driven)	EFS-MPP-001C	3	Yes	-	Yes/~~No~~Yes	Emergency Feedwater Actuation Remote Manual	Start	-
D-emergency feedwater pump (turbine driven, for inside electrical components)	EFS-MPP-001D	3	Yes	-	Yes/~~No~~Yes	Emergency Feedwater Actuation Remote Manual	Start	-
A-emergency feedwater control valve	EFS-MOV-017A	3	Yes	Yes	Yes/Yes	Emergency Feedwater Actuation	Transfer Open	As Is
						Emergency Feedwater Isolation	Transfer Closed	
						Remote Manual	Transfer Open Transfer Closed	

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Table 2.7.1.11-2 Emergency Feedwater System Equipment Characteristics (Sheet 6 of 11)

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Valve	Class 1E/Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position
D-emergency feedwater pump actuation valve on D-steam supply line	EFS-MOV-103D	3	Yes	Yes	Yes/Yes	Emergency Feedwater Actuation	Transfer Open	As Is
						Remote Manual	Transfer Closed	
D-emergency feedwater pump C-main steam line steam isolation valve	EFS-MOV-101C	2	Yes	Yes	Yes/Yes	Remote Manual	Transfer Closed	As Is
D-emergency feedwater pump D-main steam line steam isolation valve	EFS-MOV-101D	2	Yes	Yes	Yes/Yes	Remote Manual	Transfer Closed	As Is
Emergency feedwater flow	EFS-FT-016, 026, 036, 046	-	Yes	-	Yes/ ~~No~~Yes	-	-	-
Emergency feedwater pit water level	EFS-LT-060, 061, 070, 071	-	Yes	-	Yes/ No	-	-	-
Emergency feedwater pump discharge pressure	EFS-PT-050, 051, 052, 053	-	Yes	-	Yes/ ~~No~~Yes	-	-	-

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Table 2.7.1.11-2 Emergency Feedwater System Equipment Characteristics (Sheet 7 of 11)

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Valve	Class 1E/Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position	
A-EFW pit discharge check valve	EFS-VLV-008A	3	Yes	No	-/-	-	Transfer Open	-	DCD_14.03-13
B-EFW pit discharge check valve	EFS-VLV-008B	3	Yes	No	-/-	-	Transfer Open	-	DCD_14.03-13
A-emergency feedwater pump (turbine-driven) discharge check valve	EFS-VLV-012A	3	Yes	No	-/-	-	Transfer Open Transfer Closed	-	DCD_14.03-13
B-emergency feedwater pump (motor-driven) discharge check valve	EFS-VLV-012B	3	Yes	No	-/-	-	Transfer Open Transfer Closed	-	DCD_14.03-13
C-emergency feedwater pump (motor-driven) discharge check valve	EFS-VLV-012C	3	Yes	No	-/-	-	Transfer Open Transfer Closed	-	DCD_14.03-13
D-emergency feedwater pump (turbine-driven) discharge check valve	EFS-VLV-012D	3	Yes	No	-/-	-	Transfer Open Transfer Closed	-	DCD_14.03-13

Table 2.7.1.11-2 Emergency Feedwater System Equipment Characteristics (Sheet 8 of 11)

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Valve	Class 1E/Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position
A-emergency feedwater pump (turbine-driven) minimum flow line check valve	EFS-VLV-020A	3	Yes	No	-/-	-	Transfer Open Transfer Closed	-
B-emergency feedwater pump (motor-driven) minimum flow line check valve	EFS-VLV-020B	3	Yes	No	-/-	-	Transfer Open Transfer Closed	-
C-emergency feedwater pump (motor-driven) minimum flow line check valve	EFS-VLV-020C	3	Yes	No	-/-	-	Transfer Open Transfer Closed	-
D-emergency feedwater pump (turbine-driven) minimum flow line check valve	EFS-VLV-020D	3	Yes	No	-/-	-	Transfer Open Transfer Closed	-

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Table 2.7.1.11-2 Emergency Feedwater System Equipment Characteristics (Sheet 9 of 11)

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Valve	Class 1E/Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position
A-emergency feedwater check valve (upstream of EFW control valve)	EFS-VLV-018A	3	Yes	No	-/-	-	Transfer Open Transfer Closed	-
B-emergency feedwater check valve (upstream of EFW control valve)	EFS-VLV-018B	3	Yes	No	-/-	-	Transfer Open Transfer Closed	-
C-emergency feedwater check valve (upstream of EFW control valve)	EFS-VLV-018C	3	Yes	No	-/-	-	Transfer Open Transfer Closed	-
D-emergency feedwater check valve (upstream of EFW control valve)	EFS-VLV-018D	3	Yes	No	-/-	-	Transfer Open Transfer Closed	-

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Table 2.7.1.11-2 Emergency Feedwater System Equipment Characteristics (Sheet 10 of 11)

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Valve	Class 1E/Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position	
A-EFW pump turbine steam inlet line from A-main steam line check valve	EFS-VLV-102A	3	Yes	No	-/-	-	Transfer Open Transfer Closed	-	DCD_14.03-13
A-EFW pump turbine steam inlet line from B-main steam line check valve	EFS-VLV-102B	3	Yes	No	-/-	-	Transfer Open Transfer Closed	-	DCD_14.03-13
D-EFW pump turbine steam inlet line from C-main steam line check valve	EFS-VLV-102C	3	Yes	No	-/-	-	Transfer Open Transfer Closed	-	DCD_14.03-13
D-EFW pump turbine steam inlet line from D-main steam line check valve	EFS-VLV-102D	3	Yes	No	-/-	-	Transfer Open Transfer Closed	-	DCD_14.03-13

Table 2.7.1.11-2 Emergency Feedwater System Equipment Characteristics (Sheet 11 of 11)

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Valve	Class 1E/Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position
A, B-EFW pump turbine steam inlet drain line check valve	EFS-VLV-109A, B	3	Yes	No	-/-	-	Transfer Open Transfer Closed	-
C, D-EFW pump turbine steam inlet drain line check valve	EFS-VLV-109C, D	3	Yes	No	-/-	-	Transfer Open Transfer Closed	-
A, B-Emergency feedwater pits	MPT-001A, B	-	Yes	-	-/-	-	-	-

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Note: Dash (-) indicates not applicable

Table 2.7.1.11-5 Emergency Feedwater System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 1 of 10)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria	
1.a The functional arrangement of the EFWS is as described in the Design Description of Subsection 2.7.1.11.1 and in Table 2.7.1.11-1 and as shown in Figure 2.7.1.11-1.	1.a Inspection of the as-built EFWS system will be performed.	1.a The as-built EFWS conforms to the functional arrangement as described in the Design Description of Subsection 2.7.1.11.1 and in Table 2.7.1.11-1 and as shown in Figure 2.7.1.11-1.	
1.b Each mechanical division of the EFWS as shown in Figure 2.7.1.11-1 ~~pump(A, B, C and D)~~ is physically separated from the other divisions ~~pumps~~ so as not to preclude accomplishment of the safety function.	1.b Inspection and analysis of as-built EFWS will be performed.	1.b A report exists and concludes that each mechanical division of the as-built EFWS ~~pump (A, B, C and D)~~ as shown in Figure 2.7.1.11-1 is physically separated from ~~the~~ other mechanical divisions of the system ~~pumps~~ by spatial separation, barriers or enclosures so as to assure that the functions of the safety-related system are maintained considering postulated dynamic effects (i.e., missile and pipe break hazard), internal flooding and fire.	DCD_14.03-10 DCD_14.03-10
1.c ~~The A&B EFW isolation valves and EFW control valves are physically separated from the C&D EFW isolation valves and EFW control valves so as not to preclude accomplishment of the safety function.~~ Deleted.	1.c ~~Inspection and analysis of as-built EFWS will be performed.~~ Deleted.	1.c ~~The A&B EFW isolation valves and EFW control valves are physically separated from the C&D EFW isolation valves and EFW control valves by spatial separation, barriers or enclosures so as to assure that the functions of the safety-related system are maintained.~~ Deleted.	DCD_14.03-10
1.d ~~The A EFW pump actuation valve and EFW pump main steam isolation valve are physically separated from the D EFW pump actuation valve and EFW pump main steam isolation valve so as not to preclude accomplishment of the safety function.~~ Deleted.	1.d ~~Inspection and analysisof as-built EFWS will be performed.~~ Deleted.	1.d ~~A report exists and concludes that the A EFW pump actuation valve and EFW pump main steam isolation valve are physically separated from the D EFW pump actuation valve and EFW pump main steam isolation valve by spatial separation, barriers or enclosures so as to assure that the functions of the safety related system are maintained.~~ Deleted.	DCD_14.03.07-66 DCD_14.03-10

Table 2.7.1.11-5 Emergency Feedwater System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 6 of 10)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
8.a Controls are provided in the MCR to open and close the remotely operated valves identified in Table 2.7.1.11-24.	8.a.i Tests will be performed for MCR control capability of the remotely operated valves, identified in Table 2.7.1.11-4, on the as-built S-VDU.	8.a.i MCR controls for the remotely operated valves, identified in Table 2.7.1.11-4, on the as-built S-VDU have a capability to open and close the respective valves.
	8.a.ii Tests will be performed on the as-built remotely operated valves identified in Table 2.7.1.11-24 using controls on the as-built O-VDU in the as-built MCR.	8.a.ii Controls on the as-built O-VDU in the as-built MCR open and close the as-built remotely operated valves identified in Table 2.7.1.11-24 with the MCR control function.
8.b The remotely operated valves identified in Table 2.7.1.11-2 as having PSMS control perform an active safety function after receiving a signal from PSMS.	8.b.i Tests will be performed on the as-built remotely operated valves identified in Table 2.7.1.11-2 as having PSMS control using simulated signals.	8.b.i The as-built remotely operated valves identified in Table 2.7.1.11-2 as having PSMS control perform the active function identified in the table after receiving a simulated signal.
	8.b.ii Tests will be performed to demonstrate that remotely operated as-built EFW control valves and EFW isolation valves identified in Table 2.7.1.11-2 close within the required response time under preoperational conditions.	8.b.ii The as-built valves identified in Table 2.7.1.11-2 as having PSMS control close within the following times after receipt of a simulated actuation signal. The as-built EFW control valves (EFS-MOV-017A, EFS-MOV-017B, EFS-MOV-017C, EFS-MOV-017D) close within 20 seconds. The as-built EFW isolation valves (EFS-MOV-019A, EFS-MOV-019B, EFS-MOV-019C, EFS-MOV-019D) close within 20 seconds.
9.a The motor-operated valves and check valves, identified in Table 2.7.1.11-2, as having an active safety function perform an active safety function to change position as indicated in the table.	9.a.i Type tests or a combination of type tests and analyses of the motor-operated valves identified in Table 2.7.1.11-2 as having an active safety function will be performed that demonstrate the capability of the valve to operate under its design conditions.	9.a.i A report exists and concludes that each motor-operated valve identified in Table 2.7.1.11-2 as having an active safety function changes position as indicated in Table 2.7.1.11-2 under design conditions.

DCD_14.03-5

DCD_14.03-5

Table 2.7.1.11-5 Emergency Feedwater System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 7 of 10)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria	
	9.a.ii Tests of the as-built motor-operated valves identified in Table 2.7.1.11-2 as having an active safety function will be performed under preoperational flow, differential pressure, and temperature conditions.	9.a.ii Each as-built motor-operated valve changes position as indicated in Table 2.7.1.11-2 as having an active safety function under preoperational test conditions.	
	9.a.iii Inspections will be performed of the as-built motor-operated valves identified in Table 2.7.1.11-2 as having an active safety function .	9.a.iii Each as-built motor-operated valve identified in Table 2.7.1.11-2 as having an active safety function is bounded by the type tests, or a combination of type tests and analyses.	
	9.a.iv Tests of the as-built check valves identified in Table 2.7.1.11-2 as having an active safety function will be performed under preoperational test pressure, temperature, and fluid flow conditions.	9.a.iv Each as-built check valve identified in Table 2.7.1.11-2 as having an active safety function changes position as indicated in Table 2.7.1.11-2 under preoperational conditions.	
9.b After loss of motive power, the remotely operated valves, identified in Table 2.7.1.11-2, assume the indicated loss of motive power position.	9.b Tests of the as-built remotely operated valves identified in Table 2.7.1.11-2 will be performed under the conditions of loss of motive power.	9.b Upon loss of motive power, each as-built remotely operated valve identified in Table 2.7.1.11-2 assumes the indicated loss of motive power position.	
10. Alarms and displays identified in Table 2.7.1.11-4 are provided in the MCR.	10. Inspections will be performed on the as-built A-VDU and on the as-built S-VDU in the MCR for retrievability of the alarms and displays respectively, as identified in Table 2.7.1.11-4 ~~in the as-built MCR~~.	10. Alarms and displays, identified in Table 2.7.1.11-4, can be retrieved on the as-built A-VDU and on the as-built S-VDU respectively in the ~~as-built~~ MCR.	DCD_14.03-6
11. Alarms, displays and controls identified in Table 2.7.1.11-4 are provided in the RSC.	11.i Inspection will be performed on the as-built O-VDU and on the as-built S-VDU in the RSC for retrievability of the alarms and displays respectively, as identified in Table 2.7.1.11-4 ~~in the as-built RSC~~.	11.i Alarms and displays, identified in Table 2.7.1.11-4, can be retrieved on the as-built O-VDU and on the as-built S-VDU respectively in the ~~as-built~~ RSC.	DCD_14.03-7, 8

Table 2.7.1.11-5 Emergency Feedwater System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 8 of 10)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
	11.ii ~~Tests of the as-built RSC control functions identified in Table 2.7.1.11-4 will be performed.~~ Tests will be performed for RSC control capability of the equipment, identified in Table 2.7.1.11-4, on the as-built S-VDU.	11.ii RSC controls for the equipment, identified in Table 2.7.1.11-4, on the as-built S-VDU provide the necessary output from the PSMS to operate the respective equipment.
	11.iii Tests will be performed on the as-built equipment, identified in Table 2.7.1.11-4, using controls on the as-built O-VDU in the RSC.	11.iii Controls on the as-built O-VDU in the ~~as-built~~ RSC operate the as-built equipment identified in Table 2.7.1.11-4 with an RSC control function.

DCD_14.03-7, 8

DCD_14.03-7, 8

Table 2.7.1.11-5 Emergency Feedwater System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 10 of 10)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
18. Controls are provided in the MCR to start and stop the EFW pumps identified in Table 2.7.1.11-4.	18.i Tests will be performed for MCR control capability of the EFW pumps, identified in Table 2.7.1.11-4, on the as-built S-VDU.	8.a.i MCR controls for the EFW pumps, identified in Table 2.7.1.11-4, on the as-built S-VDU provide the necessary output from the PSMS to start and stop the respective pumps.
	18.ii Tests will be performed on the as-built EFW pumps identified in Table 2.7.1.11-4 using controls on the as-built O-VDU in the ~~as-built~~ MCR.	18.ii Controls on the as-built O-VDU in the ~~as-built~~ MCR start and stop the as-built EFW pumps identified in Table 2.7.1.11-4 with the MCR control function.
19. The pumps identified in Table 2.7.1.11-2 perform their safety functions under design conditions.	19. Type tests or a combination of type tests and analyses of each pump identified in Table 2.7.1.11-2 will be performed to demonstrate the ability of the pump to perform its safety function under design conditions.	19. An equipment qualification data summary report exists and concludes that the pumps identified in Table 2.7.1.11-2 perform their safety functions under design conditions.

DCD_14.03-5

DCD_14.03-5

DCD_03.09.06-69

2.7.3 Cooling Water Systems

2.7.3.1 Essential Service Water System (ESWS)

2.7.3.1.1 Design Description

The essential service water system (ESWS) is a safety-related system that provides cooling water to the component cooling water (CCW) heat exchangers and the essential chiller units. The ESWS transfers the heat from these components to the ultimate heat sink (UHS).

The ESWS consists of four independent divisions with each division providing fifty percent (50%) of the cooling capacity required for design basis accidents and for safe shutdown. Each essential service water pump (ESWP) discharge line is provided with two (2) 100% capacity strainers.

1.a The functional arrangement of the ESWS is as described in the Design Description of Subsection 2.7.3.1.1 and in Table 2.7.3.1-1 and as shown in Figure 2.7.3.1-1.

1.b Each mechanical division of the ESWS ~~(Division A, B, C & D) except for piping~~located within the standard design structures as shown in Figure 2.7.3.1-1 is physically separated from the other divisions so as not to preclude accomplishment of the safety function. DCD_14.03-10

2.a.i The ASME Code Section III components of the ESWS, identified in Table 2.7.3.1-2, are fabricated, installed, and inspected in accordance with ASME Code Section III requirements.

2.a.ii The ASME Code Section III components of the ESWS identified in Table 2.7.3.1-2 are reconciled with the design requirements.

2.b.i The ASME Code Section III piping of the ESWS, including supports, identified in Table 2.7.3.1-3, is fabricated, installed, and inspected in accordance with ASME Code Section III requirements.

2.b.ii The ASME Code Section III piping of the ESWS, including supports, identified in Table 2.7.3.1-3 is reconciled with the design requirements.

3.a Pressure boundary welds in ASME Code Section III components, identified in Table 2.7.3.1-2, meet ASME Code Section III requirements for non-destructive examination of welds.

3.b Pressure boundary welds in ASME Code Section III piping, identified in Table 2.7.3.1-3, meet ASME Code Section III requirements for non-destructive examination of welds.

4.a The ASME Code Section III components, identified in Table 2.7.3.1-2, retain their pressure boundary integrity at their design pressure.

4.b The ASME Code Section III piping, identified in Table 2.7.3.1-3, retains its pressure boundary integrity at its design pressure.

5.a The seismic Category I equipment identified in Table 2.7.3.1-2 can withstand seismic design basis loads without loss of safety function.

5.b The seismic Category I piping, including supports, identified in Table 2.7.3.1-3 can withstand seismic design basis loads without a loss of its safety function.

6.a Class 1E equipment identified in Table 2.7.3.1-2 is powered from its respective Class 1E division.

6.b Separation is provided between redundant divisions of ESWS Class 1E cables, and between Class 1E cables and non-Class 1E cables.

7. The ESWS provides cooling water required for the CCW heat exchangers and the essential chiller units of the essential chilled water system (ECWS) during all plant operating conditions, including normal plant operating, abnormal and accident conditions.

8. Controls are provided in the MCR to open and close the remotely operated valves identified in Table 2.7.3.1-~~2~~4. DCD_14.03-5

9.a The remotely operated valves and check valves, identified in Table 2.7.3.1-2 as having an active safety function, perform an active safety function to change position as indicated in the table.

9.b Upon the receipt of a signal that ESWP has started, the essential service water discharge valve opens automatically. Each pump's discharge valve is interlocked to close when the pump is not running or is tripped.

9.c After loss of motive power, the remotely operated valves, identified in Table 2.7.3.1-2, assume the indicated loss of motive power position.

10.a Controls are provided in the MCR to start and stop the essential service water pumps identified in Table 2.7.3.1-4.

10.b The pumps identified in Table 2.7.3.1-2 as having PSMS control perform an active safety function after receiving a signal from PSMS.

11. Alarms and displays identified in Table 2.7.3.1-4 are provided in the MCR.

12. Alarms, displays, and controls identified in Table 2.7.3.1-4 are provided in the RSC.

13.a Controls are provided in the MCR to place in service or remove from service the strainers identified in Table 2.7.3.1-4.

13.b The strainers identified in Table 2.7.3.1-2 as having PSMS control perform an active safety function after receiving a signal from PSMS.

14. The ESWP discharge strainer backwash isolation valves identified in Table 2.7.3.1-2 as having PSMS control perform an active safety function after receiving a signal from PSMS.

Table 2.7.3.1-2 Essential Service Water System Equipment Characteristics (Sheet 1 of 2)

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Valve	Class 1E/ Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position
Essential service water pumps	EWS-MPP-001 A, B, C, D	3	Yes	-	Yes/No	ECCS Actuation	Start	-
						LOOP sequence	Start	
						Remote Manual	Start	
Essential service water pump discharge valves	EWS-MOV-503 A, B, C, D	3	Yes	Yes	Yes/No	ESW pump start	Transfer Open	As Is
						ESW pump stop	Transfer Closed	
Component Cooling Water Heat Exchanger Essential Service Water Flow	EWS-FT-034, 035, 036, 037	-	Yes	-	Yes/ ~~No~~Yes	-	-	-
Essential Service Water Header Pressure	EWS-PT-015, 016, 017, 018	-	Yes	-	Yes/ No	-	-	-
Essential Service Water Pump Discharge Check Valves	EWS-VLV-502A, 502B, 502C, 502D	3	Yes	-	-/-	-	Transfer Open/ Transfer Closed	-
Essential service water pump discharge strainers	EWS-SST-001A, B, C, D EWS-SST-002A, B, C, D	3	Yes	-	Yes/ No	ESW pump stop	Stop	-
						Remote Manual	Start/Stop	

DCD_14.03-13

NOTE:
Dash (-) indicates not applicable

Table 2.7.3.1-5 Essential Service Water System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 1 of 10)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1.a The functional arrangement of the ESWS is as described in the Design Description of Subsection 2.7.3.1.1 and in Table 2.7.3.1-1 and as shown in Figure 2.7.3.1-1.	1.a Inspection of the as-built ESWS will be performed.	1.a The as-built ESWS conforms to the functional arrangement as described in the Design Description of Subsection 2.7.3.1.1 and in Table 2.7.3.1-1 and as shown in Figure 2.7.3.1-1.
1.b Each mechanical division of the ESWS located within the standard design structures as shown in Figure 2.7.3.1-1(Division A, B, C & D) except for piping is physically separated from the other divisions so as not to preclude accomplishment of the safety function.	1.b Inspection and analysis of the as-built ESWS will be performed.	1.b Each mechanical division of the as-built ESWS located within the standard design structures as shown in Figure 2.7.3.1-1(Division A, B, C & D) except for piping is physically separated from the other mechanical divisions of the system by spatial separation, barriers or enclosures so as to assure that the functions of the safety related system isare maintained considering postulated dynamic effects (i.e., missile and pipe break hazard), internal flooding and fire. DCD_14.03-10 DCD_14.03-10
2.a.i The ASME Code Section III components of the ESWS, identified in Table 2.7.3.1-2, are fabricated, installed, and inspected in accordance with ASME Code Section III requirements.	2.a.i Inspection of the as-built ASME Code Section III components of the ESWS identified in Table 2.7.3.1-2 will be performed.	2.a.i The ASME Code Section III data report(s) (certified, when required by ASME Code) and inspection reports (including N-5 Data Reports where applicable) exist and conclude that the as-built ASME Code Section III components of the ESWS identified in Table 2.7.3.1-2 are fabricated, installed, and inspected in accordance with ASME Code Section III requirements.

