**MITSUBISHI HEAVY INDUSTRIES, LTD.**
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TOKYO, JAPAN

November 02, 2011

Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Attention: Mr. Jeffery A. Ciocco

Docket No. 52-021
MHI Ref: UAP-HF-11375

**Subject: MHI's Responses to US-APWR DCD RAI No. 801-5897 REVISION 3, (SRP 03.09.06)**

**Reference:** 1) "REQUEST FOR ADDITIONAL INFORMATION 801-5897 REVISION 3, SRP Section: 03.09.06 - Functional Design Qualification and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints, Application Section: 3.9.6" dated 8/5/2011.

With this letter, Mitsubishi Heavy Industries, Ltd. ("MHI") transmits to the U.S. Nuclear Regulatory Commission ("NRC") a document entitled "Response to Request for Additional Information No. 801-5897 REVISION 3".

Enclosed are the responses to one RAI contained within Reference 1. This transmittal completes the response to this RAI.

Please contact Dr. C. Keith Paulson, Senior Technical Manager, Mitsubishi Nuclear Energy Systems, Inc. if the NRC has questions concerning any aspect of this submittal. His contact information is provided below.

Sincerely,

Y. Ogata

Yoshiki Ogata,
General Manager- APWR Promoting Department
Mitsubishi Heavy Industries, LTD.

Enclosure:

1. Response to Request for Additional Information No. 801-5897 REVISION 3.

DO81
NRD

CC: J. A. Ciocco
C. K. Paulson

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Docket No. 52-021
MHI Ref: UAP-HF-11375

Enclosure 1

UAP-HF-11375
Docket No. 52-021

Response to Request for Additional Information
No. 801-5897,Revision 3

November, 2011

## RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

**11/02/2011**

**US-APWR Design Certification**

**Mitsubishi Heavy Industries**

**Docket No. 52-021**

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| **RAI NO.:** | **NO. 801-5897 REVISION 3** |
| **SRP SECTION:** | **03.09.06 – Functional Design Qualification and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints** |
| **APPLICATION SECTION:** | **3.9.6** |
| **DATE OF RAI ISSUE:** | **8/5/2011** |

**QUESTION NO. RAI 03.09.06-49:**

This question is a follow-up to question 03.09.06-1, RAI 288-2274.

In RAI 03.09.06-01, the NRC staff requested that the US-APWR design certification applicant describe the functional qualification program for safety-related pumps, valves, and dynamic restraints. In its RAI response, the applicant stated that, as outlined in DCD Tier 2, Section 3.10, "Seismic and Dynamic Qualification of Mechanical and Electrical Equipment," the design and qualification requirements with respect to safety-related pumps, valves, and dynamic restraints will adhere to the requirements of ASME QME-1-2007, "Qualification of Active Mechanical Equipment Used in Nuclear Power Plants." The applicant stated that DCD Tier 2, Section 3.9.6.1, "Functional Design and Qualification of Pumps, Valves, and Dynamic Restraints," would be revised to include a reference to Section 3.10, "Seismic and Dynamic Qualification of Mechanical and Electrical Equipment," for the design and qualification requirements. Revision 2 (and Revision 3) to the US-APWR DCD Tier 2 includes the reference to Section 3.10 in Section 3.9.6.1. However, Section 3.10 applies to the seismic and dynamic qualification of mechanical and electrical equipment. US-APWR DCD Tier 2, Section 3.9.3.3, "Pump and Valve Operability Assurance," addresses the functional qualification of pumps and valves used in the US-APWR design.

The NRC staff requests that the US-APWR design certification applicant specify the application of ASME QME-1-2007 as accepted in Revision 3 to RG 1.100, "Seismic Qualification of Electrical and Active Mechanical Equipment and Functional Qualification of Active Mechanical Equipment for Nuclear Power Plants," in Section 3.9.3.3 or Section 3.9.6.1 of the US-APWR DCD Tier 2.

**ANSWER:**

US-APWR DCD Tier 2, Revision 3, Subsection 3.9.6.1 will be revised to state that the functional design and qualification of pumps, valves, and dynamic restraints is to be performed in accordance with ASME QME-1-2007, "Qualification of Active Mechanical Equipment Used in Nuclear Power Plants" (Reference 3.9-66), as endorsed in RG 1.100, Revision 3, "Seismic

Qualification of Electrical and Active Mechanical Equipment and Functional Qualification of Active Mechanical Equipment for Nuclear Power Plants" (Reference 3.9-16).

Section 3.9.10 will be revised to add reference "3.9-66 Qualification of Active Mechanical Equipment Used in Nuclear Power Plants. American Society of Mechanical Engineers (ASME) QME-1-2007." Reference 3.9-16 will be revised to read: "3.9-16 Seismic Qualification of Electrical and Active Mechanical Equipment and Functional Qualification of Active Mechanical Equipment for Nuclear Power Plants. Regulatory Guide 1.100, Rev. 3, U.S. Nuclear Regulatory Commission, Washington, DC, September 2009."

See the attached markup for the proposed changes.

**Impact on DCD**

US-APWR DCD Tier 2, Subsection 3.9.6.1 and 3.9.10 will be revised as described in the response and as indicated on the enclosed markup.(See Attachment-1.)

**Impact on R-COLA**

There is no impact on the COLA.

**Impact on S-COLA**

There is no impact on the COLA.

**Impact on PRA**

There is no impact on the PRA.

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**11/02/2011**

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**Mitsubishi Heavy Industries**

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| **RAI NO.:** | **NO. 801-5897 REVISION 3** |
| **SRP SECTION:** | **03.09.06 – Functional Design Qualification and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints** |
| **APPLICATION SECTION:** | **3.9.6** |
| **DATE OF RAI ISSUE:** | **8/5/2011** |

**QUESTION NO. RAI 03.09.06-50:**

This question is a follow-up to question RAI 03.09.06-2, RAI 228-2274.

US-APWR DCD Tier 2, Section 3.9.6, "Functional Design, Qualification, and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints," specifies the ASME OM Code, 1995 Edition through 2003 Addenda, in Reference 3.9-13 of US-APWR DCD Tier 2, Section 3.9.10, "References," as the basis for the US-APWR inservice testing (IST) program for ASME Code, Section III, Class 1, 2 and 3 safety-related pumps, valves, and dynamic restraints. US-APWR DCD Tier 2, Table 3.9-13, "Pump IST," indicates that the 2004 Edition of the ASME OM Code is used in the IST program for the US-APWR. In RAI 03.09.06-02, the NRC staff requested that the US-APWR design certification applicant verify the code edition and addenda to be used as the basis for the IST program. In its RAI response, the applicant stated that the reference in US-APWR DCD Tier 2, Table 3.9-13 should be to the latest edition and addenda of the ASME OM Code incorporated by reference in NRC regulations. Revision 3 to US-APWR DCD Tier 2, Section 3.9.10 continues to specify ASME OM Code, 1995 Edition through the 2003 Addenda, in Reference 3.9-13.

The NRC staff requests that the US-APWR design certification applicant establish a section in the DCD that specifies the overall provisions for the IST program for pumps, valves, and dynamic restraints. For example, the US-APWR DCD should specify the application of the 2004 Edition through the 2006 Addenda of the ASME OM Code (the most recent ASME OM Code edition/addenda incorporated by reference in 10 CFR 50.55a) for the IST program for pumps, valves, and dynamic restraints used in the US-APWR design. This new section should also include the IST provisions currently included in Section 3.9.6.1 of the US-APWR DCD, Tier 2. The new section should also specify that the US-APWR will be designed to allow accessibility for the performance of IST activities for pumps, valves, and dynamic restraints.

**ANSWER:**

The overall provisions for the IST program for pumps, valves, and dynamic restraints (i.e. the information that is currently discussed in US-APWR DCD Tier 2, Revision 3, Subsection 3.9.6.1), will be relocated to Section 3.9.6. This section will then provide an overview discussion of the IST program elements discussed in Subsections 3.9.6.2 through 3.9.6.4.

The revised Section 3.9.6 will also specify the applicability of the 2004 Edition through the 2006 Addenda of the ASME OM Code (the most recent ASME OM Code edition/addenda incorporated by reference in 10 CFR 50.55a) for the IST program for pumps, valves, and dynamic restraints used in the US-APWR design, and will also specify that the US-APWR will be designed to allow accessibility for the performance of IST activities for pumps, valves, and dynamic restraints.

In Subsection 3.9.10, Reference 3.9-13 will be revised to read as: "3.9-13 Code for Operation and Maintenance of Nuclear Power Plants. American Society of Mechanical Engineers (ASME OM Code), 2004 Edition through 2006 Addenda."

See the attached markup for the proposed changes.

**Impact on DCD**

US-APWR DCD Tier 2, Revision 3, Sections 3.9.6, 3.9.6.1, and 3.9.10 will be revised as described in the response and as indicated on the enclosed markup. (See Attachment-1.)

**Impact on R-COLA**

There is no impact on the COLA.

**Impact on S-COLA**

There is no impact on the COLA.

**Impact on PRA**

There is no impact on the PRA.

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| **RAI NO.:** | **NO. 801-5897 REVISION 3** |
| **SRP SECTION:** | **03.09.06 – Functional Design Qualification and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints** |
| **APPLICATION SECTION:** | **3.9.6** |
| **DATE OF RAI ISSUE:** | **8/5/2011** |

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**QUESTION NO. RAI 03.09.06-51:**

This question is a follow-up to question RAI 03.09.06-3, RAI 288-2274.

In RAI 03.09.06-3, the NRC staff requested that the US-APWR design certification applicant clarify the reference to inservice inspection (ISI) requirements in Revision 1 to US-APWR DCD Tier 2, Section 3.9.6.1 for ASME B&PV Code Section III, Class 1, 2 and 3 pumps, valves, and dynamic restraints. In its RAI response, the applicant stated that Section 3.9.6.1 would be clarified. Subsequently, Revision 2 (and Revision 3) to the US-APWR DCD Tier 2, Section 3.9.6.1 specifies IST requirements for ASME OM Code Section III, Class 1, 2 and 3 pumps, valves, and dynamic restraints. However, the scope of Section 3.9.6.1 applies to the functional design and qualification of pumps, valves, and dynamic restraints. The NRC staff requests that the applicant relocate the discussion of IST requirements to the applicable section in the DCD.

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**ANSWER:**

The discussion of IST requirements for ASME OM Code Section III, Class 1, 2 and 3 pumps, valves, and dynamic restraints contained in Subsection 3.9.6.1 will be relocated to Section 3.9.6. See the response to RAI 03.09.06-50.

See the attached markup for the proposed changes.

**Impact on DCD**

US-APWR DCD Tier 2, Revision 3, Sections 3.9.6 and 3.9.6.1 will be revised as described in the response and as indicated on the enclosed markup. (See Attachment-1.)

**Impact on R-COLA**

There is no impact on the COLA.

**Impact on S-COLA**

There is no impact on the COLA.

**Impact on PRA**

There is no impact on the PRA.

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| **SRP SECTION:** | **03.09.06 – Functional Design Qualification and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints** |
| **APPLICATION SECTION:** | **3.9.6** |
| **DATE OF RAI ISSUE:** | **8/5/2011** |

**QUESTION NO. RAI 03.09.06-52:**

This question is a follow-up to question RAI 03.09.06-4, RAI 288-2274.

In RAI 03.09.06-04, the NRC staff requested that the US-APWR design certification applicant describe testing of pumps and valves at design-basis conditions. In its RAI response, the applicant responded that testing of pumps and valves in the US-APWR is consistent with the requirements of General Design Criteria (GDC) 37, 40, 43, and 46 of 10 CFR Part 50, Appendix A.

The NRC staff requests that the US-APWR design certification applicant relocate the IST provisions in US-APWR DCD Tier 2, Section 3.9.6.1 to an IST section in the DCD, and specify provisions for the functional design and qualification of pumps, valves, and dynamic restraints in Section 3.9.6.1. For example, Section 3.9.6.1 should address the functional qualification process (such as ASME QME-1-2007 as accepted in Revision 3 to RG 1.100), specify the applicable GDC for functional design and qualification, and reference other applicable DCD sections that address functional design and qualification of pumps, valves, and dynamic restraints.

**ANSWER:**

US-APWR DCD Tier 2, Revision 3, Subsection 3.9.6.1 will be revised to specify the provisions for the functional design and qualification of pumps, valves, and dynamic restraints. Also see response to RAI 03.09.06-49.

The applicable GDC for functional design and qualification of pumps, valves, and dynamic restraints will be included in Section 3.9.6. Other applicable DCD sections that address functional design and qualification of pumps, valves, and dynamic restraints will be specified in Section 3.9.6.

See the attached markup for the proposed changes.

**Impact on DCD**

US-APWR DCD Tier 2, Revision 3, Sections 3.9.6 and 3.9.6.1 will be revised as described in the response and as indicated on the enclosed markup. (See Attachment-1.)

**Impact on R-COLA**

There is no impact on the COLA.

**Impact on S-COLA**

There is no impact on the COLA.

**Impact on PRA**

There is no impact on the PRA.

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| **RAI NO.:** | **NO. 801-5897 REVISION 3** |
| **SRP SECTION:** | **03.09.06 – Functional Design Qualification and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints** |
| **APPLICATION SECTION:** | **3.9.6** |
| **DATE OF RAI ISSUE:** | **8/5/2011** |

**QUESTION NO. RAI 03.09.06-53:**

This question is a follow-up to question RAI 03.09.06-7, RAI 288-2274.

In RAI 03.09.06-07, the NRC staff requested that the US-APWR design certification applicant provide a full description of the IST program for pumps that complies with the ASME OM Code, or specify that the COL applicant will need to supplement the US-APWR DCD to provide a full description of the IST program for pumps as part of the COL application. In its RAI response, the applicant proposed to clarify the DCD regarding the responsibility of the COL applicant to provide a full description of the IST program for pumps. Subsequently, Revision 2 (and Revision 3) to US-APWR DCD Tier 2, Section 3.9.6 states that the COL applicant is to administratively control the edition and addenda to be used for the IST program plan, and to provide a full description of their IST program plan for pumps, valves, and dynamic restraints. Further, Revision 2 (and Revision 3) to US-APWR DCD Tier 2, Section 3.9.9, "Combined License Information," specifies in COL Information Item COL 3.9(8) that the COL applicant is to administratively control the edition and addenda to be used for the IST program plan, and to provide a full description of their IST program plan for pumps, valves, and dynamic restraints.

The NRC staff requests that the US-APWR design certification applicant clarify whether the DCD is intended to fully describe the IST program for pumps used in the US-APWR, or the COL applicant must supplement the provisions in the US-APWR DCD to fully describe the IST program for pumps in its COL application.

**ANSWER:**

US-APWR DCD Tier 2, Revision 3, Subsection 3.9.6.2 will be revised to fully describe the IST program for pumps used in the US-APWR.

Section 3.9.9, "Combined License Information," Item COL 3.9(8), will be revised to delete the requirement that the COL applicant is to provide a full description of their IST program plan for pumps, valves, and dynamic restraints. See response to RAIs 03.09.06-55 and 03.09.06-68.

See the attached markup for the proposed changes.

**Impact on DCD**

US-APWR DCD Tier 2, Revision 3, Subsections 3.9.6.2 and 3.9.9 will be revised as described in the response and as indicated on the enclosed markup. (See Attachment-1.)

**Impact on R-COLA**

R-COLA will be revised to delete COL applicant response to the deleted COL action item that will be deleted from the DCD.

**Impact on S-COLA**

S-COLA will be revised to delete COL applicant response to the deleted COL action item that will be deleted from the DCD

**Impact on PRA**

There is no impact on the PRA.

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| **RAI NO.:** | **NO. 801-5897 REVISION 3** |
| **SRP SECTION:** | **03.09.06 – Functional Design Qualification and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints** |
| **APPLICATION SECTION:** | **3.9.6** |
| **DATE OF RAI ISSUE:** | **8/5/2011** |

**QUESTION NO. RAI 03.09.06-54:**

This question is a follow-up to question RAI 03.09.06-9, RAI 288-2274.

In RAI 03.09.06-09, the NRC staff requested that the US-APWR design certification applicant provide the basis for not including the Class 2 Safety Injection (SI) Auxiliary Oil Pumps, Class 3 Boric Acid Transfer Pumps, and Class 3 Emergency Gas Turbine Fuel Oil Transfer Pumps in US-APWR DCD Tier 2, Table 3.9-13. In its RAI response, the applicant stated the Emergency Gas Turbine Fuel Oil Transfer Pumps would be added to Table 3.9-13. The applicant clarified that the SI Auxiliary Oil Pumps are attached to the SI Pumps and tested concurrently, and therefore are not included in Table 3.9-13. The Boric Acid Transfer Pumps are non-safety pumps as identified in US-APWR DCD Tier 2, Table 3.2-2, "Classification of Mechanical and Fluid Systems, Components, and Equipment," and therefore are not included in Table 3.9-13. The staff finds this response to be acceptable. However, in reviewing Revision 2 to US-APWR DCD Tier 2, Table 3.9-13, the staff found that the new entries for the Emergency Gas Turbine Fuel Oil Transfer Pumps do not appear to match the RAI response (such as the pump tag numbers and specified tests). In reviewing Revision 3 to US-APWR DCD Tier 2, Table 3.9-13, the staff found that the Emergency Gas Turbine Fuel Oil Transfer Pump numbers were changed to GTS-MPP-001A to D, and 002A to D. The staff requests that the US-APWR design certification applicant resolve the differences between the RAI response and US-APWR DCD Tier 2, Table 3.9-13 for the Emergency Gas Turbine Fuel Oil Transfer Pumps.