Table 2.7.3.1-5 Essential Service Water System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 6 of 10)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria	
7. The ESWS provides cooling water required for the CCW heat exchangers and the essential chiller units of the essential chilled water system (ECWS) during all plant operating conditions, including normal plant operating, abnormal and accident conditions.	7.i Deleted.	7.i Deleted.	
	7.ii Tests will be performed to confirm that the as-built ESW pumps can provide flow to the CCW heat exchangers and the essential chiller units of the ECWS.	7.ii ~~The~~Each as-built ESW pump~~s~~ identified in Table 2.7.3.1-2 delivers at least 11,000 gpm of essential service water to the CCW heat exchangers and at least 543 gpm to the essential chiller units in the same division.	DCD_14.03.07-70
8. Controls are provided in the MCR to open and close the remotely operated valves identified in Table 2.7.3.1-~~2~~4.	8.i Tests will be performed for MCR control capability of the remotely operated valves, identified in Table 2.7.3.1-4, on the as-built S-VDU.	8.i MCR controls for the remotely operated valves, identified in Table 2.7.3.1-4, on the as-built S-VDU provide the necessary output from the PSMS to open and close the respective valves.	DCD_14.03-5
	8.ii Tests will be performed on the as-built remotely operated valves identified in Table 2.7.3.1-~~2~~4 using controls on the as-built O-VDU in the ~~as-built~~ MCR.	8.ii Controls on the as-built O-VDU in the ~~as-built~~ MCR open and close the as-built remotely operated valves identified in Table 2.7.3.1-~~2~~4 with the MCR control function.	DCD_14.03-5

Table 2.7.3.1-5 Essential Service Water System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 8 of 10)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria	
9.b Upon the receipt of a signal that ESWP has started, the essential service water discharge valve opens automatically. Each pump's discharge valve is interlocked to close when the pump is not running or is tripped.	9.b A test of each interlock for the as-built essential service water discharge valve will be performed using a simulated test signal.	9.b The ESWP discharge valve closes when its respective pump is not running. Upon the receipt of a simulated signal that ESWP has started, the as-built discharge valve for the respective pump opens automatically. The valve closes when the pump is tripped.	
9.c After loss of motive power, the remotely operated valves, identified in Table 2.7.3.1-2, assume the indicated loss of motive power position.	9.c Tests of the as-built remotely operated valves identified in Table 2.7.3.1-2 will be performed under the conditions of loss of motive power.	9.c Upon loss of motive power, each as-built remotely operated valve identified in Table 2.7.3.1-2 assumes the indicated loss of motive power position.	
10.a Controls are provided in the MCR to start and stop the essential service water pumps identified in Table 2.7.3.1-4.	10.a.i Tests will be performed for MCR control capability of the essential service water pumps, identified in Table 2.7.3.1-4, on the as-built S-VDU.	10.a.i MCR controls for the essential service water pumps, identified in Table 2.7.3.1-4, on the as-built S-VDU provide the necessary output from the PSMS to start and stop the respective pumps.	DCD_14.03-5
	10.a.ii Tests will be performed on the as-built essential service water pumps identified in Table 2.7.3.1-4 using controls on the as-built O-VDU in the ~~as-built~~ MCR.	10.a.ii Controls on the as-built O-VDU are provided in the ~~as-built~~ MCR to start and stop the as-built essential service water pumps identified in Table 2.7.3.1-4 with the MCR control function.	DCD_14.03-5 DCD_14.03-5
10.b The pumps identified in Table 2.7.3.1-2 as having PSMS control perform an active safety function after receiving a signal from PSMS.	10.b Tests will be performed on the as-built pumps identified in Table 2.7.3.1-2 using simulated signals.	10.b The as-built pumps identified in Table 2.7.3.1-2 as having PSMS control perform the active safety function identified in the table after receiving a simulated signal.	
11. Alarms and displays identified in Table 2.7.3.1-4 are provided in the MCR.	11. Inspection will be performed on the as-built A-VDU and on the as-built S-VDU in the MCR for retrievability of the alarms and displays respectively, as identified in Table 2.7.3.1-4 ~~in the as-built MCR~~.	11. Alarms and displays, identified in Table 2.7.3.1-4, can be retrieved on the as-built A-VDU and on the as-built S-VDU respectively in the ~~as-built~~ MCR.	DCD_14.03-6

Table 2.7.3.1-5 Essential Service Water System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 9 of 10)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria	
12. Alarms, displays, and controls identified in Table 2.7.3.1-4 are provided in the RSC.	12.i Inspection will be performed on the as-built O-VDU and on the as-built S-VDU in the RSC for the retrievability of the alarms and displays respectively, as identified in Table 2.7.3.1-4 in the as-built RSC.	12.i Alarms and displays, identified in Table 2.7.3.1-4, can be retrieved on the as-built O-VDU and on the as-built S-VDU respectively in the as-built RSC.	DCD_14.03-7, 8
	12.ii Tests of the as-built RSC control functions identified in Table 2.7.3.1-4 will be performed. Tests will be performed for RSC control capability of the equipment, identified in Table 2.7.3.1-4, on the as-built S-VDU.	12.ii RSC controls for the equipment, identified in Table 2.7.3.1-4, on the as-built S-VDU provide the necessary output from the PSMS to operate the respective equipment.	DCD_14.03-7, 8
	12.iii Tests will be performed on the as-built equipment, identified in Table 2.7.3.1-4, using controls on the as-built O-VDU in the RSC.	12.iii Controls on the as-built O-VDU in the as-built RSC operate the as-built equipment identified in Table 2.7.3.1-4 with an RSC control function.	DCD_14.03-7, 8

Table 2.7.3.1-5 Essential Service Water System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 10 of 10)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria	
13.a Controls are provided in the MCR to place in service or remove from service the strainers identified in Table 2.7.3.1-4.	13.a.i Tests will be performed for MCR control capability of the strainers, identified in Table 2.7.3.1-4, on the as-built S-VDU.	13.a.i MCR controls for the strainers, identified in Table 2.7.3.1-4, on the as-built S-VDU provide the necessary output from the PSMS to place in service or remove from service the respective strainers.	DCD_14.03-5
	13.a.ii Tests will be performed on the as-built strainers identified in Table 2.7.3.1-4 using controls on the as-built O-VDU in the as-built MCR.	13.a.ii Controls on the as-built O-VDU are provided in the as-built MCR to place in service or remove from service the as-built strainers identified in Table 2.7.3.1-4 with the MCR control function.	DCD_14.03-5
13.b The strainers identified in Table 2.7.3.1-2 as having PSMS control perform an active safety function after receiving a signal from PSMS.	13.b Tests will be performed on the as-built strainers identified in Table 2.7.3.1-2 as having PSMS control using simulated signals.	13.b The as-built strainers identified in Table 2.7.3.1-2 as having PSMS control perform the active safety function identified in the table after receiving a simulated signal.	
14. The ESWP discharge strainer backwash isolation valves identified in Table 2.7.3.1-2 as having PSMS control perform an active safety function after receiving a signal from PSMS.	14. A test will be performed on the as-built ESWP discharge strainer backwash isolation valves identified in Table 2.7.3.1-2 as having PSMS control using simulated signals.	14. The as-built ESWP discharge strainer backwash isolation valves identified in Table 2.7.3.1-2 as having PSMS control perform the active safety function identified in the table after receiving a simulated signal.	
15. The pumps identified in Table 2.7.3.1-2 perform their safety functions under design conditions.	15. Type tests or a combination of type tests and analyses of each pump identified in Table 2.7.3.1-2 will be performed to demonstrate the ability of the pump to perform its safety function under design conditions.	15. An equipment qualification data summary report exists and concludes that the pumps identified in Table 2.7.3.1-2 perform their safety functions under design conditions.	DCD_03.09.06-69

3.a Pressure boundary welds in ASME Code Section III components, identified in Table 2.7.3.3-2, meet ASME Code Section III requirements for non-destructive examination of welds.

3.b Pressure boundary welds in ASME Code Section III piping, identified in Table 2.7.3.3-3, meet ASME Code Section III requirements for non-destructive examination of welds.

4.a The ASME Code Section III components, identified in Table 2.7.3.3-2, retain their pressure boundary integrity at their design pressure.

4.b The ASME Code Section III piping, identified in Table 2.7.3.3-3, retains its pressure boundary integrity at its design pressure.

5.a The seismic Category I equipment identified in Table 2.7.3.3-2 can withstand seismic design basis loads without loss of safety function.

5.b The seismic Category I piping, including supports, identified in Table 2.7.3.3-3 can withstand seismic design basis loads without a loss of its safety function.

6.a The Class 1E equipment identified in Table 2.7.3.3-2 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.

6.b Class 1E equipment identified in Table 2.7.3.3-2 is powered from its respective Class 1E division.

6.c Separation is provided between redundant divisions of CCWS Class 1E cables, and between Class 1E cables and non-Class 1E cables.

7. The CCWS removes heat from various components during all plant operating conditions, including normal plant operating, ~~abnormal and accident conditions~~abnormal, and accident conditions for at least 7 days without surge tank makeup. DCD_09.02.02-49

8.a Controls are provided in the MCR to open and close the remotely operated valves identified in Table 2.7.3.3-~~2~~4. DCD_14.03-5

8.b The valves identified in Table 2.7.3.3-2 as having PSMS control perform an active safety function after receiving a signal from PSMS.

9.a The remotely operated valves and check valves, identified in Table 2.7.3.3-2, perform an active safety function to change position as indicated in the table.

9.b After loss of motive power, the remotely operated valves, identified in Table 2.7.3.3-2, assume the indicated loss of motive power position.

Table 2.7.3.3-2 Component Cooling Water System Equipment Characteristics (Sheet 1 of 11)

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Valve	Class 1E/ Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position	
Component cooling water (CCW) heat exchangers	NCS-MHX-001 A, B, C, D	3	Yes	-	-/-	-	-	-	
Component cooling water pumps	NCS-MPP-001 A, B, C, D	3	Yes	-	Yes/~~No~~Yes	ECCS Actuation	Start	-	DCD_14.03-13
						LOOP sequence	Start		
						Low CCW header pressure	Start		
Component cooling water surge tanks	NCS-MTK-001 A, B	3	Yes	-	-/-	-	-	-	
Component cooling water pump discharge check valves	NCS-VLV-016 A, B, C, D	3	Yes	-	-/-	-	Transfer Open/ Transfer Closed	-	DCD_09.02.02-68
CCW supply header tie line isolation valves	NCS-MOV-020 A, B, C, D	3	Yes	Yes	Yes/~~No~~Yes	~~ECCS Actuation and undervoltage signal~~	~~Transfer Closed~~	As Is	DCD_09.02.02-48
						~~Containment Spray~~	~~Transfer Closed~~		
						~~Low-low CCW surge tank water level~~	~~Transfer Closed~~		DCD_14.03-13
						Remote Manual	Transfer Open/ Transfer Closed		

Table 2.7.3.3-2 Component Cooling Water System Equipment Characteristics (Sheet 2 of 11)

<table>
<tr><th>Equipment Name</th><th>Tag No.</th><th>ASME Code Section III Class</th><th>Seismic Category I</th><th>Remotely Operated Valve</th><th>Class 1E/ Qual. For Harsh Envir</th><th>PSMS Control</th><th>Active Safety Function</th><th>Loss of Motive Power Position</th></tr>
<tr><td rowspan="4">CCW return header tie line isolation valves</td><td rowspan="4">NCS-MOV-007 A, B, C, D</td><td rowspan="4">3</td><td rowspan="4">Yes</td><td rowspan="4">Yes</td><td rowspan="4">Yes/~~No~~Yes</td><td>~~ECCS Actuation and undervoltage signal~~</td><td>~~Transfer Closed~~</td><td rowspan="4">As Is</td></tr>
<tr><td>~~Containment Spray~~</td><td>~~Transfer Closed~~</td></tr>
<tr><td>~~Low-low CCW surge tank water level~~</td><td>~~Transfer Closed~~</td></tr>
<tr><td>Remote Manual</td><td>Transfer Open/ Transfer Closed</td></tr>
<tr><td rowspan="3">CS/RHR heat exchanger CCW outlet 1st valves</td><td rowspan="3">NCS-MOV-145 A, B, C, D</td><td rowspan="3">3</td><td rowspan="3">Yes</td><td rowspan="3">Yes</td><td rowspan="3">Yes/No</td><td>ECCS Actuation and CCW pump start</td><td>Transfer Open</td><td rowspan="3">As Is</td></tr>
<tr><td>Low CCWP discharge pressure and Low CCW header Pressure</td><td>Transfer Closed</td></tr>
<tr><td>Remote Manual</td><td>Transfer Open/ Transfer Closed</td></tr>
</table>

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DCD_09.02.02-86

Table 2.7.3.3-2 Component Cooling Water System Equipment Characteristics (Sheet 3 of 11)

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Valve	Class 1E/ Qual. For Harsh Envir	PSMS Control	Active Safety Function	Loss of Motive Power Position
CS/RHR heat exchanger CCW outlet 2nd valves	NCS-MOV-146 A, B, C, D	3	Yes	Yes	Yes/No	Low CCWP discharge pressure and Low CCW header Pressure	Transfer Closed	As Is
						Remote Manual	Transfer Open/ Transfer Closed	
RCP CCW supply line outside containment isolation valves	NCS-MOV-402 A, B	2	Yes	Yes	Yes/~~No~~Yes	~~Containment Isolation Phase B~~	~~Transfer Closed~~	As Is
						Remote Manual	Transfer Open/ Transfer Closed	

DCD_09.02.02-86

DCD_09.02.02-58

DCD_14.03-13

Table 2.7.3.3-2 Component Cooling Water System Equipment Characteristics (Sheet 5 of 11)

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Valve	Class 1E/ Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position	
RCP CCW return line outside containment isolation valves	NCS-MOV-438 A, B	2	Yes	Yes	Yes/~~No~~Yes	~~Containment Isolation Phase B~~ Remote Manual	~~Transfer Closed~~ Transfer Open/ Transfer Closed	As Is	DCD_09.02.02-58 DCD_14.03-13
~~RCP CCW return line outside containment isolation valve bypass valves~~	~~NCS-MOV-448 A, B~~	~~2~~	~~Yes~~	~~Yes~~	~~Yes/No~~	~~Remote Manual~~	~~Transfer Open/ Transfer Closed~~	~~As Is~~	DCD_09.02.02-58
RCP motor CCW supply line isolation valves	NCS-MOV-446 A, B,C,D	3	Yes	Yes	Yes/Yes	Remote Manual	Transfer Closed	As Is	
RCP CCW supply line tie line isolation valves	NCS-MOV-232 A, B	3	Yes	Yes	Yes/~~No~~Yes	Remote Manual	Transfer Open	As Is	DCD_14.03-13
RCP CCW return line tie line isolation valves	NCS-MOV-233 A, B	3	Yes	Yes	Yes/~~No~~Yes	Remote Manual	Transfer Open	As Is	DCD_14.03-13
RCP CCW return line isolation valve	NCS-MOV-234 A, B	3	Yes	Yes	Yes/~~No~~Yes	Remote Manual	Transfer Closed	As Is	DCD_14.03-13
RCP CCW supply line isolation valves	NCS-MOV-401 A, B	3	Yes	Yes	Yes/~~No~~Yes	~~Containment Isolation Phase B~~ Remote Manual	~~Transfer Closed~~ Transfer Open/ Transfer Closed	As Is	DCD_09.02.02-58 DCD_14.03-13
Letdown heat exchanger CCW supply line outside containment isolation valve	NCS-MOV-531	2	Yes	Yes	Yes/~~No~~Yes	Containment Isolation Phase A	Transfer Closed	As Is	DCD_14.03-13
Letdown heat exchanger CCW return line outside containment isolation valve	NCS-MOV-537	2	Yes	Yes	Yes/~~No~~Yes	Containment Isolation Phase A	Transfer Closed	As Is	DCD_14.03-13

Table 2.7.3.3-2 Component Cooling Water System Equipment Characteristics (Sheet 6 of 11)

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Valve	Class 1E/ Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position	
Excess letdown heat exchanger CCW supply line outside containment isolation valve	NCS-MOV-511	2	Yes	Yes	Yes/~~No~~Yes	Containment Isolation Phase A	Transfer Closed	As Is	DCD_14.03-13
Excess letdown heat exchanger CCW return line outside containment isolation valve	NCS-MOV-517	2	Yes	Yes	Yes/~~No~~Yes	Containment Isolation Phase A	Transfer Closed	As Is	DCD_14.03-13
~~Auxiliary building CCW supply line first isolation valve~~	~~NCS-AOV-601~~	~~3~~	~~Yes~~	~~Yes~~	~~Yes/No~~	~~ECCS Actuation~~ ~~Containment Isolation Phase B~~ ~~Low-low CCW surge tank water level~~	~~Transfer Closed~~ ~~Transfer Closed~~ ~~Transfer Closed~~	~~Closed~~	DCD_09.02.02-49
~~Auxiliary building CCW supply line second isolation valve~~	~~NCS-AOV-602~~	~~3~~	~~Yes~~	~~Yes~~	~~Yes/No~~	~~ECCS Actuation~~ ~~Containment Isolation Phase B~~ ~~Low-low CCW surge tank water level~~	~~Transfer Closed~~ ~~Transfer Closed~~ ~~Transfer Closed~~	~~Closed~~	
~~Auxiliary building component cooling water return header check valve~~	~~NCS-VLV-652~~	~~3~~	~~Yes~~	-	~~-/-~~	-	~~Transfer Closed~~	-	
~~Auxiliary building component cooling water return header check valve~~	~~NCS-VLV-653~~	~~3~~	~~Yes~~	-	~~-/-~~	-	~~Transfer Closed~~	-	

Table 2.7.3.3-2 Component Cooling Water System Equipment Characteristics (Sheet 7 of 11)

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Valve	Class 1E/ Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position	
~~Turbine building~~ CCW A2(C2) supply line first isolation valves	NCS-AOV-~~661~~057 A, B	3	Yes	Yes	Yes/No	ECCS Actuation ~~and undervoltage~~	Transfer Closed	Closed	DCD_09.02.02-49
						Containment Isolation Phase B	Transfer Closed		
						~~Low-low CCW surge tank water level~~A2(C2) CCW Supply Line Isolation	Transfer Closed		DCD_14.03-11
~~Turbine building~~ CCW A2(C2) supply line second isolation valves	NCS-AOV-~~662~~058 A, B	3	Yes	Yes	Yes/No	ECCS Actuation ~~and undervoltage~~	Transfer Closed	Closed	DCD_09.02.02-49
						Containment Isolation Phase B	Transfer Closed		
						~~Low-low CCW surge tank water level~~A2(C2) CCW Supply Line Isolation	Transfer Closed		DCD_14.03-11
Turbine building component cooling water A2(C2) return header check valve	NCS-VLV-~~670~~036A, B	3	Yes	-	-/-	-	Transfer Closed	-	DCD_09.02.02-49

Table 2.7.3.3-2 Component Cooling Water System Equipment Characteristics (Sheet 9 of 11)

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Valve	Class 1E/ Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position
RCP thermal barrier heat exchanger CCW return line first isolation valves	NCS-FCV-129 A 130 A 131 A 132 A	3	Yes	Yes	Yes / Yes	High RCP thermal barrier CCW flow 1RCP Thermal Barrier HX CCW Return Line Isolation	Transfer Closed	As Is
RCP thermal barrier heat exchanger CCW return line second isolation valves	NCS-FCV-129 B 130 B 131 B 132 B	3	Yes	Yes	Yes / Yes	High RCP thermal barrier CCW flow 2RCP Thermal Barrier HX CCW Return Line Isolation	Transfer Closed	As Is
RCP CCW supply line check valves	NCS-VLV-231 A, B	3	Yes	-	-/-	-	Transfer Open/ Transfer Closed	-
Charging pump CCW supply line check valves	NCS-VLV-306 A, B	3	Yes	-	-/-	-	Transfer Open	-
Charging pump CCW return isolation valve	NCS-MOV-316 A, B	3	Yes	Yes	Yes/No	-	-	As Is
Charging pump fire fighting water supply isolation valve	NCS-MOV-321 A, B	3	Yes	Yes	Yes/No	-	-	As Is
Charging pump alternative cooling water supply isolation valve	NCS-MOV-322 A, B	3	Yes	Yes	Yes/No	-	-	As Is

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Table 2.7.3.3-2 Component Cooling Water System Equipment Characteristics (Sheet 10 of 11)

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Valve	Class 1E/ Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position
Charging pump non-essential chilled water supply isolation valve	NCS-MOV-323 A, B	3	Yes	Yes	Yes/No	-	-	As Is
Charging pump alternative cooling water return isolation valve	NCS-MOV-324A, B	3	Yes	Yes	Yes/No	-	-	As Is
Charging pump fire fighting water return isolation valve	NCS-MOV-325 A, B	3	Yes	Yes	Yes/No	-	-	As Is
Charging pump non-essential chilled water return isolation valve	NCS-MOV-326 A, B	3	Yes	Yes	Yes/ No	-	-	As Is
Component cooling water Header Flow	NCS-FT-034, 035, 037, 038	-	Yes	-	Yes/ ~~No~~Yes	-	-	-
Component cooling water Surge Tank Water Level	NCS-LT-~~010, 011, 020, 021~~010A,B,C,D, 011A,B,C,D	-	Yes	-	Yes/ ~~No~~Yes	-	-	-
Component cooling water pump discharge pressure 1	NCS-PT-025, 026, 027, 028	-	Yes	-	Yes/No	-	-	-
Component cooling water pump discharge pressure 2	NCS-PT-035, 036, 037, 038	-	Yes	-	Yes/No	-	-	-

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Table 2.7.3.3-2 Component Cooling Water System Equipment Characteristics (Sheet 11 of 11)

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Valve	Class 1E/ Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position	
Component cooling water Header Pressure	NCS-PT-030, 031, 032, 033	-	Yes	-	Yes/ ~~No~~Yes	-	-	-	DCD_14.03-13
Component cooling water Supply Temperature	NCS-TE-025, 026, 027, 028,	-	Yes	-	Yes/ ~~No~~Yes	-	-	-	DCD_14.03-13
RCP thermal barrier component cooling water flow 1	NCS-FT-129 A 130 A 131 A 132 A	-	Yes	-	Yes/~~No~~Yes	-	-	-	DCD_14.03-13
RCP thermal barrier component cooling water flow 2	NCS-FT-129 B 130 B 131 B 132 B	-	Yes	-	Yes/~~No~~Yes	-	-	-	DCD_14.03-13
Containment fan cooler alternative cooling water supply isolation valve	NCS-MOV-241	3	Yes	Yes	Yes/No	-	-	As Is	DCD_09.02.02-80
Containment fan cooler alternative cooling water return isolation valve	NCS-MOV-242	3	Yes	Yes	Yes/No	-	-	As Is	DCD_09.02.02-80

NOTE:
Dash (-) indicates not applicable.