**ANSWER:**

The Emergency Gas Turbine Fuel Oil Transfer Pump tag numbers were changed to GTS-MPP-001A through D and GTS-MPP-002A through D after submittal of the RAI 03.09.06-09 response. US-APWR DCD Tier 2, Revision 3, Table 3.9-13 reflects the correct pump tag numbers.

**Impact on DCD**

There is no impact on the DCD.

**Impact on R-COLA**

There is no impact on the COLA.

**Impact on S-COLA**

There is no impact on the COLA.

**Impact on PRA**

There is no impact on the PRA.

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| **APPLICATION SECTION:** | **3.9.6** |
| **DATE OF RAI ISSUE:** | **8/5/2011** |

**QUESTION NO. RAI 03.09.06-55:**

This question is a follow-up to question RAI 03.09.06-10, RAI 288-2274.

In RAI 03.09.06-10, the NRC staff requested that the US-APWR design certification applicant provide a full description of the IST program for valves in the US-APWR, or specify that the COL applicant will need to supplement the US-APWR DCD provisions to provide a full description of the IST program for valves as part of the COL application. In its response to RAI 03.09.06-10, the applicant referred to the regulatory requirement that the IST program to be developed by the COL licensee must satisfy the ASME OM Code incorporated by reference into 10 CFR 50.55a 12 months before fuel loading. The applicant also referred to its response to RAI 03.09.06-07 in stating that the US-APWR DCD would be revised to specify that the COL applicant will administratively control the code edition and addenda to be used for the IST program and will provide a full description of the IST program for valves. Subsequently, Revision 2 (and Revision 3) to US-APWR DCD Tier 2, Section 3.9.6 states that the COL applicant is to administratively control the code edition and addenda to be used for the IST program plan, and to provide a full description of their IST program plan for valves. Further, Revision 2 (and Revision 3) to US-APWR DCD Tier 2, Section 3.9.9 specifies in COL Information Item COL 3.9(8) that the COL applicant is to administratively control the edition and addenda to be used for the IST program plan, and to provide a full description of their IST program plan for valves. The NRC staff requests that the US-APWR design certification applicant clarify whether the DCD is intended to fully describe the IST program for valves in the US-APWR, or that the COL applicant must supplement the provisions in the USAPWR DCD to fully describe the IST program for valves in its COL application.

**ANSWER:**

US-APWR DCD Tier 2, Revision 3, Subsection 3.9.6.3 will be revised to fully describe the IST program for valves used in the US-APWR.

Section 3.9.9, "Combined License Information," Item COL 3.9(8), will be revised to delete the requirement that the COL applicant is to provide a full description of their IST program plan for pumps, valves, and dynamic restraints. See response to RAIs 03.09.06-53 and 03.09.06-68.

See the attached markup for the proposed changes.

**Impact on DCD**

US-APWR DCD Tier 2, Revision 3, Subsections 3.9.6.3 and 3.9.9 will be revised as described in the response and as indicated on the enclosed markup. (See Attachment-1.)

**Impact on R-COLA**

R-COLA will be revised to delete COL applicant response to the deleted portion of COL action item 3.9 (8) that will be deleted from the DCD.

**Impact on S-COLA**

S-COLA will be revised to delete COL applicant response to the deleted portion of COL action item 3.9 (8) that will be deleted from the DCD.

**Impact on PRA**

There is no impact on the PRA.

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| **RAI NO.:** | **NO. 801-5897 REVISION 3** |
| **SRP SECTION:** | **03.09.06 – Functional Design Qualification and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints** |
| **APPLICATION SECTION:** | **3.9.6** |
| **DATE OF RAI ISSUE:** | **8/5/2011** |

**QUESTION NO. RAI 03.09.06-56:**

This question is a follow-up to question RAI 03.09.06-11, RAI 288-2274.

In RAI 03.09.06-11, the NRC staff requested that the US-APWR design certification applicant clarify the IST program description for testing thermal relief valves. In its RAI response, the applicant stated that safety-related thermal relief valves are used in the US-APWR design and that testing of these relief valves will be included in the IST program. The applicant also noted that thermal relief valve testing will be conducted in accordance with paragraphs I-1340 and I-1390 in Appendix I, "Inservice Testing of Pressure Relief Devices in Light-Water Reactor Nuclear Power Plants," to the ASME OM Code. The applicant stated that the IST provisions for valves NCS-VLV-406A to D, NCV-VLV-513, NCS-VLV-533, and NCS-VLV-035A and B would be included in US-APWR DCD Tier 2, Table 3.9-14, "Valve Inservice Test Requirements." The NRC staff requests that the applicant clarify the numbering of these valves as incorporated into Table 3.9-14.

**ANSWER:**

Subsequent to the submittal of the response to RAI 03.09.06-11, the type designation for the valves was changed from VLV to SRV. The valve tag designation entries in US-APWR DCD Tier 2, Revision 3, Table 3.9-14, are correct. Revision 3 also corrected the typographical errors in the RAI 03.09.06-11 response and/or DCD markup related to the use of NCV instead of NCS for the valve tag designation for valves 513 and 533.

**Impact on DCD**

There is no impact on the DCD.

**Impact on R-COLA**

There is no impact on the COLA.

**Impact on S-COLA**

There is no impact on the COLA.

**Impact on PRA**

There is no impact on the PRA.

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**11/02/2011**

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| **APPLICATION SECTION:** | **3.9.6** |
| **DATE OF RAI ISSUE:** | **8/5/2011** |

**QUESTION NO. RAI 03.09.06-57:**

This question is a follow-up to question 03.09.06-12, RAI 288-2274.

In RAI 03.09.06-12, the NRC staff requested that the US-APWR design certification applicant provide additional information to confirm that the valve testing provisions in US-APWR DCD Tier 2, Table 3.9-14 are consistent with the ASME OM Code requirements and other sections of the Design Certification documentation. Supplemental requests for information based on the RAI responses are as follows (this question uses the lettering from Question 03.09.06-12 for clarity):

(c) The staff requested that the applicant provide additional information on leakage criteria for Reactor Coolant System (RCS) PIVs RCS-MOV-116A and B, and 117A and B, which are identified as ASME OM Category B valves. In its RAI response, the applicant stated that any leakage past these valves is to the pressurizer relief tank (PRT), which does not present a potential for system overpressurization due to the leakage. As a follow-up to RAI 03.09.06-12(c), the staff requests that the applicant clarify any leakage limits for the system through RCS-MOV-116A and B, and 117A and B.

(d) The staff requested that the applicant provide additional information on the leakage criteria for valves RCS-MOV-118, 119, 002A and B, and 003A and B, which are maintained closed to preserve the RCS pressure boundary. In its RAI response, the applicant stated that no leakage criteria are applicable to these valves because any leakage from these valves is discharged to the PRT. As a follow-up to RAI 03.09.06-12(d), the staff requests that the applicant clarify any leakage limits for the system through RCS-MOV-118, 119, 002A and B, and 003A and B.

(g) The staff requested that the applicant provide additional information regarding the leakage criteria for containment isolation valves SIS-MOV-001A to D, and 009A to D, and SIS-VLV-010A to D listed in Table 3.9-14. In its RAI response, the applicant indicated that Table 3.9-14 would be revised to specify leakage testing for valves SIS-MOV-009A to D. The applicant clarified that 10 CFR Part 50, Appendix J, Type C testing is not required for valves SIS-MOV-001A to D as they are installed in closed systems outside containment and have a fluid seal. Revision 2 to US-APWR DCD Tier 2, Table 3.9-14 specified leakage testing for valves SIS-MOV-009A to D, but deleted other IST requirements. Revision 3 to US-APWR DCD Tier 2, Table 3.9-14 reinstated the

exercise full stroke/quarterly operability test for these valves. However, Table 3.9-14 does not include the remote position indication test for these valves. As a follow-up to RAI 03.09.06-12(g), the staff requests that the applicant resolve the deletion of the remote position indication test for SIS-MOV-009A to D from Table 3.9-14. The staff also requests that the applicant confirm that Table 3.9-14 requires a remote position indication test for other valves in accordance with the ASME OM Code.

(i) The staff requested that the applicant clarify the allowable leak rate limits for reactor coolant pressure boundary (RCPB) PIVs SIS-MOV-014A to D. In its RAI response, the applicant stated that SIS-MOV-014A to D isolate the RCS from an attached safety injection system. The applicant stated that leakage from these valves would be discharged to the refueling water storage pit. Therefore, the applicant did not consider leakage limits to be necessary. As a follow-up to RAI 03.09.06-12 (i), the staff requests that the applicant clarify whether any leakage limitations from the RCS are applicable to these valves.

(j) The staff requested that the applicant clarify the allowable leak rate limits for valves SIS-MOV-031B, 031D, 032B and 032D. In its RAI response, the applicant stated that SIS-MOV-031B, 031D, 032B, and 032D isolate the RCS from an attached safety injection system. The applicant stated that any leakage would be discharged to the refueling water storage pit. Therefore, the applicant did not consider leakage limits to be necessary. As a follow-up to RAI 03.09.06-12 (j), the staff requests that the applicant clarify whether any leakage limitations from the RCS are applicable to these valves.

(l)The staff requested that the applicant provide additional information regarding the basis for omitting leak tests of RCS pressure boundary containment isolation valves RHS-MOV-002A to D, which are water sealed in a closed system and closed when in modes above hot shutdown. In its RAI response, the applicant discussed the function of the valves, and the configuration and operation of the associated system. Revision 2 (and Revision 3) to US-APWR DCD Tier 2, Table 3.9-14, includes Note 10 that discusses the justification for omitting leak tests of these valves. As a follow-up to RAI 03.09.06-12(l), the NRC staff requests that the applicant clarify the potential loss of the water seal and if leak testing of these valves is necessary to address this scenario.

(p) The staff requested that the applicant clarify the valve type for main feedwater isolation valves NFS-VLV-512A to D to be able to determine the appropriate IST requirements. In its RAI response, the applicant stated that the valve type and IST requirements would be specified in Table 3.9-14. Subsequently, Revision 2 to US-APWR DCD Tier 2, Table 3.9-14 identified the main feedwater isolation valves as NFS-SMV-512A to D with IST requirements as Remote Position Indication with Exercise every 2 years, Exercise Full Stroke at Cold Shutdown, and Operability Test. In Revision 3 to the US-APWR DCD, these valves are identified as FWS-SMV-512A to D. As a follow-up to RAI 03.09.06-12(p), the staff requests that the applicant clarify the apparent difference in the valve/actuator type indicated in the RAI response and DCD.

(r) The staff requested that the applicant specify the valve and actuator type for valves NMS-HCV-3625, 3635, and 3645. In its RAI response, the applicant stated that Table 3.9-14 would be revised to specify the valve and actuator type for these valves. As a follow-up to RAI 03.09.06-12(r), the staff requests that the applicant identify these valves in Table 3.9-14.

(t) The staff requested that the applicant provide additional information regarding the basis for alternate exercise methods specified for check valves CSS-VLV-005A to D in Table 3.9-14 (Revision 0) rather than nonintrusive means. In its RAI response, the applicant stated that these valves could be tested by nonintrusive means. Subsequently, Revision 2 to US-APWR DCD Tier 2, Table 3.9-14 specifies exercise testing of valves CSS-VLV-005A to D every refueling outage. In Revision 3 to US-APWR DCD Tier 2, Table 3.9-14, the applicant identified valves CSS-VLV-005A to D as OM Category AC check valves. As a follow-up to RAI 03.09.06-12(t), the staff

requests that the applicant specify the leak testing provisions (and remote position indication if equipped with remote indicators) for these valves in Table 3.9-14.

(u) The staff requested that the applicant clarify the function of valves EWS-VLV-602A to D. In its RAI response, the applicant indicated that the function of these valves is to open and close the EWSP motor cooling water path according to the cooling water supply conditions. In Revision 3 to US-APWR DCD Tier 2, the applicant deleted these valves from Table 3.9-14. As a follow-up to RAI 03.09.06-12(u), the staff requests that the applicant clarify the basis for the deletion of these valves from the IST program.

(w) The staff requested that the applicant provide additional information on the IST requirements for containment isolation check valve DWS-VLV-005. In its RAI response, the applicant stated that DWS-VLV-005 is the containment isolation valve in the demineralized water supply line, which is not used during normal operation but only during a refueling outage for maintenance activities. Table 3.9-14 specifies check valve DWS-VLV-005 as a passive valve. The staff notes that check valves are considered active valves within the IST program with testing in the open and close direction to verify the integrity of the valve disk. As a follow-up to RAI 03.09.06-12(w), the staff requests that the applicant discuss the basis for categorizing check valves in the IST program (such as DWS-VLV-005, RWS-VLV-003, and any other check valves in Table 3.9-14) as passive valves.

(y) The staff requested that the applicant provide additional information on the basis for Note 11 in Revision 0 to US-APWR DCD Tier 2, Table 3.9-14 regarding partial stroke tests of valves. In its RAI response, the applicant stated that Revision 1 to Table 3.9-14 specified exercise full stroke at cold shutdown for the main steam isolation valves and main feed isolation valves. The applicant also stated that Note 11 had been modified to reflect the revised exercising frequency. As a follow-up to RAI 03.09.06-12(y), the staff requests that the applicant clarify the discussion in Note 11 regarding hot standby testing compared to the cold shutdown frequency specified for these valves in Table 3.9-14.

(z) The staff requested that the applicant discuss the use of alternate test methods specified for accumulator injection line check valves SIS-VLV-102A to D and 103A to D, containment spray containment isolation check valves CSS-VLV-005A to D, and main steamline check valves NMS-VLV-516A to D, rather than non-intrusive testing. In its RAI response, the applicant stated that non-intrusive means can be employed to test the accumulator injection line check valves and containment spray header containment isolation check valves as indicated in response to RAI 03.09.06-12(k) and RAI 03.09.06-12(t). The applicant also indicated that non-intrusive testing can be applied to the turbine driven emergency feedwater pump steam supply line drain line check valves. However, the applicant stated that the main steam check valves (identified as MSS-VLV-516A to D in DCD Revisions 2 and 3) cannot be tested on line and, therefore, will be tested during the cold shutdown of a refueling outage. Subsequently, Revision 2 (and Revision 3) to US-APWR DCD Tier 2, Table 3.9-14, Note 12 specifies alternative testing for the main steam check valves. The staff finds that the modifications to Table 3.9-14 for testing of the accumulator injection line check valves, containment spray header containment isolation check valves, and turbine driven emergency feedwater pump steam supply line drain line check valves to satisfy the ASME OM Code. As a follow-up to RAI 03.09.06-12(z), the staff requests that the applicant clarify the provision for testing the main steamline check valves when cold shutdown conditions for a refueling outage are established, rather than for any cold shutdown.

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**ANSWER:**

(c) The leakage limits for reactor coolant system (RCS) pressure boundary valves RCS-MOV-116A and -116B, and -117A and -117B will be the same as the leakage limits for pressure isolation valves as specified in Technical Specification (TS) 3.4.14, "RCS Pressure Isolation Valve (PIV) Leakage," US-APWR DCD, Tier 2, Revision 3, Chapter 16. TS surveillance requirement SR 3.4.14.1 requires verification that leakage through the valves be equivalent to ≤ 0.5 gpm per nominal inch of valve size up to a maximum of 5 gpm at an RCS pressure□≥ 2215 psig and ≤ 2255 psig. For each affected valve, the Table 3.9-14 column labeled "Inservice Testing Type and Frequency" will be revised to require "Leak Test/ Refueling Outage" and the column labeled "IST Notes" will be revised to add reference to a new note "15". The Notes Section at the end of The Table 3.9-14 will be revised to add a new note 15 stating "Technical Specification surveillance requirement SR 3.4.14.1 will be used for the valve leakage acceptance criteria".

(d) The leakage limits for reactor coolant system (RCS) pressure boundary valves RCS-MOV-118, -119, -002A and -002B, and -003A and -003B will be the same as the leakage limits for pressure isolation valves as specified in Technical Specification (TS) 3.4.14, "RCS Pressure Isolation Valve (PIV) Leakage," US-APWR DCD, Tier 2, Revision 3, Chapter 16. TS surveillance requirement SR 3.4.14.1 requires verification that leakage through the valves be equivalent to ≤ 0.5 gpm per nominal inch of valve size up to a maximum of 5 gpm at an RCS pressure□≥ 2215 psig and ≤ 2255 psig. For each affected valve, the Table 3.9-14 column labeled "Inservice Testing Type and Frequency" will be revised to require "Leak Test/ Refueling Outage" and the column labeled "IST Notes" will be revised to add reference to a new note "15". The Notes Section at the end of The Table 3.9-14 will be revised to add a new note 15 stating "Technical Specification surveillance requirement SR 3.4.14.1 will be used for the valve leakage acceptance criteria". Table 3.9-14 will also be revised to include RCS-MOV-118 and -119.

(g) A remote position indication test every 2 years will be added to the Table 3.9-14 column "Inservice Testing Type and Frequency" for SIS-MOV-009A through -009D. Table 3.9-14 was reviewed to confirm that other valves listed in the table requiring a remote position indication test in accordance with the ASME OM Code showed the requirement for the test. As a result of the review, Table 3.9-14 column "Inservice Testing Type and Frequency" was similarly modified for SIS-MOV-001A through -001D. In addition, Table 3.9-14 lists RWS-VLV-023 as having a Remote Position under the column labeled "Safety Functions(2)". RWS-VLV-023 is a check valve which does not have remote position capability and therefore the statement regarding remote position will be deleted from Table 3.9-14 for this valve.

(i) The leakage limits for reactor coolant system (RCS) pressure boundary valves SIS-MOV-014A through -014D will be the same as the leakage limits for pressure isolation valves as specified in Technical Specification (TS) 3.4.14, "RCS Pressure Isolation Valve (PIV) Leakage," US-APWR DCD, Tier 2, Revision 3, Chapter 16. TS surveillance requirement SR 3.4.14.1 requires verification that leakage through the valves be equivalent to ≤ 0.5 gpm per nominal inch of valve size up to a maximum of 5 gpm at an RCS pressure ≥ 2215 psig and ≤ 2255 psig. For each affected valve, the Table 3.9-14 column labeled "Inservice Testing Type and Frequency" will be revised to require "Leak Test/ Refueling Outage" and the column labeled "IST Notes" will be revised to add reference to a new note "15". The Notes Section at the end of The Table 3.9-14 will be revised to add a new note 15 stating "Technical Specification surveillance requirement SR 3.4.14.1 will be used for the valve leakage acceptance criteria".

(j) The leakage limits for reactor coolant system (RCS) pressure boundary valves SIS-MOV-031A, -031D, -032A, and -032D (-031B and -032B as stated in the RAI are incorrect) will be the same as the leakage limits for pressure isolation valves as specified in Technical Specification (TS) 3.4.14, "RCS Pressure Isolation Valve (PIV) Leakage," US-APWR DCD, Tier 2, Revision 3, Chapter 16. TS surveillance requirement SR 3.4.14.1 requires verification that leakage through the valves be equivalent to ≤ 0.5 gpm per nominal inch of valve size up to a maximum of 5 gpm at an RCS pressure ≥ 2215 psig and ≤ 2255 psig. For each affected valve, the Table 3.9-14 column labeled "Inservice Testing Type and Frequency" will be revised to require "Leak Test/ Refueling Outage" and the column labeled "IST Notes" will be revised to add reference to a new note "15". The Notes Section at the end of The Table 3.9-14 will be revised to add a new note 15 stating "Technical Specification surveillance requirement SR 3.4.14.1 will be used for the valve leakage acceptance criteria".

(l) The ASME IST Category A Containment leakage described in the answer to Question No. 03.09.06-12(l) of RAI No. 288-2274 is corrected to Type A of 10CFR Appendix J. The ASME IST Category C Containment leakage test described in the answer to Question No. 03.09.06-12(l) of RAI No. 288-2274 is corrected to Type C of 10CFR Appendix J. Containment penetrations and CIVs, including valves RHS-MOV-002A, -002B, -002C, and -002D, are tested as Type A of 10CFR50 Appendix J. Type C of 10 CFR50 Appendix J is not applied to these valves. The justification for the categorization of these valves is that the RHS is a closed system outside containment designed and constructed to ASME III, Class 2 and seismic Category I requirements, and as such they do not constitute a potential containment atmosphere leak path during or following a loss-of-coolant accident with a single active failure of a system component. Should the valves leak slightly when closed, the fluid seal within the pipe or the closed piping system outside containment would preclude release of containment atmosphere to the environs. During post-accident operations, the system is filled with recirculation water. During normal operation, the system is water filled, and degradation of valves or piping is readily detected. To clarify this justification, Note 10 in Table 3.9-14 of DCD Rev. 3 describes the basis for this exception. RHS-MOV-002A, B, C and D are also subject to the RCPB Leak Test. The Inservice Testing Type and Frequency for RCPB Leak Test of these valves are described as "Cold Shutdown Pressure Isolation Leak Test/Refueling" from page 3.9-148 to page 3.9-150 in Table 3.9-14 of DCD Tier 2 Revision 3.The leakage limit of the RCPB leak Test is the same as the answer to (j).

(p) The valve tag numbers NFS-VLV-512A through -512D identified in the RAI response were changed to FWS-SMV-512A through -512D after submittal of the RAI 03.09.06-12 response. US-APWR DCD Tier 2, Revision 3, Table 3.9-14 includes the correct valve tag numbers. The tag number valve type was revised from the generic "VLV" to the specific "SMV" (stepping motor valve).

(r) The valve tag numbers of main steam bypass isolation valves NMS-HCV-3615, 3625, 3635, and 3645 were changed to MSS-HCV-565, -575, -585 and -595 in Table 3.9-14 after submittal of the RAI 03.09.06-12 response. US-APWR DCD Tier 2, Revision 3, Table 3.9-14 includes the correct valve tag numbers.

(t) Valves CSS-VLV-005A through -005D (containment spray header containment isolation check valves) are not leak tested. The basis for not testing them is provided in US-APWR DCD Tier 2, Revision 3, Table 6.2.4-3, Note 4. These valves do not possess remote position indication features.

(u) Valves EWS-VLV-602A through -602D were deleted from the ESWS shown on US-APWR DCD Tier 2, Revision 3, Figure 9.2.1-1, "Essential Service Water System Piping and Instrumentation Diagram" because the EWSP motor cooling method was changed from water to air-cooling after the RAI 03.09.06-12 response was submitted. Therefore, the EWSP motor cooling water path was deleted.

(w) The US-APWR DCD Tier 2, Revision 3, Table 3.9-14 safety functions column for check valves RWS-VLV-003, DWS-VLV-005, CAS-VLV-103, and FSS-VLV-006 will be revised to indicate these check valves are considered active valves in the IST program with testing in the open and close direction to verify the integrity of the valve disk. The Inservice Testing Type and Frequency columns for these valves will be revised to add "Check Exercise/Refueling Outage". The IST Notes column for RWS-VLV-003, CAS-VLV-103, and FSS-VLV-006 will be revised to refer to Note 3.

(y) The US-APWR DCD Tier 2, Revision 3, Table 3.9-14 Inservice Testing Type and Frequency column for main steam isolation valves MSS-SMV-515A through D and main feed isolation valves FWS-SMV-512A through D will be revised to state that the full stroke testing will be done at hot standby conditions instead of at cold shutdown, consistent with Note 11.

(z) The US-APWR DCD Tier 2, Revision 3, Table 3.9-14 Inservice Testing Type and Frequency column for the main steam check valves will be revised to state that testing for main steam check valves MSS-VLV-516A through D will be done when the unit is at cold shutdown conditions during an outage of sufficient duration, instead of limited to a refueling outage.

**Impact on DCD**

US-APWR DCD Tier 2, Revision 3, Table 3.9-14 will be revised to reflect the changes noted above and in the attached markup. (See Attachment-1.)

**Impact on R-COLA**

There is no impact on the COLA.

**Impact on S-COLA**

There is no impact on the COLA.

**Impact on PRA**

There is no impact on the PRA.

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## RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

**11/02/2011**

**US-APWR Design Certification**

**Mitsubishi Heavy Industries**

**Docket No. 52-021**

| | |
|---|---|
| **RAI NO.:** | **NO. 801-5897 REVISION 3** |
| **SRP SECTION:** | **03.09.06 – Functional Design Qualification and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints** |
| **APPLICATION SECTION:** | **3.9.6** |
| **DATE OF RAI ISSUE:** | **8/5/2011** |

**QUESTION NO. RAI 03.09.06-58:**

This question is a follow-up to question 03.09.06-13, RAI 288-2274.

In RAI 03.09.06-13, the NRC staff requested that the US-APWR design certification applicant provide a full description of the MOV testing operational program in US-APWR DCD Tier 2, Section 3.9.6.3.1, "IST Program for MOVs," or specify that the COL applicant will need to supplement the US-APWR DCD to provide a full description of the MOV testing program as part of the COL application. In its RAI response, the applicant provided a planned revision to US-APWR DCD Tier 2, Section 3.9.6.3.1, that included additional information on the IST program for MOVs in the US-APWR. Revision 2 (and Revision 3) to US-APWR DCD Tier 2, Section 3.9.6.3.1 included the changes specified in the RAI response. Based on its review of Revision 3 to the US-APWR DCD, the NRC staff finds that US-APWR DCD Tier 2, Section 3.9.6.3.1 does not provide a full description of the IST program for MOVs.

In particular, the description of the IST program for MOVs needs to specify that the MOV program will satisfy the IST testing requirements in the ASME OM Code and also satisfy the requirement for periodic verification of MOVs in accordance with 10 CFR 50.55a(b)(3)(ii).

The description of the IST program for MOVs needs to specify that either in-plant valve operation or prototype valve testing at system flow and pressure, or system differential pressure, to verify correct MOV actuator sizing and control settings will satisfy 10 CFR 50.55a(b)(3)(ii). The MOV program description may reference the Joint Owners Group (JOG) Program on MOV Periodic Verification as accepted in the NRC safety evaluation dated September 25, 2006 (ML061280315), and its supplement dated September 18, 2008 (ML082480638).

The MOV program description needs to specify whether the MOV program will implement ASME OM Code Case OMN-1, "Alternative Rules for Preservice and Inservice Testing of Certain Electric Motor-Operated Valve Assemblies in Light-Water Reactor Power Plants OM Code-1995, Subsection ISTC," and Code Case OMN-11, "Risk-Informed Testing for Motor-Operated Valves," for diagnostic testing to satisfy 10 CFR 50.55a(b)(3)(ii).

The MOV program description needs to address the guidance in RG 1.206 for MOV testing provisions.

The MOV program description also needs to specify the consideration of temperature effects on MOV output, indicate that MOV operating experience is incorporated (e.g., by discussing the application of the JOG Program on MOV Periodic Verification), and address periodic verification of MOV actuator output.

As follow-up to RAI 03.09.06-13, the NRC staff requests that the US-APWR design certification applicant provide a full description of the IST program for MOVs in the USAPWR DCD, or specify that the COL applicant will be responsible for supplementing the US-APWR DCD in support of the COL application.

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**ANSWER:**

US-APWR DCD Tier 2, Revision 3, Subsection 3.9.6.3.1 will be revised to fully describe the IST program for MOVs used in the US-APWR. The guidance of RG 1.206 will be used in developing the revised section.

The description of the IST program for MOVs will specify that the MOV program will satisfy the IST testing requirements in the ASME OM Code and also satisfy the requirement for periodic verification of MOVs in accordance with 10 CFR 50.55a(b)(3)(ii).

The description of the IST program for MOVs will specify that either in-plant valve operation or prototype valve testing at system flow and pressure, or system differential pressure, to verify correct MOV actuator sizing and control settings will satisfy 10 CFR 50.55a(b)(3)(ii). The MOV program description will reference the Joint Owners Group (JOG) Program on MOV Periodic Verification. This Joint Owners Group (JOG) Program on MOV Periodic Verification has been accepted in the NRC safety evaluation dated September 25, 2006 (ML061280315), and its supplement dated September 18, 2008 (ML082480638).

The MOV program description will specify that the MOV program will implement ASME OM Code Case OMN-1, "Alternative Rules for Preservice and Inservice Testing of Certain Electric Motor-Operated Valve Assemblies in Light-Water Reactor Power Plants OM Code-1995, Subsection ISTC," to satisfy 10 CFR 50.55a(b)(3)(ii). MHI does not intend to pursue a Risk-Informed IST program using Code Case ASME OMN-11 since ASME OMN-11 in ASME OM Code-2004 states that this Code Case shall be expire on March 3, 2006 unless previously annulled or reaffirmed.

The MOV program description also will specify the consideration of temperature effects on MOV output, indicate that MOV operating experience is incorporated (e.g., by discussing the application of the JOG Program on MOV Periodic Verification), and address periodic verification of MOV actuator output.

See the attached markup for the proposed changes.

**Impact on DCD**

US-APWR DCD Tier 2, Revision 3, Subsection 3.9.6.3.1 will be revised to reflect the changes noted above and in the attached markup. (See Attachment-1.)

**Impact on R-COLA**

There is no impact on the COLA.

**Impact on S-COLA**

There is no impact on the COLA.

**Impact on PRA**

There is no impact on the PRA.

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## RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

**11/02/2011**

**US-APWR Design Certification**

**Mitsubishi Heavy Industries**

**Docket No. 52-021**

| | |
|---|---|
| **RAI NO.:** | **NO. 801-5897 REVISION 3** |
| **SRP SECTION:** | **03.09.06 – Functional Design Qualification and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints** |
| **APPLICATION SECTION:** | **3.9.6** |
| **DATE OF RAI ISSUE:** | **8/5/2011** |

**QUESTION NO. RAI 03.09.06-59:**

This question is a follow-up to question 03.09.06-14, RAI 288-2274.

In RAI 03.09.06-14, the NRC staff requested that the US-APWR design certification applicant provide a full description of the operational program for POVs other than MOVs, or specify that the COL applicant must supplement the US-APWR DCD to provide a full description of the IST program for POVs as part of the COL application. In its RAI response, the applicant stated that US-APWR DCD Tier 2, Subsection 3.9.6.3.2 would describe the application of MOV lessons learned in developing the IST program for POVs, such as discussed in NRC Regulatory Issue Summary (RIS) 2000-03, "Resolution of Generic Safety Issue 158: Performance of Safety-Related Power-Operated Valves Under Design Basis Conditions." The applicant provided a planned modification to US-APWR DCD Tier 2, Subsection 3.9.6.3.2. In its RAI response, the applicant also stated that it would specify that the COL applicant will need to supplement the US-APWR DCD to provide a full description of the IST program for POVs as part of the COL application. Revision 2 (and Revision 3) to US-APWR DCD Tier 2, Subsection 3.9.6.3.2 provided the planned modifications.

The NRC staff reviewed the description of the IST program for POVs other than MOVs provided in Revision 3 to US-APWR DCD Tier 2, Subsection 3.9.6.3.2. As a follow-up to RAI 03.09.06-14, the staff requests that the applicant clarify whether the DCD is intended to provide a full description of the IST operational program for POVs other than MOVs, or that the COL applicant is responsible for supplementing the DCD to provide a full description of the POV program. For example, the POV program description should address provisions that specify critical parameters, consideration of uncertainties in diagnostic analysis, and POV testing acceptance criteria specified in RG 1.206. The POV program description should also specify testing for all safety-related POVs regardless of their safety significance.

**ANSWER:**

US-APWR DCD Tier 2, Revision 3, Subsection 3.9.6.3.2 will be revised to fully describe the IST program for POVs used in the US-APWR.

The POV program description will be revised address provisions identified in RG 1.206, Section C.I.3.9.6.3.2 Inservice Testing Program for Power-Operated Valves Other Than MOVs.

The POV program description will also specify testing for all safety-related POVs regardless of their safety significance.

See the attached markup for the proposed changes.

**Impact on DCD**

US-APWR DCD Tier 2, Revision 3, Subsection 3.9.6.3.2 will be revised to reflect the changes noted above and in the attached markup. (See Attachment-1.)

**Impact on R-COLA**

There is no impact on the COLA.

**Impact on S-COLA**

There is no impact on the COLA.

**Impact on PRA**

There is no impact on the PRA.

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## RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

**11/02/2011**

**US-APWR Design Certification**

**Mitsubishi Heavy Industries**

**Docket No. 52-021**

| | |
|---|---|
| **RAI NO.:** | **NO. 801-5897 REVISION 3** |
| **SRP SECTION:** | **03.09.06 – Functional Design Qualification and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints** |
| **APPLICATION SECTION:** | **3.9.6** |
| **DATE OF RAI ISSUE:** | **8/5/2011** |

**QUESTION NO. RAI 03.09.06-60:**

This question is a follow-up to question 03.09.06-16, RAI 288-2274.

In RAI 03.09.06-16, the NRC staff requested that the US-APWR design certification applicant clarify the testing provisions in US-APWR DCD Tier 2, Section 3.9.6.3.3, "IST Program for Check Valves," for check valves in series. In its RAI response, the applicant stated that the US-APWR will have series-installed check valves in the safety injection and residual heat removal systems. The applicant stated that these valves are pressure isolation valves (PIVs) that will be leak tested individually. As a follow-up to RAI 03.09.06-16, the NRC staff requests that the applicant describe the test connections for these check valves to allow testing in both directions consistent with Commission guidance for check valve testing for new plants.

**ANSWER:**

Test connections for check valves for safety injection system (SIS) and residual heat removal system (RHRS) are as described in the following. A test connection is not required to perform a test of the check valves, which are series-installed in the SIS and the RHRS.

For performing a test in the open direction of the check valves, which are series-installed in the safety injection and residual heat removal systems, the test connections are not necessary since the opening of these check valves can be verified by confirming the presence of flow in the flow paths from the discharges of the safety injection pump, containment spray/residual heat removal pump and accumulator tank through these check valves. This test will be performed at refueling phase.