Table 2.7.3.3-4 Component Cooling Water System Equipment Alarms, Displays, and Control Functions (Sheet 1 of 3)

Equipment/Instrument Name	MCR/RSC Alarm	MCR Dis-play(1)	MCR/RSC Control Function	RSC Dis-play(1)	
Component cooling water pumps (NCS-MPP-001 A,B,C,D)	No	Yes	Yes	Yes	DCD_14.03-6, 8
CCW supply header tie line isolation valves (NCS-MOV-020A,B)	No	Yes	Yes	Yes	
CCW return header tie line isolation valves (NCS-MOV-007A,B)	No	Yes	Yes	Yes	
CS/RHR heat exchanger CCW outlet 1st valves (NCS-MOV-145A,B,C,D)	No	Yes	Yes	Yes	DCD_09.02.02-86
CS/RHR heat exchanger CCW outlet 2nd valves (NCS-MOV-146A, B, C, D)	No	Yes	Yes	Yes	DCD_09.02.02-86
RCP CCW supply line outside containment isolation valves (NCS-MOV-402A,B)	No	Yes	Yes	Yes	
~~RCP CCW supply line outside containment isolation valve bypass valves (NCS-MOV-445A,B)~~	~~No~~	~~Yes~~	~~Yes~~	~~Yes~~	DCD_09.02.02-58
RCP CCW return line inside containment isolation valves (NCS-MOV-436A,B)	No	Yes	Yes	Yes	
~~RCP CCW return line inside containment isolation valve bypass valves (NCS-MOV-447A,B)~~	~~No~~	~~Yes~~	~~Yes~~	~~Yes~~	DCD_09.02.02-58
RCP CCW return line outside containment isolation valves (NCS-MOV-438A,B)	No	Yes	Yes	Yes	
~~RCP CCW return line outside containment isolation valve bypass valves (NCS-MOV-448A,B)~~	~~No~~	~~Yes~~	~~Yes~~	~~Yes~~	DCD_09.02.02-58
RCP motor CCW supply line isolation valves (NCS-MOV-446A,B,C,D)	No	Yes	Yes	Yes	
RCP CCW supply line tie line isolation valves (NCS-MOV-232A,B)	No	Yes	Yes	Yes	
RCP CCW return line tie line isolation valves (NCS-MOV-233A,B)	No	Yes	Yes	Yes	
RCP CCW return line isolation valve (NCS-MOV-234A,B)	No	Yes	Yes	Yes	
RCP CCW supply line isolation valves (NCS-MOV-401A,B)	No	Yes	Yes	Yes	
Charging pump CCW return isolation valve (NCS-MOV-316A,B)	No	Yes	Yes	Yes	
Charging pump fire fighting water supply isolation valve (NCS-MOV-321A, B)	No	Yes	Yes	Yes	
Charging pump alternative cooling water supply isolation valve (NCS-MOV-322A,B)	No	Yes	Yes	Yes	
Charging pump non-essential chilled water supply isolation valve (NCS-MOV-323A,B)	No	Yes	Yes	Yes	

Table 2.7.3.3-4 Component Cooling Water System Equipment Alarms, Displays, and Control Functions (Sheet 2 of 3)

Equipment/Instrument Name	MCR/RSC Alarm	MCR Display(1)	MCR/RSC Control Function	RSC Dis-play(1)
Charging pump alternative cooling water return isolation valve (NCS-MOV-324A,B)	No	Yes	Yes	Yes
Charging pump fire fighting water return isolation valve (NCS-MOV-325A,B)	No	Yes	Yes	Yes
Charging pump non-essential chilled water return isolation valve (NCS-MOV-326A,B)	No	Yes	Yes	Yes
Letdown heat exchanger CCW supply line outside containment isolation valve (NCS-MOV-531)	No	Yes	Yes	Yes
Letdown heat exchanger CCW return line outside containment isolation valve (NCS-MOV-537)	No	Yes	Yes	Yes
Excess letdown heat exchanger CCW supply line outside containment isolation valve ((NCS-MOV-511)	No	Yes	Yes	Yes
Excess letdown heat exchanger CCW return line outside containment isolation valve (NCS-MOV-517)	No	Yes	Yes	Yes
~~Auxiliary building CCW supply line first isolation valve (NCS-AOV-601)~~	~~No~~	~~Yes~~	~~Yes~~	~~Yes~~
~~Auxiliary building CCW supply line second isolation valve (NCS-AOV-602)~~	~~No~~	~~Yes~~	~~Yes~~	~~Yes~~
~~Turbine building~~ CCW A2(C2) supply ~~line~~header first isolation valves (NCS-AOV-~~661~~057A,B)	No	Yes	Yes	Yes
~~Turbine building~~ CCW A2(C2) supply ~~line~~header second isolation valves (NCS-AOV-~~662~~058A,B)	No	Yes	Yes	Yes
RCP thermal barrier heat exchanger CCW return line first isolation valves (NCS-FCV-129A,130A,131A,132A)	No	Yes	Yes	Yes
RCP thermal barrier heat exchanger CCW return line second isolation valves (NCS-FCV-129B,130B,131B,132B)	No	Yes	Yes	Yes
CCW header flow (NCS-FT-034,035,037,038)	No	Yes	No	Yes
CCW supply temperature (NCS-TE-025,026,027,028)	Yes	Yes	No	Yes
CCW header pressure (NCS-PT-030,031,032,033)	Yes	Yes	No	Yes

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Table 2.7.3.3-4 Component Cooling Water System Equipment Alarms, Displays, and Control Functions (Sheet 3 of 3)

Equipment/Instrument Name	MCR/RSC Alarm	MCR Display(1)	MCR/RSC Control Function	RSC Display(1)
Component cooling water pump discharge 1st pressure (NCS-PT-025, 026, 027, 028)	Yes	Yes	No	Yes
Component cooling water pump discharge 2nd pressure (NCS-PT-035, 036, 037, 038)	Yes	No	No	No
CCW surge tank water level (NCS-LT-~~010,011,020,021~~010A,B,C,D, 011A,B,C,D)	Yes	Yes	No	Yes
RCP thermal barrier component cooling water flow (NCS-FT-129A,B, 130A,B, 131A,B, 132A,B)	Yes	Yes(2)	No	Yes(2)
Containment fan cooler alternative cooling water supply isolation valve (NCS-MOV-241)	No	Yes	Yes	Yes
Containment fan cooler alternative cooling water return isolation valve (NCS-MOV-242)	No	Yes	Yes	Yes

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DCD_14.03-6, 8
DCD_09.02.02-80

Note (1): on S-VDU except for "Yes(2)"

Note (2): on O-VDU

DCD_14.03-6, 8

Table 2.7.3.3-5 Component Cooling Water System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 1 of 10)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1.a The functional arrangement of the CCWS is as described in the Design Description of Subsection 2.7.3.3 and in Table 2.7.3.3-1 and as shown in Figure 2.7.3.3-1.	1.a An inspection of the as-built CCWS will be performed.	1.a The as-built CCWS conforms to the functional arrangement as described in the Design Description of Subsection 2.7.3.3 and in Table 2.7.3.3-1 and as shown in Figure 2.7.3.3-1.
1.b Each mechanical division of the CCWS ~~(Divisions A, B, C & D) with the exception of that portion of the system consisting of the supply headers A2 & C2,~~ as shown in Figure 2.7.3.3-1 is physically separated from the other divisions so as not to preclude accomplishment of the safety function.	1.b Inspections and analysis of the as-built CCWS will be performed.	1.b A report exists and concludes that each mechanical division of the as-built CCWS as shown in Figure 2.7.3.3-1 ~~(Divisions A, B, C & D), with the exception of that portion of the system consisting of the supply headers A2 & C2,~~ is physically separated from other mechanical divisions of the system by spatial separation, barriers, or enclosures so as to assure that the functions of the safety-related system ~~is~~are maintained considering postulated dynamic effects (i.e., missile and pipe break hazard), internal flooding and fire.
2.a.i The ASME Code Section III components of the CCWS, identified in Table 2.7.3.3-2, are fabricated, installed, and inspected in accordance with ASME Code Section III requirements.	2.a.i Inspection of the as-built ASME Code Section III components of the CCWS, identified in Table 2.7.3.3-2, will be performed.	2.a.i The ASME Code Section III data report(s) (certified, when required by ASME Code) and inspection reports (including N-5 Data Reports where applicable) exist and conclude that the as-built ASME Code Section III components of the CCWS identified in Table 2.7.3.3-2 are fabricated, installed, and inspected in accordance with ASME Code Section III requirements.

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DCD_14.03-10

Table 2.7.3.3-5 Component Cooling Water System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 6 of 10)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria	
	7.ii Tests will be performed to confirm that the as-built CCW pumps can provide flow to the CCW heat exchangers.	7.ii Each as-built CCW pump identified in Table 2.7.3.3-2 is capable of achieving its design flow rate of 11,000 gpm to each CCW heat exchanger in the same division.	
	7.iii Inspections will be performed to confirm the as-built CCW surge tank volume.	7.iii The as-built CCW surge tank volume is greater than or equal to the design volume of ~~283~~420 ft^3.	DCD_09.02.02-68
	7.iv Tests will be performed to verify that the as-built CCWS can provide flow to each CS/RHR heat exchanger.	7.iv Each CCW pump deliver at least 4400 gpm of component cooling water to each CS/RHR heat exchanger.	DCD_09.02.02-68
	7.v Tests will be performed to verify that the as-built CCWS can provide flow to each RCP thermal barrier with any two CCW pumps operating.	7.v Any two CCW pumps deliver at least 40.0 gpm of component cooling water to each RCP thermal barrier.	DCD_09.02.02-68
	7.vi Tests will be performed to verify that the as-built CCWS can provide flow to each SFP heat exchanger with any two CCW pumps operating.	7.vi Any two CCW pumps deliver at least 3,600 gpm of component cooling water to each spent fuel pit heat exchanger.	DCD_09.02.02-68
8.a Controls are provided in the MCR to open and close the remotely operated valves identified in Table 2.7.3.3-~~2~~4.	8.a.i Tests will be performed for MCR control capability of the remotely operated valves, identified in Table 2.7.3.3-4, on the as-built S-VDU.	8.a.i MCR controls for the remotely operated valves, identified in Table 2.7.3.3-4, on the as-built S-VDU provide the necessary output from the PSMS to open and close the respective valves.	DCD_14.03-5
	8.a.ii Tests will be performed on the as-built remotely operated valves identified in Table 2.7.3.3-~~2~~4 using controls on the as-built O-VDU in the ~~as-built~~ MCR.	8.a.ii Controls on the as-built O-VDU in the ~~as-built~~ MCR open and close the as-built remotely operated valves identified in Table 2.7.3.3-~~2~~4 with the MCR control function.	DCD_14.03-5 DCD_14.03-5

Table 2.7.3.3-5 Component Cooling Water System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 8 of 10)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria	
10.a Controls are provided in the MCR to start and stop the CCW pumps identified in Table 2.7.3.3-4.	10.a.i Tests will be performed for MCR control capability of the CCW pumps, identified in Table 2.7.3.3-4, on the as-built S-VDU.	10.a.i MCR controls for the CCW pumps, identified in Table 2.7.3.3-4, on the as-built S-VDU provide the necessary output from the PSMS to start and stop the respective pumps.	DCD_14.03-5
	10.a.ii Tests will be performed on the as-built CCW pumps identified in Table 2.7.3.3-4 using controls on the as-built O-VDU in the ~~as-built~~ MCR.	10.a.ii Controls on the as-built O-VDU in the ~~as-built~~ MCR start and stop the as-built CCW pumps identified in Table 2.7.3.3-4 with the MCR control function.	DCD_14.03-5 DCD_14.03-5
10.b The pumps identified in Table 2.7.3.3-2 as having PSMS control perform an active safety function after receiving a signal from PSMS.	10.b Tests will be performed on the as-built pumps identified in Table 2.7.3.3-2 using simulated signals.	10.b The as-built pumps identified in Table 2.7.3.3-2 as having PSMS control perform the active safety function identified in the table after receiving a simulated signal.	DCD_14.03-5
11. Alarms and displays identified in Table 2.7.3.3-4 are provided in the MCR.	11.i Inspection will be performed on the as-built A-VDU in the MCR for retrievability of the alarms ~~and displays~~ identified in Table 2.7.3.3-4 ~~in the as-built MCR~~.	11.i Alarms ~~and displays~~ identified in Table 2.7.3.3-4 can be retrieved on the as-built A-VDU in the ~~as-built~~ MCR.	DCD_14.03-6
	11.ii Inspection will be performed on the as-built VDU in the MCR, as identified in Table 2.7.3.3-4, for retrievability of the displays identified in the table.	11.ii Displays identified in Table 2.7.3.3-4 can be retrieved on the as-built VDU in the MCR, as identified in the table.	DCD_14.03-6

Table 2.7.3.3-5 Component Cooling Water System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 9 of 10)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria	
12. Alarms, displays and controls identified in Table 2.7.3.3-4 are provided in the RSC.	12.i Inspection will be performed on the as-built O-VDU in RSC for retrievability of the alarms and displays identified in Table 2.7.3.3-4 in the as-built RSC.	12.i Alarms and displays identified in Table 2.7.3.3-4 can be retrieved on the as-built O-VDU in the as-built RSC.	DCD_14.03-7, 8
	12.ii Tests of the as-built RSC control functions identified in Table 2.7.3.3-4 will be performed. Inspection will be performed on the as-built VDU, as identified in Table 2.7.3.3-4, in the RSC for retrievability of the displays identified in the table.	12.ii Displays identified in Table 2.7.3.3-4 can be retrieved on the as-built VDU, in the RSC, as identified in the table.	DCD_14.03-7, 8
	12.iii Tests will be performed for RSC control capability of the equipment, identified in Table 2.7.3.3-4, on the as-built S-VDU.	12.iii RSC controls for the equipment, identified in Table 2.7.3.3-4, on the as-built S-VDU provide the necessary output from the PSMS to operate the respective equipment.	DCD_14.03-7, 8
	12.iv Tests will be performed on the as-built equipment, identified in Table 2.7.3.3-4, using controls on the as-built O-VDU in the RSC.	12.iv Controls on the as-built O-VDU in the as-built RSC operate the as-built equipment identified in Table 2.7.3.3-4 with an RSC control function.	DCD_14.03-7, 8
13. The CCW pumps have sufficient net positive suction head (NPSH).	13. Tests to measure the as-built CCW pump suction pressure will be performed. Inspections and analyses to determine NPSH available to each pump will be performed. The analysis will consider vendor test results of required NPSH and the effects of: – pressure losses for pump inlet piping and components, – suction from the CCW surge tank with operating pressure and water level at their minimum values.	13. A report exists and concludes that the NPSH available exceeds the required NPSH.	

2.7.3.5 Essential Chilled Water System (ECWS)

2.7.3.5.1 Design Description

The ECWS is a safety-related system that provides chilled water for the safety-related HVAC systems during all plant conditions, including normal plant operations, abnormal and accident conditions.

These HVAC systems include:

- Main Control Room HVAC system
- Class 1E electrical room HVAC system
- Safeguard component area HVAC system
- Emergency feedwater pump area HVAC system
- Safety-related component area HVAC system

The ECWS consists of four independent divisions (Division A, B, C & D) with each division providing fifty percent (50%) of cooling capacity required for design basis accidents and for safe shutdown. Each division includes one essential chiller unit, one essential chilled water (ECW) pump and one ECW compression tank.

1.a The functional arrangement of the ECWS is as described in the Design Description of Subsection 2.7.3.5.1 and in Table 2.7.3.5-1, and as shown in Figure 2.7.3.5-1.

1.b Each mechanical division of the ECWS as shown in Figure 2.7.3.5-1~~(Divisions A, B, C & D)~~ is physically separated from the other divisions so as not to preclude accomplishment of the safety function. DCD_14.03-10

2.a.i The ASME Code Section III components of the ECWS, identified in Table 2.7.3.5-2, are fabricated, installed, and inspected in accordance with ASME Code Section III requirements.

2.a.ii The ASME Code Section III components of the ECWS identified in Table 2.7.3.5-2 are reconciled with the design requirements.

2.b.i The ASME Code Section III piping of the ECWS, including supports, identified in Table 2.7.3.5-3, is fabricated, installed, and inspected in accordance with ASME Code Section III requirements.

2.b.ii The ASME Code Section III piping of the ECWS, including supports, identified in Table 2.7.3.5-3 is reconciled with the design requirements.

Table 2.7.3.5-2 Essential Chilled Water System Equipment Characteristics (Sheet 1 of 3)

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Valve	Class 1E/ Qual. For Harsh Envir.	PSMS Control	Active safety Function	Loss of Motive Power Position	
Essential Chiller Units	VWS-MEQ-001 A, B, C, D	3	Yes	-	Yes/No	ECCS Actuation	Start	-	
Essential Chilled Water Pumps	VWS-MPP-001 A, B, C, D	3	Yes	-	Yes/No	ECCS Actuation	Start	-	
Essential Chilled Water Compression Tanks	VWS-MTK-001 A, B, C, D	3	Yes	-	-/-	-	None	-	
Main Control Room Air Handling Unit Chilled Water Control Valves	VWS-TMV-141, 151, 161, 171	3	Yes	Yes	Yes/~~No~~Yes	MCR High Temperature	Transfer Open	As Is	DCD_14.03-11 DCD_14.03-13
Class 1E Electrical Room Air Handling Unit Chilled Water Control Valves	VWS-TMV-206, 226, 246, 266	3	Yes	Yes	Yes/~~No~~Yes	Class 1E Electrical Room High Temperature	Transfer Open	As Is	DCD_14.03-11 DCD_14.03-13
Safeguard Component Area Air Handling Unit Chilled Water Control Valves	VWS-TMV-304, 314, 324, 334	3	Yes	Yes	Yes/~~No~~Yes	Safeguard Component Area High Temperature	Transfer Open	As Is	DCD_14.03-11 DCD_14.03-13
Emergency Feedwater Pump Area Air Handling Unit Chilled Water Control Valves	VWS-TMV-402, 412, 422, 432	3	Yes	Yes	Yes/~~No~~Yes	Emergency Feedwater Pump Area High Temperature	Transfer Open	As Is	DCD_14.03-11 DCD_14.03-13

Table 2.7.3.5-2 Essential Chilled Water System Equipment Characteristics (Sheet 2 of 3)

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Valve	Class 1E/ Qual. For Harsh Envir.	PSMS Control	Active safety Function	Loss of Motive Power Position	
Component Cooling Water Pump Area Air Handling Unit Chilled Water Control Valves	VWS-TMV-502, 512, 522, 532	3	Yes	Yes	Yes/~~No~~<u>Yes</u>	<u>Component Cooling Water Pump Area</u> High Temperature	Transfer Open	As Is	DCD_14.03-11 DCD_14.03-13
Essential Chiller Unit Area Air Handling Unit Chilled Water Control Valves	VWS-TMV-542, 552, 562, 572	3	Yes	Yes	Yes/No	<u>Essential Chiller Unit Area</u> High Temperature	Transfer Open	As Is	DCD_14.03-11
Charging Pump Area Air Handling Unit Chilled Water Control Valves	VWS-TMV-582, 592	3	Yes	Yes	Yes/~~No~~<u>Yes</u>	<u>Charging Pump Area</u> High Temperature	Transfer Open	As Is	DCD_14.03-11 DCD_14.03-13
Annulus Emergency Exhaust Filtration Unit Area Air Handling Unit Chilled Water Control Valves	VWS-TMV-602A, 602B, 612A, 612B	3	Yes	Yes	Yes/~~No~~<u>Yes</u>	<u>Annulus Emergency Exhaust Filtration Unit Area</u> High Temperature	Transfer Open	As Is	DCD_14.03-11 DCD_14.03-13

Table 2.7.3.5-2 Essential Chilled Water System Equipment Characteristics (Sheet 3 of 3)

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Valve	Class 1E/ Qual. For Harsh Envir.	PSMS Control	Active safety Function	Loss of Motive Power Position
Penetration Area Air Handling Unit Chilled Water Control Valves	VWS-TMV-622, 632, 642, 652	3	Yes	Yes	Yes/~~No~~Yes	Penetration Area High Temperature	Transfer Open	As Is
Spent Fuel Pit Pump Area Air Handling Unit Chilled Water Control Valves	VWS-TMV-662A, 662B, 672A, 672B	3	Yes	Yes	Yes/~~No~~Yes	Spent Fuel Pit Pump Area High Temperature	Transfer Open	As is
Essential chilled water pump discharge check valves	VWS-VLV-005 A, B, C, D	3	Yes	-	-/-	-	Transfer Open	-
Compression tank relief valves	VWS-SRV-253 A, B, C, D	3	Yes	-	-/-	-	Transfer Open	-
Nitrogen supply check valves	VWS-VLV-252 A, B, C, D	3	Yes	-	-/-	-	Transfer Closed	-
Makeup water supply check valves	VWS-VLV-258 A, B, C, D	3	Yes	-	-/-	-	Transfer Closed	-

DCD_14.03-11
DCD_14.03-13

DCD_14.03-11
DCD_14.03-13

NOTE:
Dash (-) indicates not applicable

Table 2.7.3.5-5 Essential Chilled Water System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 1 of 9)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1.a The functional arrangement of the ECWS is as described in the Design Description of Subsection 2.7.3.5.1 and in Table 2.7.3.5-1, and as shown in Figure 2.7.3.5-1.	1.a Inspection of the as-built ECWS will be performed.	1.a The as-built ECWS conforms to the functional arrangement as described in the Design Description of Subsection 2.7.3.5.1 and in Table 2.7.3.5-1, and as shown in Figure 2.7.3.5-1.
1.b Each mechanical division of the ECWS as shown in Figure 2.7.3.5-1~~(Divisions A, B, C & D)~~ is physically separated from the other divisions so as not to preclude accomplishment of the safety function.	1.b Inspection and analysis of the as-built ECWS will be performed.	1.b A report exists and concludes that each mechanical division of the as-built ECWS as shown in Figure 2.7.3.5-1 ~~(Divisions A, B, C & D)~~ is physically separated from ~~the~~ other mechanical divisions of the system by spatial separation, barriers or enclosures so as to assure that the functions of the safety-related system ~~is~~are maintained considering postulated dynamic effects (i.e., missile and pipe break hazard), internal flooding and fire. DCD_14.03-10 DCD_14.03-10
2.a.i The ASME Code Section III components of the ECWS, identified in Table 2.7.3.5-2, are fabricated, installed, and inspected in accordance with ASME Code Section III requirements.	2.a.i An inspection of the as-built ASME Code Section III components of the ECWS identified in Table 2.7.3.5-2 will be performed.	2.a.i The ASME Code Section III data report(s) (certified, when required by ASME Code) and inspection reports (including N-5 Data Reports where applicable) exist and conclude that the as-built ASME Code Section III components of the ECWS identified in Table 2.7.3.5-2 are fabricated, installed, and inspected in accordance with ASME Code Section III requirements.