For performing a leak test in the close direction of the check valves, which are series-installed in the safety injection and residual heat removal systems, the test lines shown on Figure 6.3-2 ECCS P&ID (Sheets 1 to 4) and Figure 5.4.7-2 RHRS P&ID (Sheets 1 and 2) of DCD Revision 3 are used.

The RCS side of the first and the second check valves are pressurized as follows:

(1) The first check valve, which is installed on the RCS side, is pressurized by the RCS pressure. Leakage is checked at the other side of the first check valve. Test instrumentation, including a temporary pressure gauge, is installed in the test line branching from between the first and the second check valves (please see Figure 6.3-2, ECCS P&ID, Sheet 4).

(2) For the second check valve, leakage is checked by pressurizing the region between the first and the second check valves from the test line. The test line is pressurized using the accumulator tank pressure. Test instrumentation, including a temporary pressure gauge, is installed in the test line branching from the other side of the second check valve and the leakage is checked.

**Impact on DCD**

There is no impact on the DCD.

**Impact on R-COLA**

There is no impact on the COLA.

**Impact on S-COLA**

There is no impact on the COLA.

**Impact on PRA**

There is no impact on the PRA.

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**RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION**

**11/02/2011**

**US-APWR Design Certification**

**Mitsubishi Heavy Industries**

**Docket No. 52-021**

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|---|---|
| **RAI NO.:** | **NO. 801-5897 REVISION 3** |
| **SRP SECTION:** | **03.09.06 – Functional Design Qualification and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints** |
| **APPLICATION SECTION:** | **3.9.6** |
| **DATE OF RAI ISSUE:** | **8/5/2011** |

**QUESTION NO. RAI 03.09.06-61:**

This question is a follow-up to question 03.09.06-23, RAI 288-2274.

In RAI 03.09.06-23, the NRC staff requested that the US-APWR design certification applicant address several findings from the staff review comparing US-APWR DCD Tier 2, Table 6.2.4-3, "List of Containment Penetrations and System Isolation Positions," and Table 3.9-14. The NRC staff has identified the following supplemental information requests based on its review to the response to RAI 03.09.06-23:

> Table 6.2.4-3 included containment isolation valves FSS-VLV-001, 003, and 006; FSS-MOV-004; CAS-VLV-101 and 103; RMS-VLV-005; RMS-MOV-001, 002, and 003; IGS-AOV-001 and 002; and LTS-VLV-001 and 002, which were not listed in Table 3.9-14. In its RAI response, the applicant indicated that these valves would be included in the DCD. The staff has found the valves to be included in Revision 2 (and Revision 3) to US-APWR DCD Tier 2, Table 3.9-14, with the exception of FSS-VLV-001. As Supplement 1 to RAI 03.09.06-23(c), the staff requests that the applicant clarify the specification of FSS-VLV-001 in Table 3.9-14.
>
> Table 6.2.4-3 did not include units for the operating time for the containment isolation valves. In its RAI response, the applicant indicated that units for closure time will be included in Table 6.2.4-3. As Supplement 1 to RAI 03.09.06-23(e), the staff requests that the applicant clarify the specification of the stroke time units in Table 6.2.4-3.

**ANSWER:**

The valve tag number for FSS-VLV-001 was changed to FSS-AOV-001 in US-APR DCD Tier 2, Revision 3 Table 3.9-14. That revision reflects the correct designation.

The stroke time units in US-APR DCD Tier 2, Revision 3 Table 6.2.4-3 are seconds. The Table 6.2.4-3 column for "Valve Closure" will be revised to "Valve Closure (seconds)".

**Impact on DCD**

US-APWR DCD Tier 2, Revision 3, Table 3.9-14 will be revised to reflect the changes noted above and in the attached markup. (See Attachment-1.)

**Impact on R-COLA**

There is no impact on the COLA.

**Impact on S-COLA**

There is no impact on the COLA.

**Impact on PRA**

There is no impact on the PRA.

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**11/02/2011**

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| **RAI NO.:** | **NO. 801-5897 REVISION 3** |
| **SRP SECTION:** | **03.09.06 – Functional Design Qualification and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints** |
| **APPLICATION SECTION:** | **3.9.6** |
| **DATE OF RAI ISSUE:** | **8/5/2011** |

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**QUESTION NO. RAI 03.09.06-62:**

This question is a follow-up to question 03.09.06-24, RAI 288-2274.

In RAI 03.09.06-24, the NRC staff requested that the US-APWR design certification applicant provide additional information on the design and operation of the essential service water system described in US-APWR DCD Tier 2, Section 9.2.1, "Essential Service Water System,", and the need for pressure relief devices in the system. In its RAI response, the applicant stated that the essential service water system is designed to withstand maximum operating pressure, taking into account maximum pump discharge and static head in the system. Therefore, the applicant did not plan to include pressure relief devices in the essential service water system. As a follow-up to RAI 03.09.06-24, the staff requests that the applicant clarify the potential for thermal expansion and the possibility of system or component damage due to thermal expansion effects.

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**ANSWER:**

The Essential Service Water (ESW) inlet line and the ESW outlet line of CCW HXs and Chiller Units have manual valves that are locked open. When maintenance is performed on these components, the relevant component (i.e., a CCW HX or a Chiller unit) is isolated at its "cooled" side (i.e., CCW side or Chilled water side) by closing valves at forward and backward of the relevant component, then, the ESWS side of the relevant component is isolated by closing valves provided at forward and backward of the relevant component after temperature indication of the ESW outlet line equals to temperature indication of the ESW inlet line. The temperature of the ESWS side does not increase when the valves at forward and backward at the ESWS side are closed because of no heat input from CCWS side to ESWS side.

**Impact on DCD**

There is no impact on the DCD.

**Impact on R-COLA**

There is no impact on the COLA.

**Impact on S-COLA**

There is no impact on the COLA.

**Impact on PRA**

There is no impact on the PRA.

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| **RAI NO.:** | **NO. 801-5897 REVISION 3** |
| **SRP SECTION:** | **03.09.06 – Functional Design Qualification and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints** |
| **APPLICATION SECTION:** | **3.9.6** |
| **DATE OF RAI ISSUE:** | **8/5/2011** |

**QUESTION NO. RAI 03.09.06-63:**

This question is a follow-up to question 03.09.06-34, RAI 288-2274.

In RAI 03.09.06-34, the NRC staff requested that the US-APWR design certification applicant provide additional information regarding valves EWS-VLV-502A to D, and 602A to D that are listed in Table 3.9-14 but not in Revision 0 to US-APWR DCD Tier 1, Table 2.7.3.1-2, "Essential Service Water System Equipment Characteristics." In its RAI response, the applicant stated that Table 2.7.3.1-2 would be revised to include the applicable information for the subject valves. Subsequently, Revision 2 to US-APWR DCD Tier 1, Table 2.7.3.1-2 includes EWS-VLV-502A to D, and 602A to D, and their applicable performance characteristics as indicated in the RAI response (with the exception of Class 1E and harsh environment qualification). In addition, Revision 3 to US-APWR DCD Tier 1, Table 2.7.3.1-2 does not include EWS-VLV-602A to D. As a follow-up to RAI 03.09.06-34, the NRC staff requests that the applicant provide the basis for the provisions for EWS-VLV-502A to D, and 602A to D in US-APWR DCD Tier 1, Table 2.7.3.1-2.

**ANSWER:**

The EFWP motor cooling method was changed from water-cooling to air-cooling after submittal of the RAI 03.09.06-34 response; therefore, valves EWS-VLV-602A to D were deleted from the ESWS as shown on Figure 9.2.1-1, "Essential Service Water System Piping and Instrumentation Diagram" of US-APWR DCD Tier 2, Revision 3, and also from US-APWR DCD Tier 1, Revision 3, Table 2.7.3.1-2 and from US-APWR DCD Tier 2, Revision 3, Table 3.9-14.

EWS-VLV-502A through -502D remain in the system, and are included in US-APWR DCD Tier 1, Table 2.7.3.1-2, Revision 3, and US-APWR DCD Tier 2, Revision 3, Table 3.9-14.

**Impact on DCD**

There is no impact on the DCD.

**Impact on R-COLA**

There is no impact on the COLA.

**Impact on S-COLA**

There is no impact on the COLA.

**Impact on PRA**

There is no impact on the PRA.

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| **RAI NO.:** | **NO. 801-5897 REVISION 3** |
| **SRP SECTION:** | **03.09.06 – Functional Design Qualification and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints** |
| **APPLICATION SECTION:** | **3.9.6** |
| **DATE OF RAI ISSUE:** | **8/5/2011** |

**QUESTION NO. RAI 03.09.06-64:**

This question is a follow-up to question 03.09.06-36, RAI 288-2274.

In RAI 03.09.06-36, the NRC staff requested that the US-APWR design certification applicant clarify the ASME OM Code categorization of component cooling water (CCW) valves NCS-MOV-237A and B and NCS-MOV-232A and B in US-APWR DCD Tier 2, Table 3.9-14 as ASME OM Category B without leakage criteria. In its RAI response, the applicant indicated that NCS-MOV-232A and B are used to establish bypass flow and isolate CCW supply headers. Therefore, no specific maximum amount of seat leakage in the closed position is applied to the valves. The staff finds the clarification of the OM categorization of NCS-MOV-232A and B to be acceptable. As a follow-up to RAI 03.09.06-36, the NRC staff requests that the applicant discuss the ASME OM Code categorization of NCS-MOV-237A and B.

**ANSWER:**

Valves NCS-MOV-237A and B do not exist in the MHI Component Cooling Water (CCW) system design and have been identified in error. The CCW system Train A and Train C supply or return lines of the component cooling water system can be connected by valves NCS-MOV-232A and B (cross-connection between A-B reactor coolant pump and C-D reactor coolant pump supply line isolation) and NCS-MOV-233A and B (cross-connection between A-B reactor coolant pump and C-D reactor coolant pump return line isolation), respectively. The staff found the clarification of the OM categorization of NCS-MOV-232A and B to be acceptable. The basis for the ASME Code categorization for NCS-MOV-233A and B is similar. The function of valves NCS-MOV-233A and B is to establish flow bypass. Normally the train A and C CCW return lines are isolated from each other by normally closed valves. In the case of failure of one return line, valves NCS-MOV-233A and B are opened and component cooling water flow is established to both trains from the cross-connected return lines.

The valves and related piping are seismically-designed and designed as Quality Group C. The operating pressure of the CCW system is relatively low at 200 psig. The two valves in the line are

installed in series. Therefore, the valves may leak slightly when closed. No specific maximum amount seat leakage (limit) in the closed position is applied to the valves. The valves are therefore categorized as IST Category B valves.

US-APWR DCD Tier 2, Revision 3, Table 3.9-14 will be revised to correct the description of valves NCS-MOV-232A and B (supply line isolation rather than return line isolation).

**Impact on DCD**

US-APWR DCD Tier 2, Revision 3, Table 3.9-14 will be revised to reflect the changes noted above and in the attached markup. (See Attachment-1.)

**Impact on R-COLA**

There is no impact on the COLA.

**Impact on S-COLA**

There is no impact on the COLA.

**Impact on PRA**

There is no impact on the PRA.

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| **RAI NO.:** | **NO. 801-5897 REVISION 3** |
| **SRP SECTION:** | **03.09.06 – Functional Design Qualification and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints** |
| **APPLICATION SECTION:** | **3.9.6** |
| **DATE OF RAI ISSUE:** | **8/5/2011** |

**QUESTION NO. RAI 03.09.06-65:**

This question is a follow-up to question 03.09.06-40, RAI 288-2274.

In RAI 03.09.06-40, the NRC staff requested that the US-APWR design certification applicant discuss prevention of backflow-induced flooding for equipment and floor drainage systems described in US-APWR DCD Tier 1, Section 2.7.6.8, "Equipment and Floor Drainage Systems." In its RAI response, the applicant stated that the engineered safety feature (ESF) equipment rooms have isolation valves installed in the drain piping preventing in-flow of water into the room by means of the floor drains. It was further noted the isolation valves are normally closed and thus no active operation is necessary for the valves to perform their function. The potential differential pressure across the valves would be low, thus leakage past the closed isolation valve would be minimal. For these reasons, the applicant determined that no IST requirements apply to the ESF room drain isolation valves. As a follow-up to RAI 03.09.06-40, the NRC staff requests that the applicant address whether opening these valves manually is a credited safety function and clarify whether the valves should be included in the IST program.

**ANSWER:**

US-APWR DCD Tier 2, Revision 3, Subsection 9.3.3.1.1 "Safety Design Bases" states in part that the drain systems from ESF equipment rooms are designed to prevent flooding due to backflow by the virtue of the difference in elevation between the ESF rooms and the collection sump. The R/B equipment and floor drainage piping are arranged so that any ESF equipment room leakage does not penetrate into other ESF equipment rooms. Discharge from each ESF equipment room is drained by gravity to either of the R/B sump tanks. The drainage piping from each ESF room is equipped with a normally closed, manually operated valve, which is located outside the equipment room. This manual valve is the same as the isolation valve installed in the drain piping, preventing in-flow of water into the engineered safety features (ESF) room by means of the floor drains. The safety function of this normally closed manual valve is to prevent flooding of an ESF room due to backflow. Opening the valves manually is not a credited safety function. The valves will be opened as necessary during maintenance of the ESF equipment.

**Impact on DCD**

There is no impact on the DCD.

**Impact on R-COLA**

There is no impact on the COLA.

**Impact on S-COLA**

There is no impact on the COLA.

**Impact on PRA**

There is no impact on the PRA.

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**RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION**

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| **RAI NO.:** | **NO. 801-5897 REVISION 3** |
| **SRP SECTION:** | **03.09.06 – Functional Design Qualification and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints** |
| **APPLICATION SECTION:** | **3.9.6** |
| **DATE OF RAI ISSUE:** | **8/5/2011** |

**QUESTION NO. RAI 03.09.06-66:**

This question is a follow-up to question 03.09.06-43, RAI 288-2274.

In RAI 03.09.06-43, the NRC staff requested that the US-APWR design certification applicant provide additional information regarding whether the US-APWR DCD in Tier 2, Section 3.9.3.4.2.9, "Snubber Examination and Testing," and Section 3.9.6.4, "IST Program for Dynamic Restraints," will provide a full description of the IST program for dynamic restraints, or will specify that the COL applicant will need to supplement the US-APWR DCD to provide a full description of the IST program for dynamic restraints as part of the COL application. In its RAI response, the applicant noted that, as indicated in its letter dated November 7, 2008, the DCD would be revised to expand the description of the IST program for dynamic restraints in DCD Tier 2, Section 3.9.6.4, including new Sections 3.9.6.4.1 through 3.9.6.4.4. In addition, the applicant noted that COL Information Item COL 3.9(6) in Section 3.9.9 would be modified to require the COL applicant to provide the IST program plan for dynamic restraints in accordance with Nonmandatory Appendix A, "Preparation of Test Plans," to the ASME OM Code. Subsequently, Revision 2 (and Revision 3) to US-APWR DCD Tier 2, Section 3.9.6.4 included these modifications.

As a follow-up to RAI 03.09.06-43, the staff requests that the applicant provide additional information regarding compliance of the IST program for dynamic restraints in the US-APWR design with the requirements of the ASME OM Code, Subsection ISTD. For example, the staff requests that the applicant clarify whether the DCD is intended to fully describe the IST program for dynamic restraints as discussed in SECY-05-097, or that the COL applicant must fully describe the IST program for dynamic restraints in accordance with the requirements in ASME OM Code, Subsection ISTD. The staff also requests that the applicant clarify the statement in DCD Tier 2, Section 3.9.6.4 that the COL applicant is to provide the IST program plan for dynamic restraints in accordance with Nonmandatory Appendix A to the ASME OM Code, which only applies to test plans rather than the program description. This statement also needs to be clarified in COL Information Item COL 3.9(6).

**ANSWER:**

US-APWR DCD Tier 2, Revision 3, Subsection 3.9.6.4 will be revised to fully describe the IST program for dynamic restraints used in the US-APWR.

The statement in DCD Tier 2, Revision 3, Subsection 3.9.6.4 that the COL applicant is to provide the IST program plan for dynamic restraints in accordance with Nonmandatory Appendix A to the ASME OM Code will be deleted since the full program will be described in the DCD.

Section 3.9.9, "Combined License Information," Item COL 3.9(6), will be revised to delete the requirement that the COL applicant is to provide the program plan for IST of dynamic restraints in accordance with Nonmandatory Appendix A of ASME OM Code. See Response to RAI 03.09.06-68.

See the attached markup for the proposed changes.

**Impact on DCD**

US-APWR DCD Tier 2, Revision 3, Subsection 3.9.6.4 and 3.9.9 will be revised as described in the response and as indicated on the enclosed markup. (See Attachment-1.)

**Impact on R-COLA**

R-COLA will be revised to delete COL applicant response to the deleted COL action item that will be deleted from the DCD.

**Impact on S-COLA**

S-COLA will be revised to delete COL applicant response to the deleted COL action item that will be deleted from the DCD.

**Impact on PRA**

There is no impact on the PRA.

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|---|---|
| **RAI NO.:** | **NO. 801-5897 REVISION 3** |
| **SRP SECTION:** | **03.09.06 – Functional Design Qualification and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints** |
| **APPLICATION SECTION:** | **3.9.6** |
| **DATE OF RAI ISSUE:** | **8/5/2011** |

**QUESTION NO. RAI 03.09.06-67:**

This question is a follow-up to question 03.09.06-47, RAI 288-2274.

In RAI 03.09.06-47, the NRC staff requested that the US-APWR design certification applicant clarify the plans regarding relief from the ASME OM Code. In its RAI response, the applicant provided a planned modification to Section 3.9.6.5 to indicate that relief from the testing requirements of the ASME OM Code will be requested when full compliance with the requirements of the ASME OM Code is not practical. Subsequently, Revision 2 (and Revision 3) to US-APWR DCD Tier 2, Section 3.9.6.5 includes this modification. The staff notes that US-APWR DCD Tier 2, Section 3.9.6.5 does not address alternatives to the ASME OM Code. As a follow-up to RAI 03.09.06-47, the NRC staff requests that the applicant clarify alternatives planned to the ASME OM Code, such as implementation of Code Cases.

**ANSWER:**

At the present time, MHI has not identified any need for alternatives to the ASME OM Code (or the optional ASME Code Cases listed in RG 1.192 that is incorporated by reference in paragraph (b) of 10 CFR 50.55a). If in the future, full compliance with the requirements of the ASME OM Code, or the accepted alternative Code Cases, is not practical, MHI will revise US-APR DCD Tier 2, Subsection 3.9.6.5 to include the alternative(s).

**Impact on DCD**

There is no impact on the DCD.

**Impact on R-COLA**

There is no impact on the COLA.

**Impact on S-COLA**

There is no impact on the COLA.

**Impact on PRA**

There is no impact on the PRA.

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| **RAI NO.:** | **NO. 801-5897 REVISION 3** |
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| **APPLICATION SECTION:** | **3.9.6** |
| **DATE OF RAI ISSUE:** | **8/5/2011** |

**QUESTION NO. RAI 03.09.06-68:**

This question is a follow-up to question 03.09.06-48, RAI 288-2274.

In RAI 03.09.06-48, the NRC staff requested that the US-APWR design certification applicant revise the DCD to specify that the COL applicant must provide a full description of the IST operational program for pumps, valves, and dynamic restraints, and MOV testing operational program. In its RAI response, the applicant stated that its response to RAI 03.09.06-07 clarified that the COL applicant must provide a full description of the IST program for pumps, valves, and dynamic restraints. Subsequently, Revision 2 (and Revision 3) to US-APWR DCD Tier 2, Section 3.9.9 specifies in COL Information Item 3.9(8) that the COL applicant must provide a full description of the IST program plan for pumps, valves, and dynamic restraints. However, COL Information Item 3.9(6) specifies that the COL applicant must provide an IST program plan for dynamic restraints in accordance with Nonmandatory Appendix A to the ASME OM Code. As a follow-up to RAI 03.09.06-48, the NRC staff requests that the US-APWR design certification applicant clarify whether it intends that the US-APWR DCD provide a full description of the IST program for pumps, valves, and dynamic restraints. The staff also requests that the applicant clarify the intent of the reference to Nonmandatory Appendix A to the ASME OM Code in COL Information Item COL 3.9(6), and the reference to a "program plan" rather than a program description in COL Information Items COL 3.9(6) and COL 3.9(8).

**ANSWER:**

As stated in the responses to RAIs 03.09.06-50, 03.09.06-53, 03.09.06-55, and 03.09.06-66, US-APWR DCD Tier 2, Revision 3, Subsection 3.9.6.2 through 3.9.6.4 will be revised to fully describe the IST program for pumps, valves and dynamic restraints used in the US-APWR.

Section 3.9.9, "Combined License Information," Item COL 3.9(6), will be revised to delete the requirement that the COL applicant is to provide the program plan for IST of dynamic restraints in accordance with Nonmandatory Appendix A of ASME OM Code; Item COL 3.9(8), will be revised to delete the requirement that the COL applicant is to provide a full description of their IST

program plan for pumps, valves, and dynamic restraints. See responses to RAIs 03.09.06-53, 03.09.06-55, and 03.09.06-66.

See the attached markup for the proposed changes.

**mpact on DCD**

US-APWR DCD Tier 2, Revision 3, Subsections 3.9.6.2 through 3.9.6.4 and 3.9.9 will be revised as described in the response and as indicated on the enclosed markup. (See Attachment-1.)

**Impact on R-COLA**

R-COLA will be revised to delete COL applicant response to the deleted COL action item that will be deleted from the DCD.

**Impact on S-COLA**

S-COLA will be revised to delete COL applicant response to the deleted COL action item that will be deleted from the DCD.

**Impact on PRA**

There is no impact on the PRA.

### 3.9.5.3.12.1 PSI Plan

The PSI plan follows the rules of ASME Code, Section XI (Reference 3.9-43). Visual inspection of parts subject to wear and galling are examined before and after hot functional testing. In addition, critical welds are also examined for any evidence of cracks.

### 3.9.5.3.12.2 ISI Plan

The ISI plan follows the rules of ASME Code, Section XI (Reference 3.9-43).

## 3.9.6 Functional Design, Qualification, and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints

DCD_03.09.06-51
DCD_03.09.06-52

This section describes the functional design and qualification provisions and inservice testing (IST) programs for certain safety-related pumps, valves, and dynamic restraints (i.e., those safety-related pumps, valves and dynamic restraints typically designated as Class 1, 2, or 3 under Section III of the ASME Code) to ensure that they will be in a state of operational readiness to perform their safety functions throughout the life of the plant.

The regulatory requirements associated with this subsection include 10 CFR 50.55a (Reference 3.9-29), 10 CFR 50, General Design Criteria (GDC) 1, 2, 4, 14, 15, 37, 40, 43, 46, 54, Appendix A (Reference 3.9-28), 10 CFR 50 Appendix B, 10 CFR 50.55a(c)-(e) (Reference 3.9-29), 10 CFR 50.55a(f) (Reference 3.9-29), 10 CFR 50.55a(b)(3)(ii) (Reference 3.9-29), 10 CFR 52.47(b)(1) (Reference 3.9-31), and 10 CFR 52.80(a) (Reference 3.9-32).

The US-APWR design for safety-related pumps, valves, and dynamic restraints designated as Class 1, 2, or 3 meets the GDC in the following respects:

- GDC 1 as it relates to pumps, valves, and dynamic restraints being designed, fabricated, tested, and inspected to quality standards commensurate with the importance of the safety functions to be performed. This is accomplished by using recognized quality codes, standards, and design criteria that comply with the requirements of 10 CFR 50.55a.

- GDC 2 as it relates to pumps, valves, and dynamic restraints to withstand the effects of natural phenomena combined with the effects of normal and accident conditions. The safety-related SSCs are designed either to withstand the effects of natural phenomena without the loss of the capability to perform their safety functions, or are designed such that their response or failure will be in a safe condition. The nature and magnitude of the natural phenomena considered in the design of the plant are discussed in Chapter 2.

- GDC 4 as it relates to designing pumps, valves, and dynamic restraints to accommodate the effects of and to be compatible with the environment conditions associated with normal operation, maintenance, testing, and postulated accidents. The safety-related SSCs are designed to accommodate the effects of, and to be compatible with, the environmental conditions associated with the normal operation, maintenance, testing, and postulated accidents, including LOCAs. Criteria are presented in Chapter 3, and the environmental conditions are

described in Section 3.11. These SSCs are adequately protected against dynamic effects, including the effects of missiles, pipe whipping, and discharging fluids, that may result from equipment failures and from events and conditions outside the nuclear power plant. Details of the design, environmental testing, and construction/fabrication of safety-related SSCs are provided in Chapters 3, 5, 6, 7, 8, 9, and 10. The leak-before-break (LBB) evaluation of Section 3.6 identifies the design requirements for the piping that are excluded from consideration of pipe rupture due to dynamic effects from postulated pipe failure accidents. DCD_03.09.06-51 DCD_03.09.06-52

- GDC 14 as it relates to designing pumps, valves, and dynamic restraints that form the reactor coolant boundary so as to have an extremely low probability of abnormal leakage, rapidly propagating failure, and gross rupture. The RCPB is designed to accommodate the system pressures and temperatures attained under the expected modes of plant operation, including anticipated transients, with stresses within applicable limits. Consideration is given to loadings under normal operating conditions and to abnormal loadings, such as seismic loadings, as discussed in this chapter.

- GDC 15 as it relates to pumps, valves, and dynamic restraints that form the reactor coolant system being designed with sufficient margin to ensure that the design conditions are not exceeded. Steady state and transient analyses are performed to assure that RCS design conditions are not exceeded during normal operation. Additionally, RCPB components have a large margin of safety based on the application of proven materials and design codes, the use of proven fabrication techniques, the non-destructive shop testing, and the integrated hydrostatic testing of assembled components.

- GDC 37 as it relates to designing the emergency core cooling to permit periodic functional testing to ensure the leak tight integrity and performance of its active components. Preoperational performance tests of the ECCS components are performed by the manufacturer. Initial system hydrostatic and functional flow tests demonstrate structural and leak-tight integrity of components and proper functioning of the system. Thereafter, periodic tests demonstrate that components are functioning properly.

- GDC 40 as it relates to designing periodic functional testing of the containment heat removal system to ensure the leak tight integrity and performance of its active components. The CSS is designed to permit periodic testing to assure the structural and leak-tight integrity of CSS components and to assure the operability and performance of the active components of the system. All active components of the CSS, including the delivery piping up to the last powered valve before the spray nozzle, have the capability to be tested during reactor power operation. A minimum flow path return to the pump suction line is used for pump tests during normal operation. Full flow pump performance testing is conducted during plant shutdown conditions.

- GDC 43 as it relates to designing the containment atmospheric cleanup systems to permit periodic functional testing to ensure the leak tight integrity and the performance of the active components. The discussion of GDC 40 demonstrates the testability, and therefore, the operability and performance of the CSS.

- GDC 46 as it relates to designing the cooling water system to permit periodic functional testing to ensure the leak tight integrity and performance of the active components. The CCWS and the ESWS operate continuously during normal plant operation and shutdown, under flow and pressure conditions that approximate accident conditions. These operations demonstrate the operability, performance, and structural and leak-tight integrity of all cooling water system components.

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- GDC 54 as it relates to designing piping systems penetrating containment with the capability to test periodically the operability of the isolation valves and determine valve leakage acceptability. Piping that penetrates the containment has been equipped with test connections and test vents or has other provisions to allow periodic leak-rate testing to assure that leakage is within the acceptable limit as defined by the technical specifications of Chapter 16, which are consistent with 10 CFR 50, Appendix J (Reference 3.1-13), as described in Chapter 6.

Other DCD sections that interface with this section are:

- Section 3.2.2 addresses the classification system and quality group for pumps and valves.
- Section 3.9.2 addresses dynamic testing and analysis of safety-related pumps, valves, and snubbers.
- Section 3.9.3 addresses the structural design of safety-related pumps, valves, and snubbers.
- Section 3.10 addresses the seismic and dynamic qualification of safety-related pumps and valves.
- Section 3.11 addresses the environmental qualification of safety-related pumps and valves.
- Section 3.12 addresses the design and leak testing provisions of pressure retaining systems and components that interface with the reactor coolant system as part of the primary review responsibility for intersystem loss-of-coolant accidents.
- Section 3.13 addresses programs for ensuring bolting and threaded fastener adequacy and integrity.
- Section 5.2.2 addresses the valves specified for overpressure protection of the reactor coolant pressure boundary.
- Section 5.4.7 and Section 6.3 address residual heat remove and emergency core cooling systems piping, respectively that is connected to the reactor coolant system and is subject to thermally stratified flow, thermal striping, and/or thermal cyclic effects.
- Section 6.2.1.2 addresses the analyses of subcompartment differential pressures resulting from postulated pipe breaks.

- Section 9.2.1 and 9.2.2 address surveillance, testing, inspection, and maintenance programs of essential service water and component cooling systems.
- Section 10.3 addresses the number and size of valves specified for the main steam supple system.
- Section 14.2 addresses preoperational and initial startup testing for systems that contain safety-related pumps, valves, and dynamic restraints.
- Section 17.6 describes the program for implementation of the Maintenance Rule for systems that contain safety-related pumps, valves, and dynamic restraints.

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ASME Code, Section III, Class 1, 2 and 3 safety-related pumps, valves and dynamic restraints that are required to perform a specific function in shutting down the reactor to a safe-shutdown condition, in maintaining the safe-shutdown condition, or in mitigating the consequence of an accident, are subjected to IST to assess and verify operational readiness as set forth in 10 CFR 50.55a(f) (Reference 3.9-29) and ASME OM Code (Reference 3.9-13). The US-APWR will be designed to allow accessibility for the performance of IST activities for safety-related pumps, valves, and dynamic restraints.

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The pumps covered in the IST Program are those pumps that are provided with an emergency power source and required to perform a specific function in shutting down a reactor to a safe-shutdown condition, in maintaining the safe-shutdown condition, or in mitigating the consequence of an accident.

The US-APWR utilizes the ASME OM Code, 2004 Edition through the 2006 Addenda (or the optional ASME Code Cases listed in NRC RG 1.192 that is incorporated by reference in paragraph (b) of 10 CFR 50.55a, subject to the applicable limitations and modifications) (Reference 3.9-13) for developing the IST Program for ASME Code, Section III, Class 1, 2 and 3 safety-related pumps, valves and dynamic restraints. The COL Applicant is to ~~administratively control the edition and addenda to be used for the IST program plan, and to provide a full description of their IST program plan for pumps, valves, and dynamic restraints~~administratively control the IST program for pumps, valves and dynamic restraints and to control the ASME OM Code edition and addenda to be used for the IST program.

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It should be noted that the requirements of system pressure test per ASME Code, Section XI, Section IWA 5000 (Reference 3.9-43) that verify the system pressure boundary integrity are part of the ISI Program and are not part of this IST Program.

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As required by 10 CFR 50.55a(f) (Reference 3.9-29), ASME Code, Section III, Class 1, 2 and 3 safety-related pumps, valves and dynamic restraints are incorporated into a 120-month interval IST Program that is in compliance with the requirements of the latest edition and addenda of the OM Code 12 months before initial fuel load. The requirements for the IST Program are included in Technical Specification Subsection 5.5.8 of Section 5.5, Programs and Manuals.

The IST Program is also used for the required preservice (base line) testing of ASME Code, Section III, Class 1, 2, and 3 safety-related pumps, valves and dynamic restraints.

Relief requests from any of the applicable ASME OM Code test requirements are documented in the IST Program, including justification and proposed alternative of test(s)/examination(s) that assess operation readiness of the impacted pumps, valves, or dynamic restraints. DCD_03.09.06-51 DCD_03.09.06-52

### 3.9.6.1 Functional Design and Qualification of Pumps, Valves, and Dynamic Restraints

~~IST of ASME Code, Section III, Class 1, 2, and 3 pumps, valves and dynamic restraints is performed in accordance with the ASME OM Code and applicable addenda, as required by 10 CFR 50.55a(f), except where specific relief has been granted by the NRC in accordance with 10 CFR 50.55a(f). The IST program assesses and verifies operational readiness included in various sections of the ASME OM Code as follow:~~ DCD_03.09.06-49

- ~~Requirements for IST of pumps are incorporated in ISTB.~~
- ~~Requirements for IST of valves are incorporated in ISTC.~~
- ~~Requirements for IST of pressure relief valves are incorporated in Appendix I.~~
- ~~Requirements for IST of dynamic restraints are incorporated in ISTD.~~

~~The various provisions for testing pumps, valves, and dynamic restraints are incorporated into the design of the US-APWR. These provisions and requirements are discussed in Section 3.10 of the DCD.~~

~~It should be noted that the requirements of system pressure test per ASME Code, Section XI, Section IWA-5000 (Reference 3.9-43) that verify the system pressure boundary integrity are part of the ISI Program and are not part of this IST Program.~~

~~As required by the 10 CFR 50.55a(f) (Reference 3.9-29), ASME Code, Section III, Class 1, 2 and 3 safety related pumps, valves and dynamic restraints are incorporated in 120 month interval IST Program Plan that is in compliance with the requirements of the latest edition and addenda of the OM Code, 12 months before initial fuel load and, in compliance with plant, Technical Specifications and this DCD. The requirements for the IST Program are included in Technical Specification Subsection 5.5.8 of Section 5.5, Programs and Manuals.~~

~~The IST Program Plan is also used for the required preservice (base line) testing of ASME Code, Section III, Class 1, 2, and 3 safety related pumps, valves and dynamic restraints.~~

~~Relief requests from any of the applicable ASME OM Code test requirements are documented in the IST Program Plan, including justification and proposed alternative of test(s)/examination(s) that assess operation readiness of the impacted pumps, valves, or dynamic restraints.~~The functional design and qualification of safety-related pumps, valves, and dynamic restraints (snubbers) is to be performed in accordance with ASME QME-1-2007, "Qualification of Active Mechanical Equipment Used in Nuclear Power Plants" (Reference 3.9-66), as endorsed in RG 1.100, Revision 3, "Seismic Qualification of Electrical and Active Mechanical Equipment and Functional Qualification of Active Mechanical Equipment for Nuclear Power Plants" (Reference 3.9-16).