Table 2.7.3.5-5 Essential Chilled Water System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 7 of 9)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria	
9.b After loss of motive power, the remotely operated valves, identified in Table 2.7.3.5-2, assume the indicated loss of motive power position.	9.b Tests of the as-built remotely operated valves identified in Table 2.7.3.5-2 will be performed under the conditions of loss of motive power.	9.b Upon loss of motive power, each as-built remotely operated valve identified in Table 2.7.3.5-2 assumes the indicated loss of motive power position.	
10.a Controls are provided in the MCR to start and stop the ECW pumps and essential chiller units identified in Table 2.7.3.5-4.	10.a.i Tests will be performed for MCR control capability of the ECW pumps and essential chiller units, identified in Table 2.7.3.5-4, on the as-built S-VDU.	10.a.i MCR controls for the ECW pumps and essential chiller units, identified in Table 2.7.3.5-4, on the as-built S-VDU provide the necessary output from the PSMS to start and stop the respective pumps and chiller units.	DCD_14.03-5
	10.a.ii Tests will be performed on the as-built ECW pumps and essential chiller units identified in Table 2.7.3.5-4 using controls on the as-built O-VDU in the ~~as-built~~ MCR.	10.a.ii Controls on the as-built O-VDU in the ~~as-built~~ MCR start and stop the as-built ECW pumps and essential chiller units identified in Table 2.7.3.5-4 with the MCR control function.	DCD_14.03-5 DCD_14.03-5
10.b The ECW pumps and essential chiller units identified in Table 2.7.3.5-2 as having PSMS control perform an active safety function after receiving a signal from PSMS.	10.b Tests will be performed on the as-built ECW pumps and essential chiller units identified in Table 2.7.3.5-2 using simulated signals.	10.b The as-built ECW pumps and essential chiller units identified in Table 2.7.3.5-2 as having PSMS control perform the active safety function identified in the table after receiving a simulated signal.	
11. Displays identified in Table 2.7.3.5-4 are provided in the MCR.	11. Inspections will be performed on the as-built S-VDU in the MCR for retrievability of the displays identified in Table 2.7.3.5-4~~in the as-built MCR~~.	11. Displays identified in Table 2.7.3.5-4 can be retrieved on the as-built S-VDU in the ~~as-built~~ MCR.	DCD_14.03-6

Table 2.7.3.5-5 Essential Chilled Water System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 8 of 9)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria	
12. Displays and controls identified in Table 2.7.3.5-4 are provided in the RSC.	12.i Inspection will be performed on the as-built S-VDU in the RSC for retrievability of the displays identified in Table 2.7.3.5-4in the as-built RSC.	12.i Displays identified in Table 2.7.3.5-4 can be retrieved on the as-built S-VDU in the as-built RSC.	DCD_14.03-7, 8
	12.ii Tests of the as-built RSC control functions identified in Table 2.7.3.5-4 will be performed.Tests will be performed for RSC control capability of the equipment, identified in Table 2.7.3.5-4, on the as-built S-VDU.	12.ii RSC controls for the equipment, identified in Table 2.7.3.5-4, on the as-built S-VDU provide the necessary output from the PSMS to operate the respective equipment.	DCD_14.03-7, 8
	12.iii Tests will be performed on the as-built equipment, identified in Table 2.7.3.5-4, using controls on the as-built O-VDU in the RSC.	12.iii Controls on the as-built O-VDU in the as-built RSC operate each as-built component identified in Table 2.7.3.5-4 with an RSC control function.	DCD_14.03-7, 8

Table 2.7.4.1-1 Liquid Waste Management System Inspections, Tests, Analyses, and Acceptance Criteria

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria	
1. The functional arrangement of the LWMS is as described in the Design Description of Subsection 2.7.4.1.1 and in Table 2.7.4.1-2.	1. Inspection of the as-built LWMS will be performed.	1. The as-built LWMS conforms to the functional arrangement as described in the Design Description of Subsection 2.7.4.1.1 and in Table 2.7.4.1-2.	
2. Upon receipt of a high radiation signal above the pre-determined setpoint, the LWMS discharge valves close automatically.	2. Tests of the as-built LWMS discharge valves will be performed using a simulated test signal.	2. Upon receipt of a simulated LWMS high radiation test signal, the as-built LWMS discharge valves close automatically.	
3. Deleted.	3. Deleted.	3. Deleted.	
4. Deleted.	4. Deleted.	4. Deleted.	
5. Deleted.	5.a Deleted.	5.a Deleted.	
	5.b Deleted.	5.b Deleted.	
6. LWMS filters and demineralizers identified in Table 2.7.4.1-2 ~~have~~provide the capacity to maintain radioactivity releases within regulatory limits.	6. ~~Inspections will be performed to verify the amount of filtration and ion exchange media loaded in LWMS filters and demineralizer vessels.~~Inspection and analyses will be performed of the as-built LWMS filters and demineralizers.	6. ~~The vendor specified filter and ion exchange media for LWMS filters and demineralizers identified in Table 2.7.4.1-2 is loaded in the filter housings and demineralizer vessels.~~A report exists and concludes that each as-built LWMS filter and demineralizer, identified in Table 2.7.4.1-2, provides: 1) for cartridge filters, a particle size removal capability of equal to or less than specified in the design basis 2) for activated carbon filter, a media type and volume as specified in the design basis 3) for demineralizers, a decontamination factor equal to or greater than specified in the design basis.	DCD_11.02-32
7. An alarm from the liquid radwaste discharge radiation monitor is provided in the MCR.	7. Inspection will be performed on the as-built A-VDU in the MCR for retrievability of the alarm from the liquid radwaste discharge radiation monitor~~in the as-built MCR~~.	7. An alarm from the liquid radwaste discharge radiation monitor can be retrieved on the as-built A-VDU in the ~~as-built~~ MCR.	DCD_14.03-6

Table 2.7.4.2-1 Gaseous Waste Management System Inspections, Tests, Analyses, and Acceptance Criteria

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the GWMS is as described in the Design Description of Subsection 2.7.4.2.1 and in Table 2.7.4.2-2.	1. Inspection of the as-built GWMS will be performed.	1. The as-built GWMS conforms to the functional arrangement as described in the Design Description of Subsection 2.7.4.2.1 and in Table 2.7.4.2-2.
2. Upon receipt of a high radiation signal above the pre-determined setpoint, the GWMS discharge valves close automatically.	2. Tests of the as-built GWMS discharge valves will be performed using a simulated test signal.	2. Upon receipt of a simulated GWMS high radiation test signal, the as-built GWMS discharge valves close automatically.
3. Deleted.	3. Deleted.	3. Deleted.
4. Deleted.	4.a Deleted.	4.a Deleted.
	4.b Deleted.	4.b Deleted.
5. GWMS charcoal bed columns each contain the volume needed to allow decay of short half-life isotopes to keep releases within regulatory limits.	5. Inspections will be performed to verify the contained volume of each of the charcoal beds.	5. The contained volume in each of the charcoal beds is equal to or greater than 70 ft^3/column.
6. An alarm from the gaseous radwaste discharge radiation monitor is provided in the MCR.	6. Inspection will be performed on the as-built A-VDU in the MCR for the retrievability of the alarm from the gaseous radwaste discharge monitor ~~in the as-built MCR~~.	6. An alarm from gaseous radwaste discharge radiation monitor can be retrieved on the as-built A-VDU in the ~~as-built~~ MCR.

DCD_14.03-6

2.7.5 Heating, Ventilation, and Air Conditioning (HVAC) Systems

2.7.5.1 Main Control Room HVAC System

2.7.5.1.1 Design Description

The main control room (MCR) HVAC system protects the operators against a release of radioactive material, provides protection from smoke in the outside air intakes, and provides conditioned air to the MCR and other areas within the control room envelope (CRE). The capability to purge smoke from the MCR is also provided. The MCR HVAC system is a safety-related system, except for the toilet/kitchen exhaust and smoke purge fans.

The MCR HVAC system is located within the reactor building and consists of two 100% capacity MCR emergency filtration units and four 50% capacity MCR air handling units.

1.a The functional arrangement of the MCR HVAC system is as described in the Design Description of Subsection 2.7.5.1.1 and as shown in Figure 2.7.5.1-1.

1.b Each mechanical division of the MCR ~~air handling units (Divisions A, B, C & D) and MCR emergency filtration units (Divisions A & B)~~ HVAC system as shown in Figure 2.7.5.1-1~~identified in Table 2.7.5.1-1~~ is physically separated from the other divisions so as not to preclude accomplishment of the safety function. DCD_14.03-10

2. The seismic Category I equipment, identified in Table 2.7.5.1-1, can withstand seismic design basis loads without loss of safety function.

3.a Class 1E equipment, identified in Table 2.7.5.1-1, is powered from its respective Class 1E division.

3.b Separation is provided between redundant divisions of MCR HVAC system Class 1E cables, and between Class 1E cables and non-Class 1E cables.

4.a The MCR HVAC system provides conditioned air to maintain the temperature within design limits of the CRE during normal operations, abnormal and accident conditions of the plant.

4.b The MCR HVAC system provides filter efficiencies and system airflow as required in the safety analysis.

4.c The unfiltered CRE inleakage is within the performance value as specified in the safety analysis.

5.a The remotely operated dampers identified in Table 2.7.5.1-1 as having PSMS control, perform an active safety function after receiving a signal from PSMS.

5.b After loss of motive power, the remotely operated dampers, identified in Table 2.7.5.1-1, assume the indicated loss of motive power position.

Table 2.7.5.1-1 Main Control Room HVAC System Equipment Characteristics (Sheet 1 of 3)

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Damper	Class 1E/ Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position	
Main Control Room Air Handling Units	VRS-MAH-101 A, B, C, D	–	Yes	–	–/~~No~~–	–	None	–	DCD_14.03-13
Main Control Room Air Handling Unit Fans	VRS-MFN-101 A, B, C, D	–	Yes	–	Yes/~~No~~Yes	MCR isolation	Start	–	DCD_14.03-13
Main Control Room Air Handling Unit Cooling Coils	VRS-MCL-101 A, B, C, D	–	Yes	–	–/~~No~~–	–	None	–	DCD_14.03-13
Main Control Room Air Handling Unit Electric Heating Coils	VRS-MEH-101 A, B, C, D	–	Yes	–	Yes/~~No~~Yes	MCR isolation	Energized	Deenergized	DCD_14.03-13
Main Control Room Emergency Filtration Units	VRS-MFU-111 A, B	–	Yes	–	–/~~No~~–	–	None	–	DCD_14.03-13
Main Control Room Emergency Filtration Unit Fans	VRS-MFN-111 A, B	–	Yes	–	Yes/~~No~~Yes	MCR isolation	Start	–	DCD_14.03-13
Main Control Room Emergency Filtration Unit Electric Heating Coils	VRS-MEH-111 A, B	–	Yes	–	Yes/~~No~~Yes	MCR isolation	Energized	Deenergized	DCD_14.03-13
Main Control Room Air Intake Isolation Dampers	VRS-EHD-101 A, B, 102A, B	–	Yes	Yes	Yes/No	MCR isolation	Transfer Open (pressurization mode)	Closed	
						Smoke detection	Transfer Closed (isolation mode)		

Table 2.7.5.1-1 Main Control Room HVAC System Equipment Characteristics (Sheet 2 of 3)

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Damper	Class 1E/ Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position	
Main Control Room Toilet/Kitchen Exhaust Line Isolation Dampers	VRS-AOD-121, 122	–	Yes	Yes	Yes/No	MCR isolation	Transfer Closed	Closed	
Main Control Room Smoke Purge Line Isolation Dampers	VRS-AOD-131, 132	–	Yes	Yes	Yes/No	MCR isolation	Transfer Closed	Closed	
Main Control Room Emergency Filtration Unit Air Intake Dampers	VRS-MOD-111 A, B	–	Yes	Yes	Yes/~~No~~Yes	MCR isolation	Transfer Open	As is	DCD_14.03-13
Main Control Room Emergency Filtration Unit Air Return Dampers	VRS-MOD-112 A, B	–	Yes	Yes	Yes/~~No~~Yes	MCR isolation	Transfer Open	As is	DCD_14.03-13
Main Control Room Normal Air Intake Line Isolation Dampers	VRS-AOD-103 A, B	–	Yes	Yes	Yes/No	MCR isolation	Transfer Closed	Closed	
Main Control Room Circulation Line Changeover Dampers	VRS-EHD-104 A, B, 107A, B	–	Yes	Yes	Yes/~~No~~Yes	MCR isolation	Transfer Open	Closed	DCD_14.03-13
Main Control Room Air Handling Unit Inlet Dampers	VRS-EHD-105 A, B, C, D	–	Yes	Yes	Yes/~~No~~Yes	Fan Start	Transfer Open	Closed	DCD_14.03-13
Main Control Room Air Handling Unit Outlet Dampers	VRS-EHD-106 A, B, C, D	–	Yes	Yes	Yes/~~No~~Yes	Fan Start	Transfer Open	Closed	DCD_14.03-13
Main Control Room Emergency Filtration Unit Fan Outlet Dampers	VRS-MOD-113 A, B	–	Yes	Yes	Yes/~~No~~Yes	Fan Start	Transfer Open	As is	DCD_14.03-13

Table 2.7.5.1-1 Main Control Room HVAC System Equipment Characteristics (Sheet 3 of 3)

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Damper	Class 1E/ Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position
Tornado Dampers	VRS-OTD-108A,B, -124, -133	–	Yes	–No	–/No–	–	Transfer Closed (Tornado condition) Transfer Open (after tornado condition)	–
Ductwork	–	–	Yes	–	–/No–	–	None	–
Main Control Room Temperature	VRS-TS-146, 156, 166, 176	–	Yes	–	Yes/No	–	–	–

DCD_14.03.07-78
DCD_14.03-13
DCD_14.03-13

Table 2.7.5.1-3 Main Control Room HVAC System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 1 of 8)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1.a The functional arrangement of the MCR HVAC system is as described in the Design Description of Subsection 2.7.5.1.1 and as shown in Figure 2.7.5.1-1.	1.a Inspection of the as-built MCR HVAC system will be performed.	1.a The as-built MCR HVAC system conforms to the functional arrangement as described in the Design Description of Subsection 2.7.5.1.1 and as shown in Figure 2.7.5.1-1.
1.b Each mechanical division of the MCR air handling units HVAC system (Divisions A, B, C & D) and MCR emergency filtration units (Divisions (A & B) identified in Table 2.7.5.1-1as shown in Figure 2.7.5.1-1 is physically separated from the other divisions so as not to preclude accomplishment of the safety function.	1.b Inspections and analysis of the as-built MCR air handling units and MCR emergency filtration units HVAC systemidentified in Table 2.7.5.1-1 will be performed.	1.b A report exists and concludes that each mechanical division of the as-built MCR air handling unit and the MCR emergency filtration units identified in Table 2.7.5.1-1HVAC system as shown in Figure 2.7.5.1-1 is physically separated from other mechanical divisions of the system by spatial separation, barriers or enclosures so as to assure that the functions of the safety-related system are maintained considering postulated dynamic effects (i.e., missile and pipe break hazard), internal flooding and fire..

DCD_14.03-10

DCD_14.03-10

DCD_14.03-10

Table 2.7.5.1-3 Main Control Room HVAC System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 6 of 8)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria	
5.e Controls are provided in the MCR to open and close the remotely operated dampers identified in Table 2.7.5.1-2.	5.e.i Tests will be performed for MCR control capability of the remotely operated dampers, identified in Table 2.7.5.1-2, on the as-built S-VDU.	5.e.i MCR controls for the remotely operated dampers, identified in Table 2.7.5.1-2, on the as-built S-VDU provide the necessary output from the PSMS to open and close the respective dampers.	DCD_14.03-5
	5.e.ii Tests will be performed on the as-built remotely operated dampers identified in Table 2.7.5.1-2 using controls on the as-built O-VDU in the as-built MCR.	5.e.ii Controls on the as-built O-VDU in the as-built MCR open and close the as-built remotely operated dampers identified in Table 2.7.5.1-2 with the MCR control function.	DCD_14.03-5 DCD_14.03-5
5.f The remotely operated dampers and tornado dampers, identified in Table 2.7.5.1-1 as having an active safety function, perform an active safety function to change position as indicated in the table.	5.f.i Tests of the as-built remotely operated dampers identified in Table 2.7.5.1-1 as having an active safety function will be performed under preoperational test conditions.	5.f.i Each as-built remotely operated damper identified in Table 2.7.5.1-1 as having an active safety function changes position as identified in Table 2.7.5.1-1 under preoperational test conditions.	
	5.f.ii Tests of the as-built tornado dampers identified in Table 2.7.5.1-1 will be performed under preoperational test conditions. Type tests or a combination of type tests and analysis of the tornado dampers identified in Table 2.7.5.1-1 will be performed to verify that the dampers can perform their active safety function under design tornado conditions.	5.f.ii Each as-built tornado damper changes position as identified in Table 2.7.5.1-1 under preoperational test conditions. A report exists and concludes that the tornado dampers identified in Table 2.7.5.1-1 can perform their active safety function under design tornado conditions.	DCD_14.03.07-78
	5.f.iii Inspection will be performed of the as-built tornado dampers identified in Table 2.7.5.1-1.	5.f.iii Each as-built tornado damper identified in Table 2.7.5.1-1 is bounded by the type tests or combination of type tests and analysis.	DCD_14.03.07-78

Table 2.7.5.1-3 Main Control Room HVAC System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 7 of 8)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria	
6.a Controls are provided in the MCR to start and stop the MCR HVAC system air handling units and filtration units identified in Table 2.7.5.1-2.	6.a.i Tests will be performed for MCR control capability of the MCR HVAC system air handling units and filtration units, identified in Table 2.7.5.1-2, on the as-built S-VDU.	6.a.i MCR controls for the MCR HVAC system air handling units and filtration units, identified in Table 2.7.5.1-2, on the as-built S-VDU provide the necessary output from the PSMS to start and stop the respective air handling units and filtration units.	DCD_14.03-5
	6.a.ii Tests will be performed on the as-built air handling units and filtration units identified in Table 2.7.5.1-2 using controls on the as-built O-VDU in the ~~as-built~~ MCR.	6.a.ii Controls on the as-built O-VDU in the ~~as-built~~ MCR start and stop the as-built MCR HVAC system air handling units and filtration units identified in Table 2.7.5.1-2 with the MCR control function.	DCD_14.03-5 DCD_14.03-5
6.b The MCR HVAC system air handling unit fans and emergency filtration unit fans and electric heaters, identified in Table 2.7.5.1-2, start after receiving a MCR isolation signal (emergency pressurization mode).	6.b Tests of the as-built MCR HVAC system air handling unit fans and emergency filtration unit fans and electric heaters, identified in Table 2.7.5.1-2, will be performed using a simulated signal.	6.b The as-built MCR HVAC system air handling unit fans and emergency filtration unit fans and electric heaters identified in Table 2.7.5.1-2, start after receiving a simulated MCR isolation signal (emergency pressurization mode).	
6.c The MCR HVAC system air handling unit fans identified in Table 2.7.5.1-2 start after receiving an outside air smoke detection signal to initiate CRE emergency isolation mode.	6.c Tests of the as-built MCR HVAC system air handling unit fans identified in Table 2.7.5.1-2 will be performed using a simulated signal.	6.c The as-built MCR HVAC system air handling unit fans identified in Table 2.7.5.1-2 start after receiving a simulated outside air smoke detection signal to initiate CRE emergency isolation mode.	
7. Alarms and displays identified in Table 2.7.5.1-2 are provided in the MCR.	7. Inspection will be performed on the as-built A-VDU and on the as-built S-VDU in the MCR for retrievability of the alarms and displays respectively, as identified in Table 2.7.5.1-2 ~~in the as-built MCR~~.	7. Alarms and displays, identified in Table 2.7.5.1-2, can be retrieved on the as-built A-VDU and on the as-built S-VDU respectively in the ~~as-built~~ MCR.	DCD_14.03-6

Table 2.7.5.1-3 Main Control Room HVAC System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 8 of 8)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria	
8. Alarms, displays and controls identified in Table 2.7.5.1-2 are provided in the RSC.	8.i Inspection will be performed on the as-built O-VDU and on the as-built S-VDU in the RSC for retrievability of the alarms and displays respectively, as identified in Table 2.7.5.1-2 ~~in the as-built RSC~~.	8.i Alarms and displays, identified in Table 2.7.5.1-2~~.~~, can be retrieved on the as-built O-VDU and on the as-built S-VDU respectively in the ~~as-built~~ RSC.	DCD_14.03-7, 8
	8.ii ~~Tests of the as-built RSC control functions identified in Table 2.7.5.1-2 will be performed.~~ Tests will be performed for RSC control capability of equipment, identified in Table 2.7.5.1-2, on the as-built S-VDU.	8.ii RSC controls for equipment, identified in Table 2.7.5.1-2, on the as-built S-VDU provide the necessary output from the PSMS to operate the respective equipment.	DCD_14.03-7, 8
	8.iii Tests will be performed on the as-built equipment, identified in Table 2.7.5.1-2, using controls on the as-built O-VDU in the RSC.	8.iii Controls on the as-built O-VDU in the ~~as-built~~ RSC operate each as-built equipment identified in Table 2.7.5.1-2 with an RSC control function.	DCD_14.03-7, 8

2.7.5.2.1.4 Emergency Feedwater Pump Area HVAC System

The emergency feedwater pump area HVAC system is a safety-related system that provides conditioned air to each emergency feedwater pump area.

The emergency feedwater pump area HVAC system is located within the reactor building. As shown in Figure 2.7.5.2-4, each division of the emergency feedwater pump area room HVAC system includes one 100% capacity air handling unit.

2.7.5.2.1.5 Safety Related Component Area HVAC System

The safety related component area HVAC system is a safety-related system that provides conditioned air to each area of the safety-related component areas listed below.

- Component cooling water pump area
- Essential chiller unit area
- Charging pump area
- Annulus emergency exhaust filtration unit area
- Penetration area
- Spent fuel pit pump area

The safety related component area HVAC system is located within the reactor building and power source buildings. As shown in Figure 2.7.5.2-5, each division of the safety related component area HVAC system includes one 100% capacity air handling unit.

1.a The functional arrangement of the ESFVS is as described in the Design Description of Subsection 2.7.5.2.1 and as shown in Figures 2.7.5.2-1 through 2.7.5.2-5.

1.b Each mechanical division of the annulus emergency exhaust system ~~filtration units~~ as shown in Figure 2.7.5.2-1 is physically separated from the other divisions ~~of the annulus emergency exhaust system~~ so as not to preclude accomplishment of the safety function. DCD_14.03-10

1.c Each mechanical division of the Class 1E electrical room HVAC system as shown in Figure 2.7.5.2-2 ~~air handling units, Class 1E electrical room return air fans and Class 1E battery room exhaust fans~~ is physically separated from the other divisions ~~of the Class 1E electrical room HVAC system~~, with the exception of its connections to intake and discharge common air volumes, so as not to preclude accomplishment of the safety function.

1.d Each mechanical division of the safeguard component area ~~air handling units~~HVAC system as shown in Figure 2.7.5.2-3 is physically separated from the other divisions ~~of the safeguard component area HVAC system~~ so as not to preclude accomplishment of the safety function. DCD_14.03-10

1.e Each mechanical division of the emergency feedwater pump area HVAC system as shown in Figure 2.7.5.2-4~~air handling units~~ is physically separated from the other divisions ~~of the emergency feedwater pump area HVAC system~~ so as not to preclude accomplishment of the safety function. DCD_14.03-10

1.f Each mechanical division of the safety-related component area HVAC system as shown in Figure 2.7.5.2-5~~air handling units~~ is physically separated from the other divisions ~~of the safety-related component area HVAC system~~ so as not to preclude accomplishment of the safety function. DCD_14.03-10

2. The seismic Category I equipment, identified in Table 2.7.5.2-1, can withstand seismic design basis loads without loss of safety function.

3.a Class 1E equipment, identified in Table 2.7.5.2-1, is powered from its respective Class 1E division.

3.b Separation is provided between redundant divisions of ESFVS Class 1E cables, and between Class 1E cables and non-Class 1E cables.

4.a The annulus emergency exhaust system provides filter efficiency and negative pressure used in the safety analysis.

4.b The Class 1E electrical room HVAC system provides conditioned air to maintain area temperature within design limits in rooms described in Section 2.7.5.2.1.2 during normal operations, abnormal and accident conditions of the plant.

4.c The Class 1E electrical room HVAC system provides battery room ventilation to maintain hydrogen concentration within the design limit during normal operations, abnormal and accident conditions of the plant.

4.d The safeguard component area HVAC system provides conditioned air to maintain area temperature within design limits in the safeguard component areas when the respective equipment is operating during abnormal and accident conditions of the plant.

4.e The emergency feedwater pump area HVAC system provides conditioned air to maintain area temperature within design limits in the emergency feedwater pump areas when the respective equipment is operating during abnormal and accident conditions of the plant.

4.f The safety-related component area HVAC system provides conditioned air to maintain area temperature within design limits in each individual safety-related component area, when the respective equipment is operating during abnormal and accident conditions of the plant.

5.a The remotely operated dampers, identified in Table 2.7.5.2-1 as having PSMS control, perform an active safety function after receiving a signal from PSMS.

5.b After loss of motive power, the remotely operated dampers, identified in Table 2.7.5.2-1, assume the indicated loss of motive power position.

Table 2.7.5.2-1 Engineered Safety Features Ventilation System Equipment Characteristics (Sheet 1 of 10)

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Demper	Class 1E/ Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position	
Annulus Emergency Exhaust System									
Annulus Emergency Exhaust Filtration Units	VRS-MFU-001 A, B	—	Yes	—	—/~~No~~—	—	None	—	DCD_14.03-13
Annulus Emergency Exhaust Filtration Unit Fans	VRS-MFN-001 A, B	—	Yes	—	Yes/~~No~~Yes	ECCS Actuation	Start	—	DCD_14.03-13
Penetration Area Exhaust Dampers	VRS-EHD-001 A, B	—	Yes	Yes	Yes/~~No~~Yes	Fan Start	Transfer Open	Closed	DCD_14.03-13
Safeguard Component Area Exhaust Dampers	VRS-EHD-002 A, B	—	Yes	Yes	Yes/~~No~~Yes	Fan Start	Transfer Open	Closed	DCD_14.03-13
Annulus Emergency Exhaust Filtration Unit Outlet Dampers	VRS-EHD-003 A, B	—	Yes	Yes	Yes/~~No~~Yes	Fan Start	Transfer Open	Closed	DCD_14.03-13
Tornado Damper	VRS-OTD-004 A, B	—	Yes	~~—~~No	—/~~No~~—	—	Transfer Closed (Tornado condition) Transfer Open (after tornado condition)	–	DCD_14.03.07-81 DCD_14.03-13
Ductwork	—	—	Yes	—	—/~~No~~—	—	None	–	DCD_14.03-13

Table 2.7.5.2-1 Engineered Safety Features Ventilation System Equipment Characteristics (Sheet 2 of 10)

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Damper	Class 1E/ Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position	
Class 1E Electrical Room HVAC System									
Class 1E Electrical Room Air Handling Units	VRS-MAH-201 A, B, C, D	—	Yes	—	—/~~No~~—	—	None	—	DCD_14.03-13
Class 1E Electrical Room Air Handling Unit Fans	VRS-MFN-201 A, B, C, D	—	Yes	—	Yes/~~No~~Yes	ECCS Actuation	Start	—	DCD_14.03-13
Class 1E Electrical Room Air Handling Unit Cooling Coils	VRS-MCL-201 A,B,C,D	—	Yes	—	—/~~No~~—	—	None	—	DCD_14.03-13
Class 1E Electrical Room Air Handling Unit Electric Heating Coils	VRS-MEH-201 A,B,C,D	—	Yes	—	Yes/~~No~~Yes	ECCS Actuation	Energized	Deenergized	DCD_14.03-13
Class 1E Electrical Room Return Air Fans	VRS-MFN-202 A, B, C, D	—	Yes	—	Yes/~~No~~Yes	ECCS Actuation	Start	—	DCD_14.03-13
Class 1E Battery Room Exhaust Fans	VRS-MFN-251 A,B,C,D	—	Yes	—	Yes/No	ECCS Actuation	Start	—	
Class 1E Electrical Room Outside Air Intake Isolation Dampers	VRS-EHD-201 A,B,C,D	—	Yes	Yes	Yes/~~No~~Yes	ECCS Actuation	Transfer Open	Closed	DCD_14.03-13

Table 2.7.5.2-1 Engineered Safety Features Ventilation System Equipment Characteristics (Sheet 3 of 10)

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Damper	Class 1E/ Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position	
Class 1E Electrical Room Air Handling Unit Outlet Dampers	VRS-EHD-202 A,B,C,D	—	Yes	Yes	Yes/~~No~~Yes	Fan Start	Transfer Open	Closed	DCD_14.03-13
Class 1E Electrical Room Return Air Fan Inlet Dampers	VRS-EHD-203 A,B,C,D	—	Yes	Yes	Yes/~~No~~Yes	Fan Start	Transfer Open	Closed	DCD_14.03-13
Class 1E Electrical Room Air Handling Unit Inlet Dampers	VRS-EHD-204 A,B,C,D	—	Yes	Yes	Yes/~~No~~Yes	ECCS Actuation	Transfer Open	Closed	DCD_14.03-13
Class 1E Electrical Room Exhaust Line Isolation Dampers	VRS-AOD-205 A,B,C,D	—	Yes	Yes	Yes/No	ECCS Actuation	Transfer Closed	Closed	
Class 1E Battery Room Exhaust Fan Inlet Dampers	VRS-EHD-251 A,B,C,D	—	Yes	Yes	Yes/No	Fan Start	Transfer Open	Closed	
Class 1E Battery Room Exhaust Fan Outlet Dampers	VRS-EHD-252 A,B,C,D	—	Yes	Yes	Yes/No	Fan Start	Transfer Open	Closed	
Tornado Dampers	VRS-OTD-206 A,B,C,D VRS-OTD-207A,B,C,D VRS-OTD-253 A,B,C,D	—	Yes	~~—~~No	—/~~No~~—	—	Transfer Closed (Tornado condition) Transfer Open (after tornado condition)	—	DCD_14.03.07-81 DCD_14.03-13
Ductwork	—	—	Yes	—	—/~~No~~—	—	None	—	DCD_14.03-13
Class 1E Electrical Room Temperature	VRS-TS-210, 230, 250, 270	—	Yes	—	Yes/No	—	—	—	

Table 2.7.5.2-1 Engineered Safety Features Ventilation System Equipment Characteristics (Sheet 4 of 10)

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Damper	Class 1E/ Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position	
Safeguard Component Area HVAC System									
Safeguard Component Area Air Handling Units	VRS-MAH-301 A, B, C, D	—	Yes	—	—/~~No~~-	—	None	—	DCD_14.03-13
Safeguard Component Area Air Handling Unit Fans	VRS-MFN-301 A, B, C, D	—	Yes	—	Yes/~~No~~Yes	High Temperature	Start	—	DCD_14.03-13
Safeguard Component Area Air Handling Unit Cooling Coils	VRS-MCL-301 A, B, C, D	—	Yes	—	—/~~No~~—	—	None	—	DCD_14.03-13
Safeguard Component Area Air Handling Unit Electric Heating Coils	VRS-MEH-301 A, B, C, D	—	Yes	—	Yes/~~No~~Yes	Remote Manual	Energized	Deenergized	DCD_14.03-13
Safeguard Component Area Air Handling Unit Inlet Dampers	VRS-MOD-301 A, B, C, D	—	Yes	Yes	Yes/~~No~~Yes	Fan Start	Transfer Open	As is	DCD_14.03-13
Safeguard Component Area Air Handling Unit Outlet Dampers	VRS-MOD-302 A, B, C, D	—	Yes	Yes	Yes/~~No~~Yes	Fan Start	Transfer Open	As is	DCD_14.03-13
Ductwork	—	—	Yes	—	—/~~No~~—	—	None	—	DCD_14.03-13
Safeguard Component Area Temperature	VRS-TS-305, 306, 307, 315, 316, 317, 325,326, 327, 335, 336, 337	—	Yes	—	Yes/~~No~~Yes	—	—	—	DCD_14.03-13

Table 2.7.5.2-1 Engineered Safety Features Ventilation System Equipment Characteristics (Sheet 5 of 10)

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Damper	Class 1E/ Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position	
Emergency Feedwater Pump Area HVAC System									
Emergency Feedwater Pump Area Air Handling Units	VRS-MAH-401 A, B, C, D	—	Yes	—	—/~~No~~—	—	None	—	DCD_14.03-13
Emergency Feedwater Pump Area Air Handling Unit Fans	VRS-MFN-401 A, B, C, D	—	Yes	—	Yes/~~No~~Yes	High Temperature	Start	—	DCD_14.03-13
Emergency Feedwater Pump Area Air Handling Unit Cooling Coils	VRS-MCL-401 A, B, C, D	—	Yes	—	—/~~No~~—	—	None	—	DCD_14.03-13
Emergency Feedwater Pump Area Air Handling Unit Electric Heating Coils	VRS-MEH-401 A, B, C, D	—	Yes	—	Yes/~~No~~Yes	Remote Manual	Energized	Deneregized	DCD_14.03-13
Tornado Damper	VRS-OTD-403A,D, -404A,D	—	Yes	~~—~~No	—/~~No~~—	—	Transfer Closed (Tornado condition) Transfer Open (after tornado condition)	—	DCD_14.03.07-81 DCD_14.03-13
Ductwork	—	—	Yes	—	—/~~No~~—	—	None	—	DCD_14.03-13
Emergency Feedwater Pump Area Temperature	VRS-TS-401, 405, 406, 411, 415, 416, 421, 425, 426, 431, 435, 436	—	Yes	—	Yes/~~No~~Yes	—	—	—	DCD_14.03-13

Table 2.7.5.2-1 Engineered Safety Features Ventilation System Equipment Characteristics (Sheet 6 of 10)

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Damper	Class 1E/ Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position	
Safety Related Component Area HVAC System									
Component Cooling Water Pump Area Air Handling Units	VRS-MAH-501 A, B, C, D	—	Yes	—	—/~~No~~—	—	None	—	DCD_14.03-13
Component Cooling Water Pump Area Air Handling Unit Fans	VRS-MFN-501 A, B, C, D	—	Yes	—	Yes/~~No~~Yes	High Temperature	Start	—	DCD_14.03-13
Component Cooling Water Pump Area Air Handling Unit Cooling Coils	VRS-MCL-501 A, B, C, D	—	Yes	—	—/~~No~~—	—	None	—	DCD_14.03-13
Component Cooling Water Pump Area Air Handling Unit Electric Heating Coils	VRS-MEH-501 A, B, C, D	—	Yes	—	Yes/~~No~~Yes	Remote Manual	Energized	Deenergized	DCD_14.03-13
Essential Chiller Unit Area Air Handling Units	VRS-MAH-511 A, B, C, D	—	Yes	—	—/~~No~~—	—	None	—	DCD_14.03-13
Essential Chiller Unit Area Air Handling Unit Fans	VRS-MFN-511 A, B, C, D	—	Yes	—	Yes/No	High Temperature	Start	—	

Table 2.7.5.2-1 Engineered Safety Features Ventilation System Equipment Characteristics (Sheet 7 of 10)

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Damper	Class 1E/ Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position	
Essential Chiller Unit Area Air Handling Unit Cooling Coils	VRS-MCL-511 A, B, C, D	—	Yes	—	—/~~No~~—	—	None	—	DCD_14.03-13
Essential Chiller Unit Area Air Handling Unit Electric Heating Coils	VRS-MEH-511 A, B, C, D	—	Yes	—	Yes/No	Remote Manual	Energized	Deenergized	
Charging Pump Area Air Handling Units	VRS-MAH-531 A, B	—	Yes	—	—/~~No~~—	—	None	—	DCD_14.03-13
Charging Pump Area Air Handling Unit Fans	VRS-MFN-531 A, B	—	Yes	—	Yes/~~No~~Yes	High Temperature	Start	—	DCD_14.03-13
Charging Pump Area Air Handling Unit Cooling Coils	VRS-MCL-531 A, B	—	Yes	—	—/~~No~~—	—	None	—	DCD_14.03-13
Charging Pump Area Air Handling Unit Electric Heating Coils	VRS-MEH-531 A, B	—	Yes	—	Yes/~~No~~Yes	Remote Manual	Energized	Deenergized	DCD_14.03-13
Annulus Emergency Exhaust Filtration Unit Area Air Handling Units	VRS-MAH-541 A, B	—	Yes	—	—/~~No~~—	—	None	—	DCD_14.03-13

Table 2.7.5.2-1 Engineered Safety Features Ventilation System Equipment Characteristics (Sheet 8 of 10)

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Damper	Class 1E/ Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position	
Annulus Emergency Exhaust Filtration Unit Area Air Handling Unit Fans	VRS-MFN-541 A, B	—	Yes	—	Yes/~~No~~Yes	High Temperature	Start	—	DCD_14.03-13
Annulus Emergency Exhaust Filtration Unit Area Air Handling Unit Cooling Coils	VRS-MCL-541 A, B, C, D	—	Yes	—	—/~~No~~—	—	None	—	DCD_14.03-13
Annulus Emergency Exhaust Filtration Unit Area Air Handling Unit Electric Heating Coils	VRS-MEH-541 A, B~~, C, D~~	—	Yes	—	Yes/~~No~~Yes	Remote Manual	Energized	Deenergized	DCD_14.03-13
Penetration Area Air Handling Units	VRS-MAH-551 A, B, C, D	—	Yes	—	—/~~No~~—	—	None	—	DCD_14.03-13
Penetration Area Air Handling Unit Fans	VRS-MFN-551 A, B, C, D	—	Yes	—	Yes/~~No~~Yes	High Temperature	Start	—	DCD_14.03-13
Penetration Area Air Handling Unit Cooling Coils	VRS-MCL-551 A, B, C, D	—	Yes	—	—/~~No~~—	—	None	—	DCD_14.03-13

Table 2.7.5.2-1 Engineered Safety Features Ventilation System Equipment Characteristics (Sheet 9 of 10)

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Damper	Class 1E/ Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position	
Penetration Area Air Handling Unit Electric Heating Coils	VRS-MEH-551 A,B,C,D	—	Yes	—	Yes/~~No~~Yes	Remote Manual	Energized	Deenergized	DCD_14.03-13
Spent Fuel Pit Pump Area Air Handling Units	VRS-MAH-561 A, B	—	Yes	—	—/~~No~~—	—	None	—	DCD_14.03-13
Spent Fuel Pit Pump Area Air Handling Unit Fans	VRS-MFN-561 A, B	—	Yes	—	Yes/~~No~~Yes	High Temperature	Start	—	DCD_14.03-13
Spent Fuel Pit Pump Area Air Handling Unit Cooling Coils	VRS-MCL-561 A, B	—	Yes	—	—/~~No~~—	—	None	—	DCD_14.03-13
Spent Fuel Pit Pump Area Air Handling Unit Electric Heating Coils	VRS-MEH-561 A,B,C,D	—	Yes	—	Yes/~~No~~Yes	Remote Manual	Energized	Deenergized	DCD_14.03-13
Ductwork	—	—	Yes	—	—/~~No~~—	—	None	—	DCD_14.03-13
Component Cooling Water Pump Area Temperature	VRS-TS-501, 504, 505, 511, 514, 515, 521, 524, 525, 531, 534, 535	—	Yes	—	Yes/~~No~~Yes	—	—	—	DCD_14.03-13

Table 2.7.5.2-1 Engineered Safety Features Ventilation System Equipment Characteristics (Sheet 10 of 10)

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Damper	Class 1E/ Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position	
Essential Chiller Unit Area Temperature	VRS-TS-541, 544, 545, 551, 554, 555, 561, 564, 565, 571, 574, 575	—	Yes	—	Yes/No	—	—	—	
Charging Pump Area Temperature	VRS-TS-581, 584, 585, 591, 594, 595	—	Yes	—	Yes/~~No~~Yes	—	—	—	DCD_14.03-13
Annulus Emergency Exhaust Filtration Unit Area Temperature	VRS-TS-601, 604, 605, 611, 614, 615	—	Yes	—	Yes/~~No~~Yes	—	—	—	DCD_14.03-13
Penetration Area Temperature	VRS-TS-621, 624, 625, 631, 634, 635, 641, 644, 645, 651, 654, 655	—	Yes	—	Yes/~~No~~Yes	—	—	—	DCD_14.03-13
Spent Fuel Pit Pump Area Temperature	VRS-TS-661, 664, 665, 671, 674, 675	—	Yes	—	Yes/~~No~~Yes	—	—	—	DCD_14.03-13

NOTE:
Dash (-) indicates not applicable

Table 2.7.5.2-3 Engineered Safety Features Ventilation System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 1 of 11)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria	
1.a The functional arrangement of the ESFVS is as described in the Design Description of Subsection 2.7.5.2.1 and as shown in Figures 2.7.5.2-1 through 2.7.5.2-5.	1.a Inspection of the as-built ESFVS will be performed.	1.a The as-built ESFVS conforms to the functional arrangement as described in the Design Description of Subsection 2.7.5.2.1 and as shown in Figures 2.7.5.2-1 through 2.7.5.2-5.	
1.b Each mechanical division of the annulus emergency exhaust system ~~filtration units~~as shown in Figure 2.7.5.2-1 is physically separated from the other divisions ~~of the annulus emergency exhaust system~~ so as not to preclude accomplishment of the safety function.	1.b Inspections and analysis of the as-built annulus emergency exhaust system will be performed.	1.b A report exists and concludes that each mechanical division of the as-built annulus emergency ~~filtration units~~exhaust system as shown in Figure 2.7.5.2-1 is physically separated from other mechanical divisions of the system by spatial separation, barriers, or enclosures so as to assure that the functions of the safety-related systems are maintained considering postulated dynamic effects (i.e., missile and pipe break hazard), internal flooding and fire.	DCD_14.03-10 DCD_14.03-10
1.c Each mechanical division of the Class 1E electrical room HVAC system as shown in Figure 2.7.5.2-2~~air handling units, Class 1E electrical room return air fans and Class 1E battery room exhaust fans~~ is physically separated from the other divisions~~of the Class 1 E electrical room HVAC system~~, with the exception of its connections to intake and discharge common air volumes, so as not to preclude accomplishment of the safety function.	1.c Inspections and analysis of the as-built Class 1E electrical room HVAC system will be performed.	1.c A report exists and concludes that each mechanical division of the as-built Class 1E electrical room HVAC system as shown in Figure 2.7.5.2-2~~air handling units, Class 1E electrical room return air fans and Class 1E battery room exhaust fans~~ is physically separated from other mechanical divisions of the system by spatial separation, barriers, or enclosures, with the exception of its connections to intake and discharge common air volumes, so as to assure that the functions of the safety-related systems are maintained considering postulated dynamic effects (i.e., missile and pipe break hazard), internal flooding and fire.	DCD_14.03-10 DCD_14.03-10

Table 2.7.5.2-3 Engineered Safety Features Ventilation System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 2 of 11)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1.d Each mechanical division of the safeguard component area HVAC system as shown in Figure 2.7.5.2-3air handling units is physically separated from the other divisions of the safeguard component area HVAC system so as not to preclude accomplishment of the safety function.	1.d Inspections and analysis of the as-built safeguard component area HVAC system will be performed.	1.d A report exists and concludes that each mechanical division of the as-built safeguard component area HVAC system as shown in Figure 2.7.5.2-3air handling units is physically separated from other mechanical divisions of the system by spatial separation, barriers, or enclosures so as to assure that the functions of the safety-related systems are maintained considering postulated dynamic effects (i.e., missile and pipe break hazard), internal flooding and fire.