The functional design and qualification of safety-related pumps, valves, and snubbers includes the following: DCD_03.09.06-51 DCD_03.09.06-52

- Safety-related pump, valve, and piping designs include provisions to allow testing of pumps and valves at the maximum flow specified in the plant accident analyses.
- Functional design and qualification of each safety-related pump and valve is performed such that each pump and valve is capable of performing its intended function for a full range of system differential pressure and flow, ambient temperatures, and available voltage (as applicable) under conditions ranging from normal operating to design-basis accident.
- The US-APWR design provides ready access to SSC to facilitate comprehensive testing using currently available equipment and techniques. Accessibility incorporated into the design complies with the requirements of the ASME OM Code and 10 CFR 50.55a(f). System design incorporates provisions, including alternate flow paths and required instrumentation, to allow full flow testing of pumps under the IST program. The design also incorporates provisions to permit ready IST of valves.
- The provisions for the design and qualification of snubbers are provided in Section 3.9.3. Snubbers in safety-related systems include provisions to allow access for IST program activities.
- The design and installation of safety and relief valves is described in Section 3.9.3.
- The seismic and dynamic qualification of mechanical and electrical equipment is described in Section 3.10.
- Section 3.11 addresses the environmental qualification of safety-related pumps and valves.
- Safety-related valves that are part of the RCPB are designed and tested such that these valves will not experience any abnormal leakage, or increase in leakage, from their loading.
- Pumps, valves, and snubbers are designed with sufficient margin to demonstrate that the design conditions are not exceeded.
- Pump motors are designed to tolerate anticipated frequency and voltage variations due to degraded electrical power supply line conditions.

For procured equipment, the design and acceptance criteria for the equipment functional qualification are required to be specified in the purchase specifications which are part of the purchase order. The applicable level of quality assurance and documentation is also required to be specified. The vendor is required to submit a qualification plan/procedure for review and approval prior to performing the test and/or analysis, as required. Submittal of existing documentation is acceptable if documentation is provided correlating the existing data with the requirements in the purchase order. The vendor is to submit the

final qualification documentation, in the form of an equipment qualification report (EQR), for review and approval prior to acceptance of the equipment. The EQR is to contain the information identified in Section 3.9.6.1, as required, to confirm that the qualification of the equipment meets the purchase specifications. DCD_03.09.06-51 DCD_03.09.06-52

### 3.9.6.2 IST Program for Pumps

IST of pumps is performed to determine the operational readiness of ~~the pumps~~safety-related pumps in conformance with the requirements of ASME OM Code subsections ISTA and ISTB. ~~The IST of pumps is performed at the required frequency as stated in the IST Program Plan.~~Pumps that are ASME Code Section III, Class 1, 2, and 3, are included in the program. The pumps covered in the IST Program are those pumps that are provided with an emergency power source and required to perform a specific function in shutting down a reactor to a safe-shutdown condition, in maintaining the safe-shutdown condition, or in mitigating the consequence of an accident. The IST Program does not include any non-safety-related pumps since these pumps do not perform safety-related functions. ~~Test results are compared to the established and accepted preservice reference values, including the use of instrument range and accuracy. Table 3.9-13 provides a detailed listing of safety-related pumps in the IST Program Plan along with the specific parameters (flow, differential pressure, inlet pressure, vibration, speed) and test frequency. The IST Program Plan for US-APWR does not include any non-safety-related pumps since these pumps do not perform safety-related functions.~~ DCD_03.09.06-53

The OM Code identifies four types of tests, including preservice, Group A, Group B, and comprehensive tests. All pumps receive a preservice test followed on a quarterly basis by the test associated with the pump category (Group A test for Group A pumps, and Group B test for Group B pumps), and at least once every 2 years by a comprehensive test. A comprehensive test may also be substituted for a Group A or Group B test. Similarly, a Group A test may be substituted for a Group B test, and a preservice test may be substituted for any inservice test.

Table 3.9-13 provides a listing of the safety-related pumps in the IST Program including tag number, description, pump-type, group, required tests (flow, differential pressure, inlet pressure, vibration, speed), test frequency, and acceptance criteria. The allowable range for test parameters shall be those specified in the ASME OM Code, except where specific relief is granted.

Instruments will meet the requirements specified in the ASME OM Code, subsection ISTB-3500, consistent with the guidance in NUREG-1482, except where specific relief is granted.

Test results are compared to the established and accepted preservice reference values, including the use of instrument range and accuracy.

Relief from the requirements for testing, if required, and the alternative to the tests are justified and documented in Table 3.9-13.

The COL Applicant is to provide the site-specific, safety-related pump IST parameters and frequency.

### 3.9.6.3 IST Program for Valves

Safety-related valves, ~~and other selected valves~~including actuating and position indicating systems, are subject to operational readiness testing in conformance with the requirements of the ASME OM Code, subsections ISTA and ISTC. ~~IST of valves assesses operational readiness including actuating and position indicating systems.~~ The valves that are subject to IST include those valves that perform a specific function in shutting down the reactor to a safe-shutdown condition, in maintaining a safe-shutdown condition, or in mitigating the consequences of an accident. Safe-shutdown conditions are discussed in Subsection 7.4.1. In addition, pressure relief devices used for protecting systems or portions of systems that perform a function in shutting down the reactor to a safe-shutdown condition, in maintaining a safe-shutdown condition, or in mitigating the consequences of an accident, are subject to IST. DCD_03.09.06-55

Valves (including relief valves) subject to IST ~~in accordance with the ASME Code~~ are indicated in Table 3.9-14. This table includes the type of testing to be performed and the frequency at which the testing should be performed. ~~The test program conforms to the requirements of ASME OM, subsection ISTC, to the extent practical.~~ The guidance in NRC Generic Letters, and industry and utility guidelines (including NRC Generic Letters 89-04 and 96-05, Reference 3.9-53 and 3.9-54) is ~~also~~ considered in developing the test program. Inservice testing incorporates the use of non-intrusive techniques to periodically assess degradation and performance of selected valves (e.g., MOVs). DCD_03.09.06-55 DCD_03.09.06-55 DCD_03.09.06-55

Safety-related check valves with an active function are exercised in response to flow. Safety-related POVs with an active function are subject to an exercise test and an operability test. The operability test may be either a static or a dynamic (flow and differential pressure) test.

Relief from the requirements for testing, if needed, and the alternative to the tests are justified and documented in Table 3.9-14.

The COL Applicant is to provide type of testing and frequency of site-specific valves subject to IST in accordance with the ASME Code.

**Valve Functions Tested**

The IST Program ~~Plan~~ identifies the specific safety-related valve function(s). The identified safety valve function listed in Table 3.9-14, is a single or a combination of safety functions of the following: DCD_03.09.06-55

- Maintained in closed position (passive valve)
- Maintained in open position (passive valve)
- Change to safety closed position (active valve)
- Change to safety open position (active valve)
- Change to safety throttle flow position (active valve)

Based on the safety-related functions identified for each valve, the IST is to assess the operability readiness of the valve to perform its intended safety function. Active valves include valves that change position to open, change position to closed and/or have a throttling function. Active valves, which are required to change position to perform their safety function as defined in the ASME OM Code, include valves that change obturator (the part of the valve that blocks the flow stream) position to accomplish a safety-related function(s). Valve function to maintain closed position is designated as passive valve, however, it is required to be included in the IST Program ~~Plan~~ and functionally tested in accordance with the ASME OM Code requirements. DCD_03.09.06-55

If upon removal of the actuation power (electrical power, air or fluid for actuation) an active valve fails to the position associated with performing its safety-related function, it is identified as "active-to-fail" in Table 3.9-14.

Valve categories are used in determining the type of IST in accordance with the ASME OM Code. These valves function to include but are not limited to:

- Active or active-to-fail for fulfillment of the safety-related function(s)
- RCS pressure boundary isolation function
- Containment isolation function
- Seat leakage (in the closed position), is limited to a specific maximum amount when important for fulfillment of the safety-related function(s)
- Actuators that fail to a specific position (open/closed) upon loss of actuating power for fulfillment of the safety-related function(s)
- Safety-related remote position indication

The ASME IST categories are assigned based on the safety-related valve functions and the valve characteristics. The following criteria are used in assigning the valves IST categories in accordance with the ASME OM Code.

- Category A – safety-related valves with safety-related seat leakage requirements
- Category B – safety-related valves requiring IST, but without safety-related seat leakage requirements
- Category C – safety-related, self-actuated valves (such as check valves and pressure relief valves)
- Category D – safety-related, explosively actuated valves and non-reclosing pressure relief devices

Additionally, valves that are included in the IST Program that have position indication are observed locally during valve exercising to verify proper operation of the position indication. The frequency for this position indication test is in accordance with ASME OM Code. Where local observation is not practicable (such as solenoid valves), other methods are used for verification of valve position indicator operation.

### 3.9.6.3.1 IST Program for MOVs

IST of ASME Section III Class 1, 2, and 3, and safety-related motor-operated valves (MOVs) is performed in accordance with the ASME OM Code (Reference 3.9-13) and applicable addenda, as required by 10 CFR 50.55a(f) and 10 CFR 50.55a(b)(3)(ii) (Reference 3.9-29). 10 CFR 50.55a(b)(3)(ii) requires the establishment of a program to periodically verify that safety-related MOVs continue to be capable of performing their design basis safety functions. ~~The IST program incorporates the guidance of RG 1.192 (Reference 3.9-44) and NUREG-1482 (Reference 3.9-60).~~The IST Program incorporates ASME Code Case OMN-1 (Reference 3.9-67). ASME OM Code Case OMN-1, "Alternative Rules for Preservice and Inservice Testing of Certain Motor-Operated Valve Assemblies in Light-Water Reactor Power Plants," allows the use of MOV diagnostic testing as an alternative to stroke time testing and position indication verification for certain motor operated valves. Use of this Code Case is authorized by Regulartor Guide 1.192, "Operation and Maintenance Code Case Acceptability, ASME OM Code" (Reference 3.9-44). This Regulatory Guide lists ASME OM Code Cases determined acceptable for use in IST Programs by the NRC. The Regulatory Guide is incorporated by reference in the Code of Federal Regulations 10 CFR 50.55a(b). The Code Case is listed in Table 2 of this Regulatory Guide as a conditionally approved Code Case. A conditionally approved Code Case may be used without request to the NRC provided it is used with any identified limitations or modifications. The stipulations listed in Table 2 include the following: DCD_03.09.06-58

- The adequacy of the diagnostic test interval for each motor-operated valve (MOV) must be evaluated and adjusted as necessary but not later than 5 years of three refueling outages (whichever is longer) from initial implementation of OMN-1.
- When extending exercise test intervals for high risk MOVs beyond a quarterly frequency, ensure that the potential increase of Core Damage Frequency (CDF) and risk associated with the extension is small and consistent with the intent of the Commission's Safety Goal Policy Statement.
- When applying risk insights, MOVs must be categorized according to their safety significance using the methodology described in Code Case OMN-3 or use other MOV risk ranking methodologies accepted by the NRC on a plant specific or industry-wide basis.

The IST Program for MOVs also incorporates the guidance of NUREG-1482 (Reference 3.9-60).

Testing is required except where specific relief has been granted by the NRC. In addition to the above, MOVs are inservice tested in accordance with the requirements of Generic Letter 96-05 (Reference 3.9-54) to permit periodic assessment of valve operability at the prescribed frequency. Generic Letter 96-05 supersedes Generic Letter 89-10 (Reference 3.9-55) and its supplements with regard to MOV periodic performance verification. The MOV Program utilizes guidance from the Joint Owners Group MOV Periodic Verification study, MPR 2524-A (November 2006) (Reference 3.9-61). DCD_03.09.06-58

The MOV testing program requires either in-plant valve operation or prototype valve testing at system flow and pressure, or system differential pressure to verify correct MOV

actuator sizing and control settings. This MOV periodic verification program addresses the various requirements, such as, maximum torque and thrust, margins for degraded conditions, degraded voltage, control switch repeatability, load sensitive MOV behavior, etc. The available motor output is determined based on motor capabilities at design basis conditions. These conditions include, rated motor start torque; minimum voltage conditions; elevated ambient temperature conditions; and operator efficiency. ~~The MOV Program utilizes guidance from Generic Letter 96-05 and the Joint Owners Group MOV Periodic Verification study, MPR-2524-A (November 2006) (Reference 3.9-61).~~ DCD_03.09.06-58

Testing also includes remote position-indications tests, leakage tests, and exercise tests. Valves with position indicators that are included in the IST program are observed locally during valve exercising to verify that the indicators are operating correctly. Where local observation is not practical, other methods are used to verify correct valve position indicator operation. Safety-related valves with seat leakage limits are tested to verify that leakage does not exceed allowable limits. This testing includes valves that isolate piping and lines that penetrate containment; these valves are tested in accordance with 10 CFR 50, Appendix J. Most valves are tested individually as a part of the Type C testing, depending on the valve function and configuration. Safety-related MOVs are exercised periodically, and generally undergo full-stoke exercise testing quarterly. Measuring stroke time is not a separate inservice test, but is done as part of periodic testing. If it is impractical to exercise a valve during plant operation, the valve may be full-stroke tested during cold shutdowns. Valves that operate during normal plant operation and at a frequency that satisfies exercising requirements need not be additionally exercised, provided that IST-required observations are made at intervals no greater than that specified in the IST Program.

Retesting MOVs to verify functionality is required after valve or valve-actuator maintenance. The extent of retesting depends upon the type of maintenance performed. MOV testing is incorporated into the initial plant startup test program (refer to Section 14.2). Containment isolation valve (CIV) leak rate test frequency is addressed in Section 6.2.6.

Acceptance criteria for successful completion of the IST of MOVs includes the following:

- Consistent with the safety function, the valve fully opens and/or the valve fully closes or both. Diagnostic equipment indicates hard seat contact.
- The testing demonstrates adequate margin with respect to the design basis, including consideration of diagnostic equipment inaccuracies, degraded voltage, control switch repeatability, load sensitive MOV behavior, and margin for degradation
- The maximum torque and/or thrust (as applicable) achieved by the MOV, allowing sufficient margin for diagnostic equipment inaccuracies and control switch repeatability, does not exceed the allowable structural and undervoltage motor capability limits for the individual parts of the MOV.

Valves that fail to meet their respective acceptance criteria are declared inoperable.

Prior to power operation, a design basis verification test is performed on each active MOV to verify the capability of each valve to meet its safety-related design basis requirements. The test is performed at conditions that are as close to design basis conditions as practicable. The test results are used along with valve preservice tests to develop the initial (periodic verification) testing frequency for each active MOV.

The preservice test program for MOVs is conducted in accordance with the ASME OM Code (Reference 3.9-13), ISTC 3100, under conditions as near as practical to those expected during subsequent IST. The interval between testing to demonstrate continued design basis capability does not exceed five years or three refueling outages, whichever is longer.

In some cases, the valves are tested on a less frequent basis since it is not practicable to exercise the valve during plant operation. If an exception is taken to performing ASME OM Code test frequency such as full-stroke exercise testing of a valve, then full-stroke testing is performed during cold shutdown condition on a frequency that is not more often than required by the ASME OM Code (Reference 3.9-13). If testing is not practicable during plant shutdown condition, then the full-stroke testing is performed during refueling outage. The inservice operability testing of some MOVs rely on non-intrusive diagnostic techniques to permit periodic assessment of valve operability at design basis conditions. DCD_03.09.06-58 DCD_03.09.06-58

The IST program is to identify MOVs that require non-intrusive diagnostic testing techniques. The specified frequency of testing using operability of non-intrusive diagnostic techniques is a maximum of once every 10 years. The initial test frequency is the longest of every three refueling cycles or five years, until sufficient data exists to determine a longer test frequency is appropriate, in accordance Code Case OMN-1 (Reference 3.9-67) with GL 96-05 (Reference 3.9-54). DCD_03.09.06-58

### 3.9.6.3.2 IST Program for POVs Other Than MOVs

ASME Code, Section III, Class 1, 2 and 3 safety-related POVs (air operated, hydraulic operated, solenoid operated) are subject to operational readiness testing in accordance with the requirements stated in the ASME OM Code. IST of valves assesses operational readiness including actuating, stroke timing, fail safe, and verification of position indicating systems. The ability of power-operated valves to perform their design-basis functions is verified either before installation or as part of preoperational testing performed during the initial plant startup test program, as described in Section 14.2. DCD_03.09.06-59

~~POVs other than active MOVs are exercised quarterly in accordance with ASME OM ISTC. Active and passive POVs upon which operability testing is performed are identified in Table 3.9-14.~~Although the design basis capability of active safety-related power-operated valves is verified as part of the design and qualification process, power-operated valves that perform an active safety function are tested again after installation in the plant as required, to ensure valve setup is acceptable to perform their required functions, consistent with valve qualification. These tests, which are typically performed under static (no flow or pressure) conditions, also document the baseline performance of the valves to support maintenance and trending programs. During the testing, critical parameters needed to ensure proper valve setup are measured. Depending on the valve and actuator type, these parameters include seat load, running torque or thrust, valve travel, actuator spring rate, bench set and regulator supply pressure. Uncertainties

associated with performance of these tests and use of the test results (including those associated with measurement equipment and potential degradation mechanisms) are addressed appropriately. Uncertainties are considered in the specification of acceptable valve setup parameters or in the interpretation of the test results (or a combination of both). Uncertainties affecting both valve function and structural limits are addressed. Installed solenoid-operated valves are tested using Class 1E electrical power supply voltage and current to verify they remain capable of performing their required safety function during design-basis accident conditions. DCD_03.09.06-55

Additional testing is performed as part of the air-operated valve (AOV) program, which includes the key elements for an AOV Program as identified in the Joint Owners Group Air Operated Valve Program Document, (Reference 3.9-62) and the Comments on Joint Owners' Group Air Operated Program Document (Reference 3.9-63). The AOV program incorporates the attributes for a successful ~~pov~~POV long-term periodic verification program, as discussed in RIS 2000-03, Resolution of Generic Safety Issue 158: Performance of Safety-related Power-Operated Valves Under Design Basis Conditions, (Reference 3.9-64), by incorporating lessons learned from previous nuclear power plant operations and research programs as they apply to the periodic testing of AOVs and other POVs included in the IST program. Key lessons learned that are addressed in the AOV program include: DCD_03.09.06-59

- Valves are categorized according to their safety significance and risk ranking.
- Setpoints for AOVs are defined based on current vendor information or valve qualification diagnostic testing, such that the valve is capable of performing its design-basis function(s).
- Periodic static testing is performed, at a minimum on high risk (high safety significance) valves, to identify potential degradation, unless those valves are periodically cycled during normal plant operation under conditions that meet or exceed the worst case operating conditions within the licensing basis of the plant for the valve, which would provide adequate periodic demonstration of AOV capability. If required based on valve qualification or operating experience, periodic dynamic testing is performed to re-verify the capability of the valve to perform its required functions.
- Sufficient diagnostics are used to collect relevant data (e.g., valve stem thrust and torque, fluid pressure and temperature, stroke time, operating and/or control air pressure, etc.) to verify the valve meets the functional requirements of the qualification specification. Solenoid operated valves are verified, to the extent practical, to be capable of performing their safety functions for the electrical power supply amperage and voltage at design basis extremes. Test frequency is specified, and is evaluated each refueling outage based on data trends as a result of testing. Frequency for periodic testing is in accordance with References 3.9-62 and 3.9-63, with a minimum of 5 years (or 3 refueling cycles) of data collected and evaluated before extending test intervals. Post-maintenance procedures include appropriate instructions and criteria to ensure baseline testing is re-performed as necessary when maintenance on the valve, valve repair or replacement, have the potential to affect valve functional performance.