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Table 2.7.5.2-3 Engineered Safety Features Ventilation System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 3 of 11)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1.e Each mechanical division of the emergency feedwater pump area HVAC system as shown in Figure 2.7.5.2-4air handling units is physically separated from the other divisions of the emergency feedwater pump area HVAC system so as not to preclude accomplishment of the safety function.	1.e Inspections and analysis of the as-built emergency feedwater pump area HVAC system will be performed.	1.e A report exists and concludes that each mechanical division of the as-built emergency feedwater pump area HVAC system as shown in Figure 2.7.5.2-4air handling units is physically separated from other mechanical divisions of the system by spatial separation, barriers, or enclosures so as to assure that the functions of the safety-related systems are maintained considering postulated dynamic effects (i.e., missile and pipe break hazard), internal flooding and fire. DCD_14.03-10 DCD_14.03-10
1.f Each mechanical division of the safety-related component area HVAC system as shown in Figure 2.7.5.2-5 air handling units is physically separated from the other divisions of the safety-related component area HVAC system so as not to preclude accomplishment of the safety function.	1.f Inspections and analysis of the as-built safety-related component area HVAC system will be performed.	1.f A report exists and concludes that each mechanical division of the as-built safety-related component area HVAC system as shown in Figure 2.7.5.2-5 air handling units is physically separated from other mechanical divisions of the system by spatial separation, barriers, or enclosures so as to assure that the functions of the safety-related systems are maintained considering postulated dynamic effects (i.e., missile and pipe break hazard), internal flooding and fire. DCD_14.03-10 DCD_14.03-10
2. The seismic Category I equipment, identified in Table 2.7.5.2-1, can withstand seismic design basis loads without loss of safety function.	2.i Inspections will be performed to verify that the as-built seismic Category I equipment identified in Table 2.7.5.2-1 is located in a seismic Category I structure.	2.i The as-built seismic Category I equipment identified in Table 2.7.5.2-1 is located in a seismic Category I structure.

Table 2.7.5.2-3 Engineered Safety Features Ventilation System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 8 of 11)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
5.d Controls are provided in the MCR to open and close the remotely operated dampers identified in Table 2.7.5.2-2.	5.d.i Tests will be performed for MCR control capability of the remotely operated dampers, identified in Table 2.7.5.2-2, on the as-built S-VDU.	5.d.i MCR controls for the remotely operated dampers, identified in Table 2.7.5.2-2, on the as-built S-VDU provide the necessary output from the PSMS to open and close the respective dampers.
	5.d.ii Tests will be performed on the as-built remotely operated dampers identified in Table 2.7.5.2-2 using controls on the as-built O-VDU in the ~~as-built~~ MCR.	5.d.ii Controls on the as-built O-VDU in the ~~as-built~~ MCR open and close the as-built remotely operated dampers identified in Table 2.7.5.2-2 with the MCR control function.

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DCD_14.03-5

Table 2.7.5.2-3 Engineered Safety Features Ventilation System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 10 of 11)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
6.a Controls are provided in the MCR to start and stop the ESFVS air handling units and filtration units identified in Table 2.7.5.2-2.	6.a.i Tests will be performed for MCR control capability of the ESFVS air handling units and filtration units, identified in Table 2.7.5.2-2, on the as-built S-VDU.	6.a.i MCR controls for the ESFVS air handling units and filtration units, identified in Table 2.7.5.2-2, on the as-built S-VDU provide the necessary output from the PSMS to start and stop the respective air handling units and filtration units.
	6.a.ii Tests will be performed on the as-built air handling units and filtration units identified in Table 2.7.5.2-2 using controls on the as-built O-VDU in the ~~as-built~~ MCR.	6.a.ii Controls on the as-built O-VDU in the ~~as-built~~ MCR start and stop the as-built air handling units and filtration units identified in Table 2.7.5.2-2 with the MCR control function.
6.b The annulus emergency exhaust filtration unit fans identified in Table 2.7.5.2-1 start and the isolation dampers identified in Table 2.7.5.4-1 perform an active safety function to close upon receipt of an ECCS actuation signal.	6.b Tests of the as-built annulus emergency exhaust filtration unit fans identified in Table 2.7.5.2-1 and isolation damper identified in Table 2.7.5.4-1 will be performed using a simulated signal.	6.b The as-built annulus emergency exhaust filtration unit fans identified in Table 2.7.5.2-1 start and each of the as-built isolation dampers identified in Table 2.7.5.4-1 close upon receipt of a simulated ECCS actuation signal.

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DCD_14.03-5

DCD_14.03-5

Table 2.7.5.2-3 Engineered Safety Features Ventilation System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 11 of 11)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria	
6.c The Class 1E electrical room HVAC system air handling unit fans identified in Table 2.7.5.2-1 start after receiving an ECCS actuation signal.	6.c Tests of the as-built Class 1E electrical room HVAC system air handling unit fans identified in Table 2.7.5.2-1 will be performed using a simulated signal.	6.c The as-built Class 1E electrical room HVAC system air handling unit fans identified in Table 2.7.5.2-1 start after receiving a simulated ECCS actuation signal.	
6.d The safeguard component area HVAC system, emergency feedwater pump area HVAC system, and the safety related component area HVAC system air handling unit fans identified in Table 2.7.5.2-1 start after receiving a high temperature signal.	6.d Tests of the as-built safeguard component area HVAC system, emergency feedwater pump area HVAC system, and the safety related component area HVAC system air handling unit fans identified in Table 2.7.5.2-1 will be performed using a simulated signal.	6.d The as-built safeguard component area HVAC system, emergency feedwater pump area HVAC system, and the safety related component area HVAC system air handling unit fans identified in Table 2.7.5.2-1 start after receiving a simulated high temperature signal.	
7. Alarms and displays identified in Table 2.7.5.2-2 are provided in the MCR.	7. Inspection will be performed on the as-built A-VDU and on the as-built S-VDU in the MCR for retrievability of the alarms and displays respectively, as identified in Table 2.7.5.2-2 ~~in the as-built MCR~~.	7. Alarms and displays, identified in Table 2.7.5.2-2, can be retrieved on the as-built A-VDU and on the as-built S-VDU respectively in the ~~as-built~~ MCR.	DCD_14.03-6
8. Alarms, displays and controls identified in Table 2.7.5.2-2 are provided in the RSC.	8.i Inspection will be performed on the as-built O-VDU and on the as-built S-VDU in the RSC for retrievability of the alarms and displays respectively, as identified in Table 2.7.5.2-2 ~~in the as-built RSC~~.	8.i Alarms~~,~~ and displays, identified in Table 2.7.5.2-2, can be retrieved on the as-built O-VDU and on the as-built S-VDU respectively in the ~~as-built~~ RSC.	DCD_14.03-7, 8
	8.ii ~~Tests of the as-built RSC control functions identified in Table 2.7.5.2-2 will be performed.~~ Tests will be performed for RSC control capability of equipment, identified in Table 2.7.5.2-2, on the as-built S-VDU.	8.ii RSC controls for equipment, identified in Table 2.7.5.2-2, on the as-built S-VDU provide the necessary output from the PSMS to operate the respective equipment.	DCD_14.03-7, 8
	8.iii Tests will be performed on the as-built equipment, identified in Table 2.7.5.2-2, using controls on the as-built O-VDU in the RSC.	8.iii Controls on the as-built O-VDU in the ~~as-built~~ RSC operate the as-built equipment identified in Table 2.7.5.2-2 with an RSC control function.	DCD_14.03-7, 8

Table 2.7.5.4-1 Auxiliary Building Ventilation System Equipment Characteristics

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Damper	Class 1E/ Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position
Auxiliary Building HVAC System								
Penetration Area Supply Line Isolation Dampers	VAS-AOD-501 A, B, 502 A, B	—	Yes	Yes	Yes/No(1)	ECCS Actuation	Transfer Closed	Closed
Penetration Area Exhaust Line Isolation Dampers	VAS-AOD-503 A, B, 504 A, B	—	Yes	Yes	Yes/No(2)	ECCS Actuation	Transfer Closed	Closed
Safeguard Component Area Supply Line Isolation Dampers	VAS-AOD-505 A, B, C, D, 506 A, B, C, D	—	Yes	Yes	Yes/No(3)	ECCS Actuation	Transfer Closed	Closed
Safeguard Component Area Exhaust Line Isolation Dampers	VAS-AOD-507 A, B, C, D, 508 A, B, C, D	—	Yes	Yes	Yes/No(4)	ECCS Actuation	Transfer Closed	Closed
Auxiliary Building HVAC System Exhaust Line Isolation Dampers	VAS-AOD-511, 512	—	Yes	Yes	Yes/~~No~~Yes	ECCS Actuation	Transfer Closed	Closed

Note:
(1)VAS-AOD-502A,B : Yes
(2)VAS-AOD-503A,B: Yes
(3)VAS-AOD-506A,B,C,D: Yes
(4)VAS-AOD-507A,B,C,D: Yes

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Table 2.7.5.4-3 Auxiliary Building Ventilation System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 2 of 5)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
3.b. Separation is provided between redundant divisions of ABVS Class 1E cables, and between Class 1E cables and non-Class 1E cables.	3.b Inspections of the as-built Class 1E divisional cables will be performed.	3.b Physical separation or electrical isolation is provided in accordance with RG 1.75 between the as-built cables of redundant ABVS Class 1E divisions and between Class 1E cables and non-Class 1E cables.
4.a The remotely operated dampers identified in Table 2.7.5.4-1 as having PSMS control, perform an active safety function after receiving a signal from PSMS.	4.a Tests will be performed of the as-built remotely operated dampers identified in Table 2.7.5.4-1 as having PSMS control using a simulated signal.	4.a Each as-built remotely operated damper identified in Table 2.7.5.4-1 as having PSMS control, performs the active safety function identified in the Table 2.7.5.4-1 after receiving a simulated signal.
4.b After loss of motive power, the remotely operated dampers identified in Table 2.7.5.4-1, assume the loss of motive power position.	4.b Tests of the as-built remotely operated dampers identified in Table 2.7.5.4-1 will be performed under the conditions of loss of motive power.	4.b Upon loss of motive power, each as-built remotely operated damper identified in Table 2.7.5.4-1 assumes the indicated loss of motive power position.
4.c The fire dampers in the ductwork of the ABVS that penetrates the fire barriers that are required to protect safe shutdown capability close under design air flow conditions.	4.c Type tests, tests, a combination of type tests and analyses, or a combination of tests and analyses of the as-built fire dampers will be performed under the design air flow conditions or conditions which bound the design air flow conditions.	4.c A report exists and concludes that the fire dampers in the ductwork of the ABVS that penetrates the fire barriers that are required to protect safe shutdown capability close under the design air flow conditions or the conditions which bound the design air flow conditions.
5. Controls are provided in the MCR to open and close the remotely operated dampers identified in Table 2.7.5.4-2.	5.i Tests will be performed for MCR control capability of the remotely operated dampers, identified in Table 2.7.5.4-2, on the as-built S-VDU.	5.i MCR controls for the remotely operated dampers, identified in Table 2.7.5.4-2, on the as-built S-VDU provide the necessary output from the PSMS to open and close the respective dampers. DCD_14.03-5
	5.ii Tests will be performed on the as-built remotely operated dampers identified in Table 2.7.5.4-2 using controls on the as-built O-VDU in the ~~as-built~~ MCR.	5.ii Controls on the as-built O-VDU exist in the ~~as-built~~ MCR to open and close the as-built remotely operated dampers identified in Table 2.7.5.4-2 with the MCR control function. DCD_14.03-5 DCD_14.03-5

Table 2.7.5.4-3 Auxiliary Building Ventilation System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 3 of 5)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
6. Displays identified in Table 2.7.5.4-2 are provided in the MCR.	6. Inspections will be performed on the as-built S-VDU in the MCR for retrievability of the displays identified in Table 2.7.5.4-2 ~~in the as-built MCR~~.	6. Displays identified in Table 2.7.5.4-2 can be retrieved on the as-built S-VDU in the ~~as-built~~ MCR.

DCD_14.03-6

Table 2.7.5.4-3 Auxiliary Building Ventilation System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 4 of 5)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria	
7. Displays and controls identified in Table 2.7.5.4-2 are provided in the RSC.	7.i Inspection will be performed on the as-built S-VDU in the RSC for retrievability of the displays identified in Table 2.7.5.4-2 ~~in the as-built RSC~~.	7.i Displays identified in Table 2.7.5.4-2 can be retrieved on the as-built S-VDU in the ~~as-built~~ RSC.	DCD_14.03-7, 8
	7.ii ~~Tests of the as-built RSC control functions identified in Table 2.7.5.4-2 will be performed.~~ Tests will be performed for RSC control capability of equipment, identified in Table 2.7.5.4-2, on the as-built S-VDU.	7.ii RSC controls for equipment, identified in Table 2.7.5.4-2, on the as-built S-VDU provide the necessary output from the PSMS to operate the respective equipment.	DCD_14.03-7, 8
	7.iii Tests will be performed on the as-built equipment, identified in Table 2.7.5.4-2, using controls on the as-built O-VDU in the RSC.	7.iii Controls on the as-built O-VDU in the ~~as-built~~ RSC operate the as-built equipment identified in Table 2.7.5.4-2 with an RSC control function.	DCD_14.03-7, 8
8. The TSC HVAC system provides a habitable workspace environment for the TSC under normal operations, abnormal and accident conditions of the plant.	8.a Tests and analyses of the as-built TSC HVAC system will be performed.	8.a A report exists and concludes that the as-built TSC HVAC system is capable of providing conditioned air to maintain area design temperature for the TSC during normal operations, abnormal and accident conditions of the plant.	
	8.b Deleted.	8.b Deleted.	
9. The auxiliary building HVAC system provides conditioned air to maintain area temperature within design limits in areas housing mechanical and electrical equipment (including areas housing ESF equipment) in the reactor building, power source building, auxiliary building and access building during normal plant operation.	9. Tests and analyses of the as-built auxiliary building HVAC system will be performed.	9. A report exists and concludes that the as-built auxiliary building HVAC system is capable of providing conditioned air to maintain area temperature within design limits in the areas housing mechanical and electrical equipment (including areas housing ESF equipment) in the reactor building, power source building, auxiliary building and access building during normal plant operation.	

Table 2.7.6.3-1 Spent Fuel Pit Cooling and Purification System Equipment Characteristics

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Valve	Class 1E/ Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position	
Spent fuel pit pumps	SFS-MPP-001A,B	3	Yes	–	Yes/~~No~~Yes	Remote Manual	Start	–	DCD_14.03-13
						Low-low SFP water level	Stop	–	DCD_09.01.03-8
Spent fuel pit heat exchangers	SFS-MHX-001A,B	3	Yes	–	—/—	—/—	—	–	
Spent fuel pit	SFS-MPT-001	—	Yes	—	—/—	—	—	–	
Spent fuel pump discharge check valves	SFS-VLV-006A,B	3	Yes	—	—/—	—	Transfer Open/ Transfer Close	–	
Spend fuel pit level	SFS-LT-010, 020	—	Yes	—	Yes/Yes	—	—	—	DCD_09.01.03-8 DCD_14.03-13
Spend fuel pit temperature	SFS-TE-010, 020	—	Yes	—	Yes/Yes	—	—	—	DCD_09.01.03-8 DCD_14.03-13
Spend fuel pit pump discharge flow	SFS-FT-032, 042	—	Yes	—	Yes/Yes	—	—	—	DCD_09.01.03-8 DCD_14.03-13

Note: Dash (-) indicates not applicable

Table 2.7.6.3-2 Spent Fuel Pit Cooling and Purification System Piping Characteristics

Pipe Line Name	ASME Code Section III Class	Seismic Category I
SFP cooling piping up to and including the following valves: Purification line isolation valves: SFS-VLV-101A,B and SFS-VLV-133A,B	3	Yes
Safety-related SFP make up line from RWSP	3	Yes
Connection piping to and from RHRS	3	Yes
Water transfer line to transfer canal, cask pit, fuel inspection pit.	3	Yes

Table 2.7.6.3-3 Spent Fuel Pit Cooling and Purification System Equipment Alarms, Displays and Control Functions

Equipment/Instrument Name	MCR/RSC Alarm	MCR Display(1)	MCR/RSC Control Function	RSC Display(1)
SFP pump SFS-MPP-001A, B	No	Yes	Yes	~~No~~Yes
SFP level (SFS-LIA-010, 020)	Yes	Yes(2)	No	Yes (2)
SFP temperature (SFS-TIA-010, 020)	Yes	Yes(2)	No	Yes(2)
SFP pump discharge flow (SFS-FIA-032, 042)	Yes	Yes(2)	No	Yes(2)

Note (1): on S-VDU except for "Yes(2)"

Note (2): on O-VDU

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DCD_09.01.03-8
DCD_14.03-6, 8

Table 2.7.6.3-5 Spent Fuel Pit Cooling and Purification System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 4 of 6)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
7.a Class 1E equipment, identified in Table 2.7.6.3-1, is powered from its respective Class 1E division.	7.a A test will be performed on each division of the as-built Class 1E equipment identified in Table 2.7.6.3-1 by providing a simulated test signal only in the Class 1E division under test.	7.a The simulated test signal exists at the as-built Class 1E equipment identified in Table 2.7.6.3-1 under test.
7.b Separation is provided between redundant divisions of SFPCS Class 1E cables, and between Class 1E cables and non-Class 1E cables.	7.b Inspections of the as-built Class 1E divisional cables will be performed.	7.b Physical separation or electrical isolation is provided in accordance with RG 1.75, between the as-built cables of redundant SFPCS Class 1E divisions and between Class 1E cables and non-Class 1E cables.
8. The SFPCS circulates the SFP water through the SFP heat exchangers to remove the decay heat generated by spent fuel assemblies.	8.a An analysis will be performed that determines the heat removal capability of the SFP heat exchangers.	8.a A report exists and concludes that the product of the overall heat transfer coefficient and the effective heat transfer area, UA, of each SFP heat exchanger is greater than or equal to 4.3×10^6 Btu/hr-°F.
	8.b Tests will be performed to confirm that the as-built SFP pumps can provide flow to the as-built SFP heat exchangers.	8.b Each as-built SFP pump delivers at least 3600 gpm to each as-built SFP heat exchanger.
9. Displays identified in Table 2.7.6.3-3 are provided in the MCR.	9. Inspection will be performed on the as-built VDU in the MCR, as identified in Table 2.7.6.3-3, for the retrievability of the displays identified in ~~Table 2.7.6.3-3 in the as-built MCR~~the table.	9. Displays identified in Table 2.7.6.3-3 can be retrieved ~~in the as-built MCR~~on the as-built VDU in the MCR, as identified in the table.

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Table 2.7.6.3-5 Spent Fuel Pit Cooling and Purification System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 5 of 6)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria	
10. Displays, and controls identified in Table 2.7.6.3-3 are provided in the RSC.	10.i Inspection will be performed on the as-built VDU in the RSC, as identified in Table 2.7.6.3-3, for retrievability of the displays identified in ~~Table 2.7.6.3-3 in the as-built RSC~~the table.	10.i Displays identified in Table 2.7.6.3-3 can be retrieved ~~in the as-built RSC~~on the as-built VDU in the RSC, as identified in the table.	DCD_14.03-7, 8
	10.ii ~~Tests of the as-built RSC control functions identified in Table 2.7.6.3-3 will be performed.~~Tests will be performed for RSC control capability of equipment, identified in Table 2.7.6.3-3, on the as-built S-VDU.	10.ii RSC controls for equipment, identified in Table 2.7.6.3-3, on the as-built S-VDU provide the necessary output from the PSMS to operate the respective equipment.	DCD_14.03-7, 8
	10.iii Tests will be performed on the as-built equipment, identified in Table 2.7.6.3-3, using controls on the as-built O-VDU in the RSC.	10.iii Controls on the as-built O-VDU in the ~~as-built~~ RSC operate the as-built equipment identified in Table 2.7.6.3-3 with an RSC control function.	DCD_14.03-7, 8
11. Controls are provided in the MCR to start and stop the spent fuel pit pumps identified in Table 2.7.6.3-3.	11.i ~~Tests will be performed on the as-built spent fuel pit pumps identified in Table 2.7.6.3-3 using controls in the as-built MCR.~~Tests will be performed for MCR control capability of equipment, identified in Table 2.7.6.3-3, on the as-built S-VDU.	11.i MCR controls for equipment, identified in Table 2.7.6.3-3, on the as-built S-VDU have a capability to operate the respective equipment.	DCD_14.03-5
	11.ii Tests will be performed on the as-built equipment, identified in Table 2.7.6.3-3, using controls on the as-built O-VDU in the MCR.	11.ii Controls on the as-built O-VDU in the ~~as-built~~ MCR start and stop the as-built spent fuel pit pumps identified in Table 2.7.6.3-3.	DCD_14.03-5
12. The check valves, identified in Table 2.7.6.3-1 as having an active safety function, perform an active safety function to change position as indicated in the table.	12. Tests of the as-built check valves identified in Table 2.7.6.3 as having an active safety function will be performed under preoperational test pressure, temperature, and fluid flow conditions.	12. Each as-built check valve identified in Table 2.7.6.3 as having an active safety function changes position as indicated in Table 2.7.6.3-1 under preoperational test conditions.	

2.7.6.6 Process Effluent Radiation Monitoring and Sampling System (PERMS)

2.7.6.6.1 Design Description

The purpose and functions of the process effluent radiation monitoring and sampling system (PERMS) are:

- Sample, measure, control, and record the radioactivity levels of selected process streams within the plant and effluent streams released into the environment
- Activate alarms and control releases of radioactivity
- Provide data to keep doses to workers ALARA
- Provide process data to support plant operation

The process and effluent radiological monitoring and sampling system is used to verify that releases to the environment are within the dose limit and the numerical guidelines of applicable NRC regulations.

The main control room (MCR) outside air intake radiation monitors are safety-related, while the remainder of the PERMS is non safety-related.

The safety function of the MCR outside air intake radiation monitors is that the detection of radioactivity levels in the stream exceeding the predetermined setpoints automatically activates signals to start the main control room isolation, and activates an alarm in the MCR for operator actions.

1. The functional arrangement of the PERMS is as described in the Design Description of Subsection 2.7.6.6.1 and in Table 2.7.6.6-1.

2. The seismic Category I radiation monitors identified in Table 2.7.6.6-1 can withstand seismic design basis loads without loss of safety function.

3.a The Class 1E radiation monitors identified in Table 2.7.6.6-1 are powered from their respective Class 1E division.

3.b Separation is provided between redundant divisions of PERMS Class 1E cables, and between Class 1E cables and non-Class 1E cables.

4. Each redundant division of the Class 1E radiation monitors identified in Table 2.7.6.6-1 is physically separated from the other divisions.

5. ~~Data~~Displays and alarms, including power failure alarms, from the Class 1E monitors identified in Table 2.7.6.6-1 are provided in the MCR. DCD_14.03-6

Table 2.7.6.6-2 Process Effluent Radiation Monitoring and Sampling System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 2 of 2)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria	
3.b Separation is provided between redundant divisions of PERMS Class 1E cables, and between Class 1E cables and non-Class 1E cables.	3.b Inspections of the as-built Class 1E divisional cables will be performed.	3.b Physical separation or electrical isolation is provided in accordance with RG 1.75, between the as-built PERMS cables of redundant Class 1E divisions and between Class 1E cables and non-Class 1E cables.	
4. Each redundant division of the Class 1E radiation monitors identified in Table 2.7.6.6-1 is physically separated from the other divisions.	4. Inspections of the as-built Class 1E radiation monitors of the PERMS will be performed.	4. Each redundant division of the as-built Class 1E radiation monitors identified in Table 2.7.6.6-1 is physically separated from other divisions in accordance with RG 1.75.	
5. ~~Data~~Displays and alarms, including power failure alarms, from the Class 1E monitors identified in Table 2.7.6.6-1 are provided in the MCR.	5.i An inspection will be performed on the as-built S-VDU in the MCR for retrievability of ~~data and alarms in the as-built MCR~~the displays of the as-built Class 1E monitors identified in Table 2.7.6.6-1.	5.i The ~~data and alarms, including power failure alarms, from~~displays of the as-built Class 1E monitors identified in Table 2.7.6.6-1 can be retrieved on the as-built S-VDU in the ~~as-built~~ MCR.	DCD_14.03-6
	5.ii An inspection will be performed on the as-built A-VDU in the MCR for retrievability of alarms, including power failure alarms, from the as-built Class 1E monitors identified in Table 2.7.6.6-1.	5.ii The alarms, including power failure alarms, from the as-built Class 1E monitors identified in Table 2.7.6.6-1 can be retrieved on the as-built A-VDU in the MCR.	DCD_14.03-6

6.a The Class 1E equipment identified in Table 2.7.6.7-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis event without loss of safety function for the time required to perform the safety function.

6.b Class 1E equipment, identified in Table 2.7.6.7-1, is powered from its respective Class 1E division.

6.c Separation is provided between redundant divisions of PSS Class 1E cables, and between Class 1E cables and non-Class 1E cables.

7. Deleted.

8. The PSS provides the capability of obtaining reactor coolant and containment atmosphere samples.

9. The motor-operated valves, air-operated valves and check valves, identified in Table 2.7.6.7-1, perform an active safety function to change position as indicated in the table.

10.a Controls are provided in the MCR to open and close the remotely operated valves identified in Table 2.7.6.7-~~1~~4. DCD_14.03-5

10.b The remotely operated valves identified in Table 2.7.6.7-1 as having PSMS control perform an active safety function after receiving a signal from PSMS.

11. After loss of motive power, the remotely operated valves identified in Table 2.7.6.7-1 assume the indicated loss of motive power position.

12. Displays identified in Table 2.7.6.7-4 are provided in the MCR.

13. Displays and controls identified in Table 2.7.6.7-4 are provided in the RSC.

2.7.6.7.2 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.7.6.7-5 describes the ITAAC for process and post-accident sampling system.

The ITAAC associated with the PSS components, and piping that comprise a portion of the CIS are described in Table 2.11.2-2.

Table 2.7.6.7-1 Process and Post-accident Sampling System Equipment Characteristics

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Valve	Class 1E/ Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position	
Isolation valves on RHR down stream of containment spray and residual heat removal heat exchanger	PSS-MOV-052A,B,C,D	2	Yes	Yes	Yes / ~~No~~Yes	Remote Manual	Transfer Closed	As Is	DCD_14.03-13
Containment isolation valves inside CV on sample from RCS Hot Leg	PSS-MOV-013,023	2	Yes	Yes	Yes/Yes	Containment Isolation Phase A	Transfer Closed	As Is	
Containment isolation valves outside containment on sample from RCS Hot Leg	PSS-MOV-031A,B	2	Yes	Yes	Yes/ ~~No~~Yes	Containment Isolation Phase A	Transfer Closed	As Is	DCD_14.03-13
Containment isolation valve outside CV on post-accident liquid sample return to containment sump	PSS-MOV-071	2	Yes	Yes	Yes/ ~~No~~Yes	Remote Manual	Transfer Closed	As Is	DCD_14.03-13
Containment isolation valve inside CV on post-accident liquid sample return to containment sump	PSS-VLV-072	2	Yes	No	— / —	—	Transfer Closed	—	
Containment isolation valve inside CV on gas sample from Pressurizer	PSS-AOV-003	2	Yes	Yes	Yes/Yes	Containment Isolation Phase A	Transfer Closed	Closed	
Containment isolation valve inside CV on liquid sample from Pressurizer	PSS-MOV-006	2	Yes	Yes	Yes/Yes	Containment Isolation Phase A	Transfer Closed	As Is	
Containment isolation valves inside CV on sample from Accumulator	PSS-AOV-062A,B,C,D	2	Yes	Yes	Yes /Yes	Containment Isolation Phase A	Transfer Closed	Closed	
Containment isolation valve outside CV on sample from Accumulator	PSS-AOV-063	2	Yes	Yes	Yes /~~No~~Yes	Containment Isolation Phase A	Transfer Closed	Closed	DCD_14.03-13

Note: Dash (-) indicates not applicable

Table 2.7.6.7-5 Process and Post-accident Sampling System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 7 of 8)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
10.a Controls are provided in the MCR to open and close the remotely operated valves identified in Table 2.7.6.7-~~1~~4.	10.a.i Tests will be performed for MCR control capability of the remotely operated valves, identified in Table 2.7.6.7-4, on the as-built S-VDU.	10.a.i MCR controls for the remotely operated valves, identified in Table 2.7.6.7-4, on the as-built S-VDU provide the necessary output from the PSMS to open and close the respective valves.
	10.a.ii Tests will be performed on the as-built remotely operated valves identified in Table 2.7.6.7-~~1~~4 using the controls on the as-built O-VDU in the ~~as-built~~ MCR.	10.a.ii Controls on the as-built O-VDU in the ~~as-built~~ MCR open and close the as-built remotely operated valves identified in Table 2.7.6.7-~~1~~4 with the MCR control function.
10.b The remotely operated valves identified in Table 2.7.6.7-1 as having PSMS control perform an active safety function after receiving a signal from PSMS.	10.b Tests will be performed on the as-built remotely operated valves identified in Table 2.7.6.7-1 as having PSMS control using simulated signals.	10.b The as-built remotely operated valves identified in Table 2.7.6.7-1 as having PSMS control, perform the active function identified in the table after receiving a simulated signal.
11. After loss of motive power, the remotely operated valves identified in Table 2.7.6.7-1 assume the indicated loss of motive power position.	11. Tests of the as-built remotely operated valves identified in Table 2.7.6.7-1 will be performed under the conditions of loss of motive power.	11. Upon loss of motive power, each as-built remotely operated valve identified in Table 2.7.6.7-1 assumes the indicated loss of motive power position.

DCD_14.03-5

DCD_14.03-5

DCD_14.03-5

Table 2.7.6.7-5 Process and Post-accident Sampling System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 8 of 8)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria	
12. Displays identified in Table 2.7.6.7-4 are provided in the MCR.	12. Inspection will be performed on the as-built S-VDU in the MCR for retrievability of the displays identified in Table 2.7.6.7-4 ~~in the as-built MCR~~.	12. Displays identified in Table 2.7.6.7-4 can be retrieved on the as-built S-VDU in the ~~as-built~~ MCR.	DCD_14.03-6 DCD_14.03-6
13. Displays, and controls identified in Table 2.7.6.7-4 are provided in the RSC.	13.i Inspection will be performed on the as-built S-VDU in the RSC for retrievability of the displays identified in Table 2.7.6.7-4 ~~in the as-built RSC~~.	13.i Displays identified in Table 2.7.6.7-4 can be retrieved on the as-built S-VDU in the ~~as-built~~ RSC.	DCD_14.03-7, 8
	13.ii ~~Tests of the as-built RSC control functions identified in Table 2.7.6.7-4 will be performed.~~ Tests will be performed for RSC control capability of equipment, identified in Table 2.7.6.7-4, on the as-built S-VDU.	13.ii RSC controls for equipment, identified in Table 2.7.6.7-4, on the as-built S-VDU provide the necessary output from the PSMS to operate the respective equipment.	DCD_14.03-7, 8
	13.iii Tests will be performed on the as-built equipment, identified in Table 2.7.6.7-4, using controls on the as-built O-VDU in the RSC.	13.iii Controls on the as-built O-VDU in the ~~as-built~~ RSC operate the as-built equipment identified in Table 2.7.6.7-4 with an RSC control function.	DCD_14.03-7, 8

Table 2.7.6.8-1 Equipment and Floor Drainage Systems Inspections, Tests, Analyses and Acceptance Criteria (Sheet 1 of 2)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the equipment and floor drainage systems is as described in the Design Description of Subsection 2.7.6.8.1, and as shown in Figure 2.7.6.8-1.	1. Inspection of the as-built equipment and floor drainage systems will be performed.	1. The as-built equipment and floor drainage systems conform to the functional arrangement as described in the Design Description of Subsection 2.7.6.8.1, and as shown in Figure 2.7.6.8-1.
2. Alarms identified in Subsection 2.7.6.8.1 are provided in the MCR.	2. Inspection will be performed on the as-built A-VDU in the MCR for retrievability of the alarms identified in Subsection 2.7.6.8.1 ~~in the as-built MCR~~.	2. Alarms identified in Subsection 2.7.6.8.1 can be retrieved on the as-built A-VDU in the ~~as-built~~ MCR.
3. Flow from the T/B sump is isolated when the T/B sump discharge radiation monitor setpoint is reached.	3. A test will be performed on the as-built T/B sump discharge valve using a simulated signal.	3. Upon receipt of a simulated T/B sump discharge radiation monitor signal, the as-built T/B sump discharge valve closes.
4. The seismic Category I drain isolation valves from the ESF equipment rooms identified in Figure 2.7.6.8-1 can withstand seismic design basis loads without loss of safety function.	4.a Inspections will be performed to verify that the as-built seismic Category I ESF equipment rooms drain isolation valves identified in Figure 2.7.6.8-1 are located in a seismic Category I structure.	4.a The as-built seismic Category I ESF equipment rooms drain isolation valves identified in Figure 2.7.6.8-1 are located in a seismic Category I structure.
	4.b Type tests, analyses, or a combination of type tests and analyses of the seismic Category I ESF equipment rooms drain isolation valves identified in Figure 2.7.6.8-1 will be performed using analytical assumptions, or will be performed under conditions which bound the seismic design basis requirements.	4.b A report exists and concludes that the seismic Category I ESF equipment rooms drain isolation valves identified in Figure 2.7.6.8-1 can withstand seismic design basis loads without loss of safety function.

DCD_14.03-6

Table 2.7.6.9-2 Fire Protection System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 2 of 2)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
5. Deleted	5. Deleted	5. Deleted
6.a The FPS fire water supply is available as an alternative component cooling water source for severe accident prevention.	6.a Inspection will be performed of the as-built FPS fire water supply system.	6.a The as-built FPS fire water supply system is connected to component cooling water system shown in Figure 2.7.3.3-1 as an alternative component cooling water source for severe accident prevention.
6.b The FPS fire water supply is available to the containment spray system and water injection to the reactor cavity for severe accident mitigation.	6.b Inspection will be performed of the as-built FPS fire water supply system.	6.b The as-built FPS fire water supply system is connected to the containment spray system as shown in Figure 2.11.3-1 and water injection line to the reactor cavity as shown in Figure 2.11.2-1 for severe accident mitigation.
7. Deleted.	7. Deleted.	7. Deleted.
8. Displays identified in Table 2.7.6.9-1 are provided in the MCR.	8. Inspection will be performed on the as-built O-VDU in the MCR for retrievability of the displays identified in Table 2.7.6.9-1 ~~in the as-built MCR~~.	8. Displays identified in Table 2.7.6.9-1 can be retrieved on the as-built O-VDU in the ~~as-built~~ MCR.

DCD_14.03-6

1. The functional arrangement of the area radiation and airborne radioactivity monitoring systems is as described in the Design Description of Subsection 2.7.6.13.1, and in Tables 2.7.6.13-1 and 2.7.6.13-2.

2. The seismic Category I radiation monitors identified in Table 2.7.6.13-1 can withstand seismic design basis loads without loss of safety function.

3. The Class 1E radiation monitors identified in Table 2.7.6.13-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis event without loss of safety function for the time required to perform the safety function.

4.a Class 1E radiation monitors identified in Table 2.7.6.13-1 are powered from their respective Class 1E division.

4.b Separation is provided between redundant divisions of Class 1E radiation monitor cables, and between Class 1E cables and non-Class 1E cables.

5. Each redundant division of Class 1E radiation monitors identified in Table 2.7.6.13-1 is physically separated from the other divisions.

6. ~~Data~~Displays and alarms, including power failure alarms, from the Class 1E radiation monitors identified in Table 2.7.6.13-1 are provided in the main control room. DCD_14.03-6

2.7.6.13.2 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.7.6.13-3 describes the ITAAC for area radiation and airborne radioactivity monitoring systems.

Table 2.7.6.13-3 Area Radiation and Airborne Radioactivity Monitoring Systems Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 3 of 3)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
6. DataDisplays and alarms, including power failure alarms, from the Class 1E radiation monitors identified in Table 2.7.6.13-1 are provided in the MCR.	6. i An inspection will be performed on the as-built S-VDU in the MCR for retrievability of data and alarms in the as-built MCRthe displays of the as-built Class 1E monitors identified in Table 2.7.6.13-1.	6.i The data and alarms, including power failure alarms, fromdisplays of the as-built Class 1E radiation monitors identified in Table 2.7.6.13-1 can be retrieved on the as-built S-VDU in the as-built MCR.
	6. ii An inspection will be performed on the as-built A-VDU in the MCR for retrievability of alarms, including power failure alarms, from the as-built Class 1E monitors identified in Table 2.7.6.13-1.	6.ii The alarms, including power failure alarms, from the as-built Class 1E monitors identified in Table 2.7.6.13-1, can be retrieved on the as-built A-VDU in the MCR.

DCD_14.03-6

DCD_14.03-6

Table 2.11.2-1 Containment Isolation System Equipment Characteristics (Sheet 1 of 10)

System Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Valve	Class 1E/ Qual. For Harsh Envir.	Safety-Related Display	PSMS Control	Active Safety Function	Loss of Motive Power Position
RCS	RCS-VLV-133	2	Yes	No	-/-	No	-	Transfer Closed	-
RCS	RCS-AOV-132	2	Yes	Yes	Yes/<u>Yes</u>~~No~~	Yes	Containment Isolation Phase A	Transfer Closed	Closed
RCS	RCS-VLV-139	2	Yes	No	-/-	No	-	Transfer Closed	-
RCS	RCS-VLV-140	2	Yes	No	-/-	No	-	-	-
RCS	RCS-AOV-138	2	Yes	Yes	Yes/<u>Yes</u>~~No~~	Yes	Containment Isolation Phase A	Transfer Closed	Closed
RCS	RCS-AOV-147	2	Yes	Yes	Yes/ Yes	Yes	Containment Isolation Phase A	Transfer Closed	Closed
RCS	RCS-AOV-148	2	Yes	Yes	Yes/<u>Yes</u>~~No~~	Yes	Containment Isolation Phase A	Transfer Closed	Closed
WMS	LMS-AOV-052	2	Yes	Yes	Yes/Yes	Yes	Containment Isolation Phase A	Transfer Closed	Closed
WMS	LMS-AOV-053	2	Yes	Yes	Yes/<u>Yes</u>~~No~~	Yes	Containment Isolation Phase A	Transfer Closed	Closed
WMS	LMS-AOV-055	2	Yes	Yes	Yes/Yes	Yes	Containment Isolation Phase A	Transfer Closed	Closed

DCD_14.03-13 (RCS-AOV-132)
DCD_14.03-13 (RCS-AOV-138)
DCD_14.03-13 (RCS-AOV-148)
DCD_14.03-13 (LMS-AOV-053)

Table 2.11.2-1 Containment Isolation System Equipment Characteristics (Sheet 2 of 10)

System Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Valve	Class 1E/ Qual. For Harsh Envir.	Safety-Related Display	PSMS Control	Active Safety Function	Loss of Motive Power Position	
WMS	LMS-AOV-056	2	Yes	Yes	Yes/YesNo	Yes	Containment Isolation Phase A	Transfer Closed	Closed	DCD_14.03-13
WMS	LMS-AOV-060	2	Yes	Yes	Yes/YesNo	Yes	Containment Isolation Phase A	Transfer Closed	Closed	DCD_14.03-13
WMS	LMS-LCV-010A	2	Yes	Yes	Yes/Yes	Yes	Containment Isolation Phase A	Transfer Closed	Closed	
WMS	LMS-LCV-010B	2	Yes	Yes	Yes/YesNo	Yes	Containment Isolation Phase A	Transfer Closed	Closed	DCD_14.03-13
WMS	LMS-AOV-104	2	Yes	Yes	Yes/Yes	Yes	Containment Isolation Phase A	Transfer Closed	Closed	
WMS	LMS-AOV-105	2	Yes	Yes	Yes/YesNo	Yes	Containment Isolation Phase A	Transfer Closed	Closed	DCD_14.03-13
RWS	RWS-MOV-002	2	Yes	Yes	Yes/Yes	Yes	Containment Isolation Phase A	Transfer Closed	As Is	
RWS	RWS-MOV-004	2	Yes	Yes	Yes/YesNo	Yes	Containment Isolation Phase A	Transfer Closed	As Is	DCD_14.03-13
RWS	RWS-VLV-003	2	Yes	No	-/-	No	-	Transfer Closed	-	

Table 2.11.2-1 Containment Isolation System Equipment Characteristics (Sheet 3 of 10)

System Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Valve	Class 1E/ Qual. For Harsh Envir.	Safety-Related Display	PSMS Control	Active Safety Function	Loss of Motive Power Position	
RWS	RWS-VLV-023	2	Yes	No	-/-	No	-	Transfer Closed	-	
RWS	RWS-AOV-022	2	Yes	Yes	Yes/Yes~~No~~	Yes	Containment Isolation Phase A	Transfer Closed	Closed	DCD_14.03-13
PMWS	DWS-VLV-005	2	Yes	No	-/-	No	-	-	-	
PMWS	DWS-VLV-004	2	Yes	No	-/-	No	-	-	-	
IAS	C~~I~~AS-VLV-003	2	Yes	No	-/-	No	-	Transfer Closed	-	DCD_14.03-13
IAS	C~~I~~AS-MOV-002	2	Yes	Yes	Yes/Yes~~No~~	Yes	Containment Isolation Phase A	Transfer Closed	As Is	DCD_14.03-13
FSS	FSS-VLV-003	2	Yes	No	-/-	No	-	Transfer Closed	-	
FSS	FSS-AOV-001	2	Yes	Yes	Yes/Yes~~No~~	Yes	Containment Isolation Phase A	Transfer Closed	Closed	DCD_14.03-13
FSS	FSS-VLV-006	2	Yes	No	-/-	No	-	-	-	
FSS	FSS-MOV-004	2	Yes	Yes	Yes/Yes~~No~~	Yes	-	-	As Is	DCD_14.03-13
SSAS	SAS-VLV-103	2	Yes	No	-/-	No	-	-	-	
SSAS	SAS-VLV-101	2	Yes	No	-/-	No	-	-	-	
CVVS	VCS-AOV-306	2	Yes	Yes	Yes/Yes	Yes	Containment Purge Isolation	Transfer Closed	Closed	

Table 2.11.2-1 Containment Isolation System Equipment Characteristics (Sheet 4 of 10)

System Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Valve	Class 1E/ Qual. For Harsh Envir.	Safety-Related Display	PSMS Control	Active Safety Function	Loss of Motive Power Position	
CVVS	VCS-AOV-307	2	Yes	Yes	Yes/Yes~~No~~	Yes	Containment Purge Isolation	Transfer Closed	Closed	DCD_14.03-13
CVVS	VCS-AOV-305	2	Yes	Yes	Yes/Yes	Yes	Containment Purge Isolation	Transfer Closed	Closed	
CVVS	VCS-AOV-304	2	Yes	Yes	Yes/Yes~~No~~	Yes	Containment Purge Isolation	Transfer Closed	Closed	DCD_14.03-13
CVVS	VCS-AOV-356	2	Yes	Yes	Yes/Yes	Yes	Containment Purge Isolation	Transfer Closed	Closed	
CVVS	VCS-AOV-357	2	Yes	Yes	Yes/Yes~~No~~	Yes	Containment Purge Isolation	Transfer Closed	Closed	DCD_14.03-13
CVVS	VCS-AOV-355	2	Yes	Yes	Yes/Yes	Yes	Containment Purge Isolation	Transfer Closed	Closed	
CVVS	VCS-AOV-354	2	Yes	Yes	Yes/Yes~~No~~	Yes	Containment Purge Isolation	Transfer Closed	Closed	DCD_14.03-13
CVVS	VCS-PT-371,372 (instrument line)	-	Yes	-	-~~No~~/-~~No~~	No	-	-	-	DCD_14.03-13
VWS	VWS-MOV-407	2	Yes	Yes	Yes/Yes~~No~~	Yes	Containment Isolation Phase A	Transfer Closed	As Is	DCD_14.03-13

Table 2.11.2-1 Containment Isolation System Equipment Characteristics (Sheet 5 of 10)

System Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Valve	Class 1E/ Qual. For Harsh Envir.	Safety-Related Display	PSMS Control	Active Safety Function	Loss of Motive Power Position	
VWS	VWS-MOV-403	2	Yes	Yes	Yes/YesNo	Yes	Containment Isolation Phase A	Transfer Closed	As Is	DCD_14.03-13
VWS	VWS-MOV-422	2	Yes	Yes	Yes/Yes	Yes	Containment Isolation Phase A	Transfer Closed	As is	
VWS	VWS-VLV-421	2	Yes	No	-/-	No	-	Transfer Closed	-	
VWS	VWS-VLV-423	2	Yes	No	-/-	No	-	Transfer Closed	-	
RMS	RMS-VLV-005	2	Yes	No	-/-	No	-	Transfer Closed	-	
RMS	RMS-MOV-003	2	Yes	Yes	Yes/YesNo	Yes	Containment Isolation Phase A	Transfer Closed	As Is	DCD_14.03-13
RMS	RMS-MOV-001	2	Yes	Yes	Yes/Yes	Yes	Containment Isolation Phase A	Transfer Closed	As Is	
RMS	RMS-MOV-002	2	Yes	Yes	Yes/YesNo	Yes	Containment Isolation Phase A	Transfer Closed	As Is	DCD_14.03-13
ICIGS	IGS-AOV-002	2	Yes	Yes	Yes/Yes	Yes	Containment Isolation Phase A	Transfer Closed	Closed	
ICIGS	IGS-AOV-001	2	Yes	Yes	Yes/YesNo	Yes	Containment Isolation Phase A	Transfer Closed	Closed	DCD_14.03-13