- Guidance is included to address lessons learned from other valve programs in procedures and training specific to the AOV program.
- Documentation from AOV testing, including maintenance records and records from the corrective action program are retained and periodically evaluated as a part of the AOV program.

The attributes of the AOV testing program described above, to the extent that they apply to and can be implemented on other safety-related POVs, such as electro-hydraulic valves, are applied to those other POVs.

POVs other than active MOVs are exercised quarterly in accordance with ASME OM ISTC. Active and passive POVs upon which operability testing is performed are identified in Table 3.9-14. DCD_03.09.06-59

### 3.9.6.3.3 IST Program for Check Valves

Safety-related check valves identified with specific safety-related functions to open and/or to close are tested periodically. Exercising a check valve confirms the valve capability to move to the position(s) to fulfill the safety-related function(s). ~~The exercise test shows that the check valve opens in response to flow and closes on cessation of flow. Required design flow is provided to fully open the check valve. Either permanently or temporarily installed non-intrusive check valve indication is used for this test. The effects of rapid pump starts and stops are considered in the testing, if it is expected for system operating conditions. Any other reverse flow conditions are considered in the testing if it may occur during expected system operating conditions.~~Check valve testing requires verification that obturator movement is in the direction required for the valve to perform its safety function. For check valves that perform a safety function in the open and closed directions, the valve is tested by initiating flow and observing whether or not the obturator moves to the full-open position. During flow conditions, the obturator moves to and maintains contact with the backseat without fluctuating, while allowing the flowrate and maximum differential pressure across the valve to remain within acceptable design limits for the system. When flow ceases or reverses, the obturator moves to the valve seat to fulfill the test requirements. DCD_03.09.06-55

For valves that have a safety function in only the open direction, the valve is exercised by initiating flow and observing whether or not the obturator moves to the full-open position. Check valves that have a safety function in only the closed direction are exercised by initiating flow and observing whether or not the obturator moves to at least the partially open position. When flow ceases or reverses, the obturator moves to the valve seat. The US-APWR design incorporates provisions to permit safety-related check valves to be tested for performance in both the forward and reverse flow directions. Check valve testing includes observations of a direct indicator or other positive means, such as changes in system pressure, flowrate, level, temperature, seat leakage, testing, or nonintrusive testing results. Acceptance criteria for this testing consider the specific system design and valve application. For example, a valve's safety function may require obturator movement in both open and closed directions. A mechanical exerciser may be used to operate a check valve for testing. Where a mechanical exerciser is used, acceptance criteria are provided for the force or torque required to move the check valve's obturator. Exercise tests also detect missing, sticking, or binding obturators.

DCD_03.09.06-55

As noted in Subsection ISTC-5221 of the ASME OM Code, if these test methods are impractical, or if sufficient flow cannot be achieved or verified, a sample disassembly examination program verifies valve obturator movement. In accordance with Subsection ISTC-5221 of the ASME OM Code and the guidance of NUREG-1482, the sample disassembly examination program groups check valves by category of similar design (manufacturer, size, model number and materials), application, and service condition, including valve orientation, and requires a periodic examination of one valve from each group.

During the disassembly process, the full-stroke motion of the obturator is verified and verification is performed that the internals of the valve are structurally sound (i.e., no loose or corroded parts). Also, if the disassembly is to verify the full-stroke capability of the valve, the disk is manually exercised. While the valve is in a partially disassembled condition the valve internals are inspected and the condition of the moving parts evaluated. Nondestructive examination is performed on the hinge pin to assess wear, and seat contact surfaces are examined to verify adequate contact. Full- stroke motion of the obturator is re-verified immediately prior to completing reassembly. At least one valve from each group is disassembled and examined at each refueling outage, and the valves in each group are disassembled and examined at least once every eight years. A condition monitoring program may be established to modify testing or disassembly inspection periods when sufficient operating data have been collected for a valve type. The condition monitoring program is prescribed by post- maintenance program or ASME OM Code Appendix II requirements for each equipment type. Before returning to service, valves disassembled for examination or valves that received maintenance that could affect their performance are exercised with a full or part stroke. Details and bases of the sampling program are documented and recorded in the test plan.

When operating conditions, valve design, valve location, or other considerations prevent direct observation or measurements by use of conventional methods to determine adequate check valve function, diagnostic equipment and nonintrusive techniques are used to monitor internal conditions. Nonintrusive techniques include acoustic, ultrasonic, magnetic, and x-ray technologies, that are used to measure valve- operating parameters (e.g., fluid flow, disk position, disk movement, and disk impact forces). Nonintrusive techniques also detect valve degradation. Diagnostic equipment and techniques used for valve operability determinations are verified as effective and accurate under the preservice test program. Testing is performed to the extent practical under normal operation, cold shutdown, or refueling conditions applicable to each check valve. Testing includes effects created by sudden starting or stopping of pumps, if applicable, or other conditions, such as flow reversal. When maintenance that could affect valve performance is performed on a valve in the IST program, post-maintenance testing is conducted prior to returning the valve to service.

Preoperational testing is performed during the initial test program (refer to Section 14.2) to verify that valves are installed in a configuration that allows correct operation, testing, and maintenance. Preoperational testing verifies that piping design features accommodate check valve testing requirements. Tests also verify disk movement to and from the seat and determine, without disassembly, that the valve disk positions correctly, fully opens or fully closes as expected, and remains stable in the open position under the

full spectrum of system design-basis fluid flow conditions. Additional information on leak rate testing is provided in Section 6.2.6. DCD_03.09.06-55

Valves that normally operate at a frequency that satisfies the exercising requirement need not be additionally exercised, provided that the observations required of IST are made and recorded at intervals no greater than that specified in this section.

The ASME OM Code specifies a quarterly check valve exercise frequency. In some cases, check valves are tested on a less frequent basis because it is not practical to exercise the valve during plant operation. If an exception is taken to performing quarterly exercise testing, then exercise testing is performed during cold shutdown on a frequency not more often than quarterly. If this is not practical, the exercise testing is performed during each refueling outage. If exercise testing during a refueling outage is not practical, then an alternative means is provided. Alternative means include non-intrusive diagnostic techniques or valve disassembly and inspection. Non-intrusive methods may include monitoring an upstream pressure indicator, monitoring tank level, performing a leak test, a system hydrostatic, or pressure test, or radiography. DCD_03.09.06-55

**Check Valve Disassembly and Inspection**

The IST ~~program plan~~Program identifies which valves require periodic valve disassembly and inspection, and the frequency of inspection is documented in Table 3.9-14. DCD_03.09.06-55

### 3.9.6.3.4 Pressure Isolation Valve Leak Testing

Safety-related valves with seat leakage limits are tested to verify their seat leakage. These valves include RCS Isolation Valves - valves that provide isolation of piping that interface with the RCS and other safety systems.

The ASME Code, Section XI (Reference 3.9-43) specifies a test frequency of at least once every two years. The ASME Code, Section XI does not require additional leak testing for valves that demonstrate operability during the course of plant operation. In such cases, the acceptability of the valve performance is recorded during plant operation to satisfy IST requirements. Therefore, a specific IST need not be performed on valves that meet this criterion.

The maximum leakage requirement for pressure isolation valves (PIVs) that provide isolation between high and low pressure systems is included in the surveillance requirements for Technical Specification 3.4.14. The PIVs that require leakage testing are tabulated in Table 3.9-14.

### 3.9.6.3.5 Containment Isolation Valve Leak Testing

Containment isolation valves that provide isolation for piping systems that penetrate the containment are tested in accordance with 10 CFR 50, Appendix J (Reference 3.9-56). Depending on the function and configuration, some valves are tested during the integrated leak rate testing (Type A), test individually as a part of the 10 CFR 50, Appendix J, Type C testing, or both. The leak rate test frequency for a containment isolation valve is defined in Subsection 6.2.4. The provisions in 10 CFR 50.55a(b)2 (Reference 3.9-29) requires leakage limits and corrective actions for individual

containment isolation valves where corrective actions are required by reference to ASME OM Code (Reference 3.9-13). The IST program plan as defined in Subsection 3.9.6.3, identifies scope, exceptions and changes in accordance with 10 CFR 50, Appendix J (Reference 3.9-56).

#### 3.9.6.3.6 IST Program for Safety and Relief Valves

Pressure relief devices that provide a safety-related function in shutting down the reactor, in mitigating the consequence of an accident, and/or in protecting equipment in systems that perform a safety-related function, are tested in accordance with ASME OM Code for IST. The ISTs for these valves are identified ASME OM Code, Appendix I.

The periodic IST includes visual inspection, seat tightness determination, set pressure determination, and operational determination of balancing devices, alarms, and position indication as appropriate. The frequency for this IST is every five years for ASME Code, Section III, Class 1 (Reference 3.9-1) and main steam line safety valve, or every 10 years for ASME Code, Section III, Classes 2 and 3 devices. Twenty percent of the valves from each valve group are tested within any 24-month interval for Class 1 and main steam line safety valve, and within any 48-month interval for Class 2 and 3 devices. Non-reclosing pressure relief devices, if existing, are inspected when installed and replaced every five years unless historical data indicate a requirement for more frequent replacements.

#### 3.9.6.3.7 IST Program for Manually Operated Valves

Safety-related active manually operated valves are identified in the IST Program ~~Plan~~, and exercised periodically in accordance with frequency and requirements specified in the ASME OM Code. DCD_03.09.06-55

#### 3.9.6.3.8 IST Program for Explosively Activated Valves

Not applicable to US-APWR design.

### 3.9.6.4 IST Program for Dynamic Restraints

As described in Subsection 3.12.6.6, dynamic restraints within piping systems is to be minimized as-much-as-possible due to the maintenance and testing requirements for these components. However, dynamic restraints in the form of snubber supports are utilized where free thermal movements are required and restraining movements caused by dynamic loadings is also required. Snubber operability inspections and tests including scope and frequency requirements are specified and controlled in the components support inspection and testing program plan. The ASME OM Code~~, 1995 Edition through the 2003 Addenda~~ (Reference 3.9-13) provides ISI methods and requirements for examinations and tests of snubbers at nuclear power plants. Preservice and inservice examinations must be performed using the VT-3 visual examination method described in IWA-2213 of the ASME Code, Section XI, 1995 Edition through the 2003 Addenda (Reference 3.9-43). DCD_03.09.06-66

~~The COL Applicant is to provide the program plan for IST of dynamic restraints in accordance with Nonmandatory Appendix A of ASME OM Code (Reference 3.9-13).~~ DCD_03.09.06-68

The program plan for IST of dynamic restraints includes the location of snubbers in safety-related systems and components, the snubber type (hydraulic or mechanical), applicable standard, and function (shock, vibration, or dual-purpose snubber). While the ASME Code, Section III (Reference 3.9-1), Subsection NF does not require fatigue evaluations for shock snubbers, fatigue strength of the snubber is to be evaluated for dual-purpose or vibration arrester snubber types.

The snubber is selected to satisfy the system design requirements. The snubber design and operating information form the basis for snubber examination and testing requirements. The following subsections describe these requirements which comply with the ASME OM Code (Reference 3.9-13).

#### 3.9.6.4.1 Design and Operating Information

The selection of snubbers involves a process of matching design requirements with manufacturer recommendations for performance limitations. Snubber installations are in accordance with the design requirements and manufacturers instructions, including settings for hot and cold conditions. The selection criteria of the snubber are determined through an iterative process of comparing the snubber's spring constant with the spring constant for a given load capacity modeled in the piping system. Additional piping system analyses are performed as necessary until the values coincide for the installed and modeled snubber load capacities and spring constants. The final settings of the snubber are determined by the thermal movement of the pipe at the snubber location, and snubber direction. These settings must assure that the pipe thermal movements at the snubber location and direction are within the boundaries of the total travel of the snubber, for all operating conditions of the piping system.

Design and operating information provide the input for the performance of the IST program. ~~Nonmandatory Appendix C of the ASME OM Code (Reference 3.9-13) provides guidance on design and operating information which may be useful in the development of IST programs for snubbers.~~ Items recommended for use include: DCD_03.09.06-66

a. Snubber operation and maintenance instructions including parts list.

b. Design drawings showing snubber rating, location, orientation, pin-to-pin dimensions, and hot and cold settings.

c. Procurement specifications.

d. Snubber qualification and acceptance test results.

e. Snubber application reports.

f. Desired reservoir fluid level as a function of piston location and spatial orientation.

g. Correlation of activation velocity, acceleration, and release rate at normal test temperatures to the range of operating temperatures expected.

h. Method for measuring the position setting.

i. Required fluid and seal material specification.

j. Limiting environmental conditions affecting service.

k. Drag force for each size and type of snubber furnished.

l. Correlation of hydraulic snubber release rate at various loads and the acceleration limiting value of mechanical snubbers at various loads to justify testing at less than rated loads.

#### 3.9.6.4.2 Preservice Examination Requirements

A preservice examination in accordance with the ASME OM Code (Reference 3.9-13) is performed on all snubbers after placing the systems in service prior to initial plant operation. ~~Typical items to be considered are listed in Nonmandatory Appendix B of the ASME OM Code.~~ The initial visual examination verifies, as a minimum: DCD_03.09.06-66

a. No visible sign of damage or impaired operational readiness exist.

b. Snubber load rating, location, orientation, position setting, and configuration are in accordance with design drawings and specifications.

c. Adequate swing clearance is provided to allow snubber movement.

d. Fluid is at the recommended level, and fluid is not leaking from the snubber system, if applicable.

e. Structural connections, such as welds, pins, bearings, studs, fasteners, lock nuts, tabs, wire, and cotter pins, are installed correctly.

The functional preservice testing of the snubber examines the thermal movement through incremental movement verification, swing clearance, and total movement verification in accordance with the ASME OM Code (Reference 3.9-13) Sections ISTD-4131 through ISTD-4133. Snubbers that fail the functional test requirements are re-installed correctly, adjusted, repaired, or replaced until such time the requirements are satisfied.

Preservice operational readiness testing, which may be performed at the manufacturer's facility, verify the following attributes as specified in ASME OM Code (Reference 3.9-13) Section ISTD-5100:

a. Activation is within the specified range of velocity or acceleration in tension and in compression.

b. Release rate, when applicable, is within the specified range in tension and in compression. For units specifically required not to displace under continuous load, the ability of the snubber to withstand load without displacement.

c. For mechanical snubbers, drag force is within specified limits in tension and in compression.

d. For hydraulic snubbers, if required to verify proper assembly, drag force is within specified limits in tension and in compression.