Table 2.11.2-2 Containment Isolation System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 8 of 11)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
	8.xv Tests will be performed to verify as-built PSS CIVs close within the isolation response times.	8.xv The following as-built PSS CIVs close within the required times: ≤ 15 seconds PSS-AOV-003 PSS-MOV-006 PSS-MOV-013 PSS-MOV-023 PSS-MOV-031 A,B PSS-AOV-062 A,B,C,D PSS-AOV-063
9. The Containment Isolation System (CIS) provides a safety-related function of containment isolation to prevent or limit the release of fission products to the environment in the event of an accident.	9. Tests will be performed to verify the as-built containment isolation valve leakage rates in accordance with 10 CFR 50, Appendix J, Type C tests.	9. The as-built containment isolation valve leak rates are less than the allowable leakage rate specified in 10 CFR 50, Appendix J.
10. Controls are provided in the MCR to open and close the remotely operated valves identified in Table 2.11.2-3.	10.i Tests will be performed for MCR control capability of the remotely operated valves, identified in Table 2.11.2-3, on the as-built S-VDU.	10.i MCR controls for the remotely operated valves, identified in Table 2.11.2-3, on the as-built S-VDU provide the necessary output from the PSMS to open and close the respective valves. DCD_14.03-5
	10.ii Tests will be performed on the as-built remotely operated valves identified in Table 2.11.2-3 using controls on the as-built O-VDU in the ~~as-built~~ MCR.	10.ii Controls on the as-built O-VDU in the ~~as-built~~ MCR open and close the as-built remotely operated valves identified in Table 2.11.2-3 with the MCR control function. DCD_14.03-5 DCD_14.03-5
11.a Displays identified in Table 2.11.2-3 are provided in the MCR.	11.a Inspection will be performed on the as-built S-VDU in the MCR for retrievability of the displays identified in Table 2.11.2-3 ~~in the as-built MCR~~.	11.a Displays identified in Table 2.11.2-3 can be retrieved on the as-built S-VDU in the ~~as-built~~ MCR. DCD_14.03-6

Table 2.11.2-2 Containment Isolation System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 9 of 11)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
11.b Displays and controls identified in Table 2.11.2-3 are provided in the RSC.	11.b.i Inspection will be performed on the as-built S-VDU in the RSC for retrievability of the displays identified in Table 2.11.2-3 in the as-built RSC.	11.b.i Displays identified in Table 2.11.2-3 can be retrieved on the as-built S-VDU in the as-built RSC.
	11.b.ii Tests will be performed for RSC control capability of equipment, identified in Table 2.11.2-3, on the as-built S-VDU.	11.b.ii RSC controls for equipment, identified in Table 2.11.2-3, on the as-built S-VDU provide the necessary output from the PSMS to operate the respective equipment.
	11.b.iii Tests of the as-built RSC control functions identified in Table 2.11.2-3 will be performed. Tests will be performed on the as-built equipment, identified in Table 2.11.2-3, using controls on the as-built O-VDU in the RSC.	11.b.iii Controls on the as-built O-VDU in the as-built RSC operate each as-built equipment identified in Table 2.11.2-3 with an RSC control function.
12. The motor-operated, air-operated and check valves, identified in Table 2.11.2-1 as having an active safety function, perform an active safety function to change position as indicated in the table.	12.a Type tests or a combination of type tests and analyses of the motor-operated and air-operated valves identified in Table 2.11.2-1 will be performed that demonstrate the capability of the valve to operate under its design conditions.	12.a A report exists and concludes that each motor-operated and air-operated valve changes position as identified in Table 2.11.2-1 under design conditions.
	12.b Tests of the as-built motor-operated and air-operated valves identified in Table 2.11.2-1 will be performed under preoperational flow, differential pressure, and temperature conditions.	12.b Each as-built motor-operated and air-operated valves changes position as indicated in Table 2.11.2-1 under preoperational test conditions.

DCD_14.03-7, 8
DCD_14.03-7, 8
DCD_14.03-7, 8
DCD_14.03-7, 8

2.11.3 Containment Spray System (CSS)

2.11.3.1 Design Description

The CSS is a safety-related system. The purposes of the CSS are to cool the containment and remove fission products following an accident, thus the system serves as a dual-function engineered safety feature (ESF).

The CSS functions by automatically spraying borated water into the containment upon receipt of a containment spray actuation signal. This action limits the containment internal peak pressure to well below the design pressure and reduces it to approximately atmospheric pressure in a design basis LOCA or secondary system piping failure.

The CSS provides the containment isolation function, as described in Section 2.11.2, for the lines penetrating the containment.

The CSS and the residual heat removal system (RHRS) share major components which are containment spray/residual heat removal (CS/RHR) pumps and heat exchangers. The CSS includes:

- four CS/RHRS pumps (included in RHRS)
- four CS/RHRS heat exchangers (included in RHRS)
- a spray ring header composed of four concentric interconnected rings, piping, spray nozzles and valves

The CSS includes four 50% capacity CS/RHR pumps divisions. Each recirculation sump pit of the refueling water storage pit (RWSP) contains paired suction piping for the CS/RHRS pump and the safety injection pump. RWSP suction isolation valves can be closed to prevent leakage of RWSP water from CS/RHRS.

1.a The functional arrangement of the CSS is as described in the Design Description of Subsection 2.11.3.1 and in Table 2.11.3-1, and as shown in Figure 2.11.3-1.

1.b Each mechanical division of the CSS as shown in Figure 2.11.3-1~~(Divisions A, B, C & D)~~ is physically separated from the other divisions, with the exception of ~~inside the containment~~piping and spray headers downstream of check valves, so as not to preclude accomplishment of the safety function. DCD_14.03-10

2.a.i The ASME Code Section III components of the CSS, identified in Table 2.11.3-2, are fabricated, installed, and inspected in accordance with ASME Code Section III requirements.

2.a.ii The ASME Code Section III components of the CSS identified in Table 2.11.3-2 are reconciled with the design requirements.

2.b.i The ASME Code Section III piping of the CSS, including supports and design features described in the design basis to limit potential gas accumulation, identified in Table DCD_05.04.07-11

8.a Controls are provided in the MCR to open and close the remotely operated valves identified in Table 2.11.3-42. DCD_14.03-5

9.a The motor-operated valves and check valves, identified in Table 2.11.3-2 as having an active safety function, perform an active safety function to change position as indicated in the table.

9.b After loss of motive power, the remotely operated valves, identified in Table 2.11.3-2, assume the indicated loss of motive power position.

10.a The CS/RHR pump starts after receiving a containment spray actuation signal.

10.b The containment spray header containment isolation valves identified in Table 2.11.3-2 open upon receipt of a containment spray actuation signal.

10.c An interlock is provided for each division of CS/RHR to preclude the simultaneous opening of both the RHR discharge line containment isolation valves identified in Table 2.4.5-2 and the corresponding containment spray header containment isolation valves identified in Table 2.11.3-2.

10.d An interlock is provided for each division of CS/RHR to allow opening of the containment spray header containment isolation valves identified in Table 2.11.3-2 only if either of the corresponding two in-series CS/RHR pump hot leg isolation valves identified in Table 2.4.5-2 is closed.

11. Alarms and displays identified in Table 2.11.3-4 are provided in the MCR.

12. Alarms, displays and controls identified in Table 2.11.3-4 are provided in the RSC.

13. The pumps identified in Table 2.11.3-2 perform their safety functions under design conditions. DCD_03.09.06-69

2.11.3.2 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.11.3-5 describes the ITAAC for the CSS. ITAAC Item 7 in Table 2.4.4-5 describes ITAAC for ECC/CS suction strainer performance.

The ITAAC associated with the CSS equipment, components, and piping that comprise a portion of the CIS are described in Table 2.11.2-2.

Table 2.11.3-2 Containment Spray System Equipment Characteristics

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Valve	Class 1E/ Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position
Containment Spray Nozzles	-	2	Yes	-	-/-	-	-	-
CS/RHR Pump RWSP Suction Isolation Valves	CSS-MOV-001 A, B, C, D	2	Yes	Yes	Yes/ Yes	Remote Manual	Transfer Closed	As Is
Containment Spray Header Containment Isolation Valves	CSS-MOV-004A, B, C, D	2	Yes	Yes	Yes/Yes ~~No~~	Containment Spray Actuation Remote Manual with CS/RHR Valve Open Block Interlock	Transfer Open Transfer Closed	As Is
Containment Spray Header Containment Isolation Check Valves	CSS-VLV-005A, B, C, D	2	Yes	-	-/-	-	Transfer Open/ Transfer Closed	-
Containment Spray Header Fire Water Supply Line Stop Valve	CSS-MOV-011	2	Yes	Yes	Yes/Yes ~~No~~	-	-	As Is
Containment Pressure	CSS-PT-010, 011, 012, 013	-	Yes	-	Yes/Yes	-	-	-
Containment Pressure	CSS-PT-014 (instrument line)	-	Yes	-	-~~No~~/-~~No~~	-	-	-
Containment Temperature	CSS-TE-020	-	Yes	-	Yes/Yes	-	-	-

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DCD_14.03-11

DCD_14.03-13

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Table 2.11.3-5 Containment Spray System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 1 of 9)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1.a The functional arrangement of the CSS is as described in the Design Description of Subsection 2.11.3.1 and in Table 2.11.3-1, and as shown in Figure 2.11.3-1.	1.a Inspection of the as-built CSS will be performed.	1.a The as-built CSS conforms to the functional arrangement as described in the Design Description of Subsection 2.11.3.1 and in Table 2.11.3-1, and as shown in Figure 2.11.3-1.
1.b Each mechanical division of the CSS as shown in Figure 2.11.3-1(Divisions A, B, C & D) is physically separated from the other divisions, with the exception of inside the containmentpiping and spray headers downstream of check valves, so as not to preclude accomplishment of the safety function.	1.b Inspections and analysis of the as-built CSS will be performed.	1.b A report exists and concludes that each mechanical division of the as-built CSS as shown in Figure 2.11.3-1 is physically separated from other mechanical divisions of the systemwith the exception of inside the containment by spatial separation, barriers or enclosures, with the exception of piping and spray headers downstream of check valves, so as to assure that the functions of the safety-related system are maintained considering postulated dynamic effects (i.e., missile and pipe break hazard), internal flooding and fire.
2.a.i The ASME Code Section III components of the CSS, identified in Table 2.11.3-2, are fabricated, installed, and inspected in accordance with ASME Code Section III requirements.	2.a.i Inspection of the as-built ASME Code Section III components of the CSS, identified in Table 2.11.3-2, will be performed.	2.a.i The ASME Code Section III data report(s) (certified, when required by ASME Code) and inspection reports (including N-5 Data Reports where applicable) exist and conclude that the as-built ASME Code Section III components of the CSS identified in Table 2.11.3-2 are fabricated, installed, and inspected in accordance with ASME Code Section III requirements.
2.a.ii The ASME Code Section III components of the CSS identified in Table 2.11.3-2 are reconciled with the design requirements.	2.a.ii A reconciliation analysis of the components identified in Table 2.11.3-2 using as-designed and as-built information and ASME Code Section III design report(s) (NCA-3550) will be performed.	2.a.ii The ASME Code Section III design report(s) (certified, when required by ASME Code) exist and conclude that design reconciliation has been completed in accordance with the ASME Code, for the as-built ASME Code Section III components of the CSS identified in Table 2.11.3-2 . The report documents the results of the reconciliation analysis.

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Table 2.11.3-5 Containment Spray System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 6 of 9)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
7.b The CSS provides containment spray during design basis accidents.	7.b The as-built CS/RHR pump full flow tests will be performed. Analysis will be performed to convert the test results from the test conditions to the design basis condition.	7.b A report exists and concludes that each as-built CS/RHR pump delivers no less than 2645 gpm of RWSP water into the containment under design basis conditions.
7.c The CS/RHR pumps have sufficient net positive suction head (NPSH).	7.c Tests to measure the as-built CS/RHR pump suction pressure will be performed. Inspection and analysis to determine NPSH available to each CS/RHR pump will be performed. The analysis will consider the vendor test results of required NPSH and the effects of: - pressure losses for pump inlet piping and components, - pressure losses for pump suction strainers due to debris blockage, - suction from the RWSP water level at the minimum value.	7.c A report exists and concludes that the NPSH available exceeds the NPSH required.
8. Controls are provided in the MCR to open and close the remotely operated valves identified in Table 2.11.3-4~~2~~.	8.i Tests will be performed for MCR control capability of the remotely operated valves, identified in Table 2.11.3-4, on the as-built S-VDU.	8.i MCR controls for the remotely operated valves, identified in Table 2.11.3-4, on the as-built S-VDU provide the necessary output from the PSMS to open and close the respective valves.
	8.ii Tests will be performed on the as-built remotely operated valves identified in Table 2.11.3-4~~2~~ using controls on the as-built O-VDU in the ~~as-built~~ MCR.	8.ii Controls on the as-built O-VDU in the ~~as-built~~ MCR open and close the as-built remotely operated valves identified in Table 2.11.3-4~~2~~ with the MCR control function.

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Table 2.11.3-5 Containment Spray System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 8 of 9)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
10.b The containment spray header containment isolation valves identified in Table 2.11.3-2 open upon receipt of a containment spray actuation signal.	10.b Tests of the as-built containment spray header containment isolation valves identified in Table 2.11.3-2 will be performed using a simulated signal.	10.b Each as-built containment spray header containment isolation valve identified in Table 2.11.3-2 opens upon receipt of a simulated signal.
10.c An interlock is provided for each division of CS/RHR to preclude the simultaneous opening of both the RHR discharge line containment isolation valves identified in Table 2.4.5-2 and the corresponding containment spray header containment isolation valves identified in Table 2.11.3-2.	10.c Tests will be performed on each as-built interlock for the RHR discharge line containment isolation valves identified in Table 2.4.5-2 and the containment spray header containment isolation valves identified in Table 2.11.3-2.	10.c Each as-built interlock for the RHR discharge line containment isolation valves identified in Table 2.4.5-2 and the corresponding containment spray header containment isolation valves identified in Table 2.11.3-2 precludes the simultaneous opening of both the RHR discharge line containment isolation valves and the corresponding containment spray header containment isolation valves.
10.d An interlock is provided for each division of CS/RHR to allow opening of the containment spray header containment isolation valves identified in Table 2.11.3-2 only if either of the corresponding two in-series CS/RHR pump hot leg isolation valves identified in Table 2.4.5-2 is closed.	10.d Tests will be performed on each as-built interlock for the containment spray header containment isolation valves identified in Table 2.11.3-2 and CS/RHR pump hot leg isolation valves identified in Table 2.4.5-2.	10.d The CSS containment isolation valves identified in Table 2.11.3-2 are interlocked and are allowed to open only if either of the corresponding two in-series CS/RHR pump hot leg isolation valves identified in Table 2.4.5-2 is closed.
11. Alarms and displays identified in Table 2.11.3-4 are provided in the MCR.	11. Inspections will be performed on the as-built A-VDU and on the as-built S-VDU in the MCR for retrievability of the alarms and displays respectively, as identified in Table 2.11.3-4 ~~in the as-built MCR~~.	11. Alarms and displays, identified in Table 2.11.3-4, can be retrieved on the as-built A-VDU and on the as-built S-VDU respectively in the ~~as-built~~ MCR.

DCD_14.03-6

2.11.3-5 Containment Spray System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 9 of 9)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria	
12. Alarms, displays and controls identified in Table 2.11.3-4 are provided in the RSC.	12.i Inspections will be performed on the as-built O-VDU and on the as-built S-VDU in the RSC for retrievability of the alarms and displays respectively, as identified in Table 2.11.3-4 in the as built RSC.	12.i Alarms and displays, identified in Table 2.11.3-4, can be retrieved on the as-built O-VDU and on the as-built S-VDU respectively in the as-built RSC.	DCD_14.03-7, 8
	12.ii Tests will be performed for RSC control capability of equipment, identified in Table 2.11.3-4, on the as-built S-VDU.	12.ii RSC controls for equipment, identified in Table 2.11.3-4, on the as-built S-VDU provide the necessary output from the PSMS to operate the respective equipment.	DCD_14.03-7, 8
	12.iii Tests of the as-built RSC control functions identified in Table 2.11.3-4 will be performed. Tests will be performed on the as-built equipment, identified in Table 2.11.3-4, using controls on the as-built O-VDU in the RSC.	12.iii Controls on the as-built O-VDU in the as-built RSC operate the as-built equipment identified in Table 2.11.3-4 with an RSC control function.	DCD_14.03-7, 8
13. The pumps identified in Table 2.11.3-2 perform their safety functions under design conditions.	13. Type tests or a combination of type tests and analyses of each pump identified in Table 2.11.3-2 will be performed to demonstrate the ability of the pump to perform its safety function under design conditions.	13. An equipment qualification data summary report exists and concludes that the pumps identified in Table 2.11.3-2 perform their safety functions under design conditions.	DCD_03.09.06-69

Table 2.11.4-1 Containment Hydrogen Monitoring and Control System Inspections, Tests, Analyses, and Acceptance Criteria

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria	
1. The functional arrangement of the CHS is as described in the Design Description of Subsection 2.11.4.1 and as shown in Figure 2.11.4-1.	1. Inspection of the as-built CHS will be performed.	1. The as-built CHS conforms to the functional arrangement as described in the Design Description of Subsection 2.11.4.1 and as shown in Figure 2.11.4-1.	
2. Deleted.	2. Deleted.	2. Deleted.	
3. The hydrogen igniters, identified on Figure 2.11.4-1, are energized after receiving an ECCS actuation signal.	3. Tests will be performed on the as-built hydrogen igniters, identified on Figure 2.11.4-1, using a simulated signal.	3. The as-built hydrogen igniters, identified on Figure 2.11.4-1, are energized after receiving a simulated signal.	
4. An alarm and a display for containment hydrogen concentration measured by a hydrogen concentration detector of the CHS are provided in the MCR.	4. Inspection will be performed on the as-built A-VDU and on the as-built O-VDU in the MCR for retrievability of the alarm and display respectively for containment hydrogen concentration measured by a hydrogen concentration detector of the CHS ~~in the as-built MCR~~.	4. An alarm and a display for containment hydrogen concentration measured by a hydrogen concentration detector of the CHS can be retrieved on the as-built A-VDU and on the as-built O-VDU respectively in the ~~as-built~~ MCR.	DCD_14.03-6
5. Controls are provided in the MCR to energize and deenergize the twenty hydrogen igniters of the CHS.	5. Tests will be performed on the twenty as-built hydrogen igniters using controls on the as-built O-VDU in the ~~as-built~~ MCR.	5. Controls on the as-built O-VDU in the ~~as-built~~ MCR energize and deenergize each of the twenty as-built hydrogen igniters of the CHS.	DCD_14.03-5
6.a. The twenty hydrogen igniters of the CHS shown in Figure 2.11.4-1 are powered by two non-class 1E buses ~~(i.e., ten igniters per bus),~~ with non-class 1E alternate ac (AAC) power sources.	6.a. ~~Inspections~~Tests will be performed on the twenty as-built hydrogen igniters of the CHS.	6.a. The twenty as-built hydrogen igniters of the CHS shown in Figure 2.11.4-1 are powered by two non-class 1E buses ~~(i.e., ten igniters per bus),~~ with non-class 1E AAC power sources.	DCD_14.03.11-51 DCD_19-560 DCD_14.03.11-51
6.b. Dedicated batteries are provided with the capacity to provide power for at least 24 hours to eleven out of twenty hydrogen igniters of the CHS.	6.b.i Analysis will be performed to verify dedicated batteries have enough capacity to carry the load profile of eleven out of twenty hydrogen igniters of the CHS for a duration of twenty-four hours assuming charger is unavailable.	6.b.i A report exists and concludes that the dedicated batteries have enough capacity to carry the load profile of eleven out of twenty hydrogen igniters of the CHS for a duration of twenty-four hours assuming charger is unavailable.	DCD_14.03.11-51
	6.b.ii A capacity test of the as-built dedicated batteries will be performed.	6.b.ii Capacity of the as-built dedicated batteries carries greater than or equal to the analyzed load profile.	DCD_14.03.11-51

Table 3.9-14 Valve Inservice Test Requirements (Sheet 121 of 121)

Valve Tag Number	Description	Valve/ Actuator Type	Safety-Related Missions	Safety Functions(2)	ASME IST Category	Inservice Testing Type and Frequency	IST Notes	
RCS-MOV-118	Depressurization valve for severe accident	Remote MO Globe	Maintain Close Transfer Open Transfer Close	Active RCS Pressure Boundary Remote Position	A	Remote Position Indication, Exercise/ 2 Years Exercise Full Stroke/ Cold Shutdown Operability Test Leak Test/ Refueling Outage	2 15	DCD_03.09.06-57 (d)
RCS-MOV-119	Depressurization valve for severe accident	Remote MO Globe	Maintain Close Transfer Open Transfer Close	Active RCS Pressure Boundary Remote Position	A	Remote Position Indication, Exercise/ 2 Years Exercise Full Stroke/ Cold Shutdown Operability Test Leak Test/ Refueling Outage	2 15	DCD_03.09.06-57 (d)
RHS-AOV-024B	Low Pressure Letdown Line Isolation	Remote AO Globe	Maintain Close Transfer Close	Active-to-Fail Remote Position	B	Remote Position Indication, Exercise/ 2 Years Exercise Full Stroke/ Quarterly Operability Test		DCD_14.03-11
RHS-AOV-024C	Low Pressure Letdown Line Isolation	Remote AO Globe	Maintain Close Transfer Close	Active-to-Fail Remote Position	B	Remote Position Indication, Exercise/ 2 Years Exercise Full Stroke/ Quarterly Operability Test		DCD_14.03-11

Notes:
1. This note applies to the pressurizer safety valves and to the main steam safety valves. Their position indication sensors are tested during set-pressure testing required in I-8100 of the ASME OM Code, Mandatory Appendix I.
2. These valves are normally closed to maintain the reactor coolant system pressure boundary. These valves are tested during cold shutdowns when the reactor coolant system pressure is reduced to atmospheric pressure so that an opening of this valve during this IST will not cause a LOCA.
3. The check valve exercise test is performed during refueling outage. Valves in the inaccessible primary containment can not be tested during power operation. Test of valves in operating systems may cause impact of power operation. Simultaneous testing of valves in the same system group will be considered.