#### 3.9.6.4.3 Inservice Examination Requirements

External characteristics~~, such as items listed in Nonmandatory Appendix B of the ASME OM Code (Reference 3.9-13),~~ are visually examined on the required schedule and evaluated to determine their operational readiness in accordance with the ASME OM Code (Reference 3.9-13) Section ISTD-4200. DCD_03.09.06-66

The initial examination interval of snubbers begins no sooner than 2 months after attaining 5% reactor power operation, and is completed by the end of the first refueling outage. Subsequent examination intervals begin at the end of the previous examination interval, and conclude at the end of the next refueling outage. The duration of examination intervals following the completion of the second refueling outage is in accordance with Table ISTD-4252-1 of the ASME OM Code. Snubbers determined to be unacceptable at any time during the interval, based on the visual examination acceptance criteria, shall be counted in determining the subsequent examination interval in accordance with Table ISTD-4252-1.

Snubbers are tested for operational readiness during each fuel cycle. Tests in accordance with a specified sampling plan are performed during normal system operation, or during system or plant outages. Snubber operational readiness tests verify that:

a. Activation is within the specified range of velocity or acceleration in tension and in compression.

b. Release rate, when applicable, is within the specified range in tension and in compression. For units specifically required not to displace under continuous load, the ability of the snubber to withstand load without displacement.

c. Drag force, when applicable, is within specified limits in tension and in compression.

Snubbers are tested in their as-found condition (without preconditioning) regarding the parameters to be tested to the fullest extent practicable. Snubbers may be tested in their installed location by using Owner-approved test methods and equipment, or removed and bench tested, in accordance with Owner-approved procedures. Snubbers that do not meet test requirements are evaluated to determine the cause of the failure. Unacceptable snubbers are adjusted, repaired, modified, or replaced.

#### 3.9.6.4.4 Service Life Monitoring

The initial snubber service life is predicted based on manufacturer's recommendations or design review. Methods for predicting service life are given in Nonmandatory Appendix F of the ASME OM Code (Reference 3.9-13).

Service life is evaluated at least once each fuel load cycle, and increased or decreased, if warranted. The evaluation is based upon technical data from representative snubbers that have been in service in the plant, or other information related to service life. If the

evaluation indicates that service life will be exceeded before the next scheduled system or plant outage, one of the following actions are taken:

a. The snubber is replaced with a snubber for which the service life will not be exceeded before the next scheduled system or plant outage.

b. Technical justification is documented for extending the service life to or beyond the next scheduled system or plant outage.

c. The snubber is reconditioned such that its service life will be extended to or beyond the next scheduled system or plant outage.

### 3.9.6.5 Relief Request and Authorization to ASME OM Code

Considerable experience has been used in designing and locating pumps, valves, and dynamic restraints to permit preservice and IST required by ASME OM Code. Deferral of testing to cold shutdown or refueling outages in conformance with the rules of the ASME OM Code (Reference 3.9-13), since during power operation it is not practical, is not considered a relief request. Relief from the testing requirements of the ASME OM Code will be requested when full compliance with requirement of the ASME OM Code is not practical. ~~In such cases, specific information will be provided which identifies the applicable code requirements, justification for the relief request and the testing method to be used as an alternative.~~In such cases, the information provided should include the following: DCD_03.09.06-68

(1) identification of the component by name, number, functions, class under Section III of the ASME Code, valve category (as defined in ISTC-1033 of the ASME OM Code), and pump group (as defined in ISTB-2000 of the ASME OM Code)

(2) identification of the ASME OM Code requirement(s) from which the applicant is requesting relief or to which the applicants is requesting an alternative

(3) for a relief request pursuant to 10 CFR 50.55a(f)(6)(I) or (g)(6)(I), the basis for requesting the relief and an explanation of why compliance with the ASME OM Code is impractical or should otherwise not be required

(4) for an alternative request pursuant to 10 CFR 50.55a(a)(3), details regarding the proposed alternative(s) demonstrating that (1) the proposed IST will provide an acceptable level of quality and safety, or (2) compliance with the specified requirement would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety

(5) description of the plan, including milestones, for implementing the proposed IST program

### 3.9.7 [Reserved]

### 3.9.8 [Reserved]

### 3.9.9 Combined License Information

*COL 3.9(1)* *The COL Applicant is to assure snubber functionality in harsh service conditions, including snubber materials (e.g., lubricants, hydraulic fluids, seals).*

*COL 3.9(2)* *The first COL Applicant is to complete the vibration assessment program, including the vibration test results, consistent with guidance of RG 1.20. Subsequent COL Applicant need only provide information in accordance with the applicable portion of position C.3 of RG 1.20 for Non-Prototype internals.*

*COL 3.9(3)* *Deleted*

*COL 3.9(4)* *Deleted*

*COL 3.9(5)* *Deleted*

*COL 3.9(6)* ~~*The COL Applicant is to provide the program plan for IST of dynamic restraints in accordance with Nonmandatory Appendix A of ASME OM Code.*~~*Deleted.* DCD_03.09.06-53,55,66 and 68

*COL 3.9(7)* *Deleted*

*COL 3.9(8)* ~~*The COL Applicant is to administratively control the edition and addenda to be used for the IST program plan, and to provide a full description of their IST program plan for pumps, valves, and dynamic restraints.*~~*The COL Applicant is to administratively control the IST program for pumps, valves and dynamic restraints and to control the ASME OM Code edition and addenda to be used for the IST program.* DCD_03.09.06-53,55,66 and 68

*COL 3.9(9)* *Deleted*

*COL 3.9(10)* *The COL Applicant is to identify the site-specific active pumps.*

*COL 3.9(11)* *The COL Applicant is to provide site-specific, safety-related pump IST parameters and frequency.*

*COL 3.9(12)* *The COL Applicant is to provide type of testing and frequency of site-specific valves subject to IST in accordance with the ASME Code.*

### 3.9.10 References

3.9-1 Nuclear Power Plant Components, ASME Boiler and Pressure Vessel Code. Section III, Division 1, American Society of Mechanical Engineers. Includes: NCA, NB, NC, ND, NF, NG, Code Cases and Appendices including Appendix I, F, and N, 2001 edition thru 2003 Addenda[4].

3.9-2 Nuclear Safety Criteria for the Design of Stationary Pressurized Water Reactor Plants, ANS N5.1.1-1983, American Nuclear Society.

3.9-3 Thermal Stresses in Piping Connected to Reactor Coolant Systems, Generic Communications. Bulletin No. 88-08, U.S. Nuclear Regulatory Commission, Washington, DC, June 22, 1988, including Supplements 1, 2, and 3, dated: June 24, 1988; August 4, 1988; and April 11, 1989.

3.9-4 Pressurizer Surge Line Thermal Stratification. Generic Communications, Bulletin No. 88-11, U.S. Nuclear Regulatory Commission, Washington, DC, December 20, 1988.

3.9-5 Fracture Toughness Requirements, Domestic Licensing of Production and Utilization Facilities, Energy. Title 10, Code of Federal Regulations, Part 50, Appendix G, U.S. Nuclear Regulatory Commission, Washington, DC.

3.9-6 Abaqus, Finite Element Structural Analysis Program, Version 6.7, SIMULIA, Providence, RI.

3.9-7 ANSYS, Finite Element Structural Analysis Program, Release 11.0, ANSYS, Inc, Canonsburg, PA, 2007.

3.9-8 RELAP-5, Transient Hydraulic Analysis Program, MOD 3.2, Idaho National Engineering and Environmental Laboratory, Idaho Falls, ID.

3.9-9 MULTIFLEX, A FORTRAN-IV Computer Program for Analyzing Thermal-Hydraulic-Structure System Dynamics. WCAP-8709 (proprietary), and WCAP-8709 (nonproprietary), September 1977.

3.9-10 NASTRAN, Femap with NX NASTRAN, Version 9.3.

3.9-11 Deleted

3.9-12 Initial Test Programs for Water-Cooled Nuclear Power Plant. Regulatory Guide 1.68, Rev. 3, U.S. Nuclear Regulatory Commission, Washington, DC, March 2007.

3.9-13 Code for Operation and Maintenance of Nuclear Power Plants. American Society of Mechanical Engineers (ASME OM Code), ~~1995 Edition through 2003 Addenda~~2004 Edition through 2006 Addenda. DCD_03.09.06-50

3.9-14 Code for Pressure Piping, Power Piping, ANSI B31.1, 2004 Edition, American Society of Mechanical Engineers.

3.9-15 Deleted

4. As for the RCL piping the 1992 Edition including 1992 Addenda will be used for ASME Code Section III NB-3200,NB-3600 analyses in accordance with the requirements of 10 CFR 50.55a(b)(1)( iii ) except for analyzing equation factor for fillet welds. Stress indices for ASME Class 1 piping analyses will use the 1989 Edition of ASME Code Section III, Division 1, Subsection NB. DCD_03.12-27

3.9-16 ~~Seismic Qualification of Electric and Mechanical Equipment for Nuclear Power Plants. Regulatory Guide 1.100, Rev. 3, U.S. Nuclear Regulatory Commission, Washington, DC, September 2009.~~Seismic Qualification of Electrical and Active Mechanical Equipment and Functional Qualification of Active Mechanical Equipment for Nuclear Power Plants. Regulatory Guide 1.100, Rev. 3, U.S. Nuclear Regulatory Commission, Washington, DC, September 2009. DCD_03.09.06-49

3.9-17 Policy, Technical, and Licensing Issues Pertaining to Evolutionary and Advanced Light-Water Reactor (ALWR) Designs. SECY-93-087, April 2, 1993 ; SRM-93-087 issued on July 21, 1993.

3.9-18 Combining Modal Responses and Spatial Components in Seismic Response Analysis. Regulatory Guide 1.92, Rev. 2, U.S. Nuclear Regulatory Commission, Washington, DC, July 2006.

3.9-19 Combining Modal Responses and Spatial Components in Seismic Response Analysis. Regulatory Guide 1.92, Rev. 1, U.S. Nuclear Regulatory Commission, Washington, DC, February 1976.

3.9-20 Damping Values for Seismic Design of Nuclear Power Plants. Regulatory Guide 1.61, Rev. 1, U.S. Nuclear Regulatory Commission, Washington, DC, March 2007.

3.9-21 Preoperational Vibration Assessment Program for Reactor Internals During Preoperational and Initial Startup Testing. Regulatory Guide 1.20, Rev. 3, U.S. Nuclear Regulatory Commission, Washington, DC, March 2007.

3.9-22 Comprehensive Vibration Assessment Program for US-APWR Reactor Internals, MUAP-07027 (~~Rev. 1~~) ~~(Proprietary) and MUAP-07027 Rev. 1 (Non-Proprietary)~~Mitsubishi Heavy Industries, May 2009. DCD_03.09.05-30

3.9-23 Au Yang, M.K. and Connelly, W.H. A Computerized Method for Flow-Induced Random Vibration Analysis of Nuclear Reactor Internals. Nuclear Engineering and Design 42, 1977, pp 277-263.

3.9-24 APWR Reactor Internals 1/5-Scale Model Flow Test Report. MUAP-07023 Rev. 1 (Proprietary) and MUAP-07023 Rev. 1 (Non-Proprietary), May 2009.

3.9-25 Dynamic Testing and Analysis of Systems, Structures, and Components, Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants. NUREG-0800, SRP 3.9.2, Rev. 3, U.S. Nuclear Regulatory Commission, Washington, DC, March 2007.

3.9-26 Design Response Spectra for Seismic Design of Nuclear Power Plants. Regulatory Guide 1.60, Rev. 1, U.S. Nuclear Regulatory Commission, Washington, DC, December 1973.

3.9-27 Stress Limits for ASME Class 1, 2, and 3 Components and Component Supports, and Core Support Structures Under Specified Service Loading

3.9-60 Guidelines for Inservice Testing at Nuclear Power Plants, NUREG-1482, U.S. Nuclear Regulatory Commission, Washington, DC, April 1995.

3.9-61 MOV Periodic Verification (PV) Study, MPR 2524-a, Joint Owners Group (JOG), November 2006.

3.9-62 Joint Owners Group Air Operated Valve Program Document, Revision 1, December 13, 2000.

3.9-63 Comments on Joint Owners' Group Air Operated Valve Program Document, USNRC Letter from Eugene V. Imbro to Mr. David J. Modeen, Nuclear Energy Institute, October 8, 1999.

3.9-64 Resolution of Generic Safety Issue 158: Performance of Safety-Related Power-Operated Valves Under Design Basis Conditions, Regulatory Issue Summary RIS 2000-03, U.S. Nuclear Regulatory Commission, Washington, DC, March 15, 2000.

3.9-65 PICEP: Pipe Crack Evaluation Program. NP-3596-SR, Rev.1, Electric Power Research Institute, 1987.

3.9-66 Qualification of Active Mechanical Equipment Used in Nuclear Power Plants, American Society of Mechanical Engineers (ASME) QME-1-2007. DCD_03.09.06-49

3.9-67 Alternative Rules for Preservice and Inservice Testing of Certain Motor-Operated Valve Assemblies in Light-Water Reactor Power Plants, American Society of Mechanical Engineers (ASME) Code Case OMN-1, Rev. 0, 1999. DCD_03.09.06-58

**Table 3.9-14 Valve Inservice Test Requirements (Sheet 2 of 119)**

| 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-117A | Safety depressurization valve | Remote MO Globe | Maintain Close<br>Transfer Open<br>Transfer Close | Active<br>RCS Pressure Boundary<br>Remote Position | B | Remote Position Indication, Exercise/ 2 Years<br>Exercise Full Stroke/ Cold Shutdown<br>Operability Test<br>Leak Test/Refueling Outage | 2<br>15 | DCD_03.09.06-57 (c)<br>DCD_03.09.06-57 (c) |
| RCS-MOV-117B | Safety depressurization valve | Remote MO Globe | Maintain Close<br>Transfer Open<br>Transfer Close | Active<br>RCS Pressure Boundary<br>Remote Position | B | Remote Position Indication, Exercise/ 2 Years<br>Exercise Full Stroke/ Cold Shutdown<br>Operability Test<br>Leak Test/Refueling Outage | 2<br>15 | DCD_03.09.06-57 (c)<br>DCD_03.09.06-57 (c) |
| RCS-MOV-116A | Safety depressurization valve block valve | Remote MO Gate | Maintain Open<br>Maintain Close<br>Transfer Close<br>Transfer Open | Active<br>RCS Pressure Boundary<br>Remote Position | B | Remote Position Indication, Exercise/ 2 Years<br>Exercise Full Stroke/ Quarterly<br>Operability Test<br>Leak Test/Refueling Outage | 15 | DCD_03.09.06-57 (c)<br>DCD_03.09.06-57 (c) |
| RCS-MOV-116B | Safety depressurization valve block valve | Remote MO Gate | Maintain Open<br>Maintain Close<br>Transfer Close<br>Transfer Open | Active<br>RCS Pressure Boundary<br>Remote Position | B | Remote Position Indication, Exercise/ 2 Years<br>Exercise Full Stroke/ Quarterly<br>Operability Test<br>Leak Test/Refueling Outage | 15 | DCD_03.09.06-57 (c)<br>DCD_03.09.06-57 (c) |
| (Deleted) | | | | | | | | |

**Table 3.9-14 Valve Inservice Test Requirements (Sheet 3 of 119)**

| Valve Tag Number | Description | Valve/ Actuator Type | Safety-Related Missions | Safety Functions(2) | ASME IST Category | Inservice Testing Type and Frequency | IST Notes | |
|---|---|---|---|---|---|---|---|---|
| (Deleted) | | | | | | | | |
| RCS-MOV-002A | Reactor vessel head vent valve | Remote MO Globe | Maintain Close<br>Transfer Open<br>Transfer Close | Active<br>RCS Pressure Boundary<br>Remote Position | B | Remote Position Indication, Exercise/ 2 Years<br>Exercise Full Stroke/ Cold Shutdown<br>Operability Test<br>Leak Test/Refueling Outage | 2<br>15 | DCD_03.09.06-57 (d)<br>DCD_03.09.06-57 (d) |
| RCS-MOV-002B | Reactor vessel head vent valve | Remote MO Globe | Maintain Close<br>Transfer Open<br>Transfer Close | Active<br>RCS Pressure Boundary<br>Remote Position | B | Remote Position Indication, Exercise/ 2 Years<br>Exercise Full Stroke/ Cold Shutdown<br>Operability Test<br>Leak Test/Refueling Outage | 2<br>15 | DCD_03.09.06-57 (d)<br>DCD_03.09.06-57 (d) |
| RCS-MOV-003A | Reactor vessel head vent valve | Remote MO Globe | Maintain Close<br>Transfer Open<br>Transfer Close | Active<br>RCS Pressure Boundary<br>Remote Position | B | Remote Position Indication, Exercise/ 2 Years<br>Exercise Full Stroke/ Cold Shutdown<br>Operability Test<br>Leak Test/Refueling Outage | 2<br>15 | DCD_03.09.06-57 (d)<br>DCD_03.09.06-57 (d) |
| RCS-MOV-003B | Reactor vessel head vent valve | Remote MO Globe | Maintain Close<br>Transfer Open<br>Transfer Close | Active<br>RCS Pressure Boundary<br>Remote Position | B | Remote Position Indication, Exercise/ 2 Years<br>Exercise Full Stroke/ Cold Shutdown<br>Operability Test<br>Leak Test/Refueling Outage | 2<br>15 | DCD_03.09.06-57 (d)<br>DCD_03.09.06-57 (d) |

**Table 3.9-14 Valve Inservice Test Requirements (Sheet 16 of 119)**

| Valve Tag Number | Description | Valve/ Actuator Type | Safety-Related Missions | Safety Functions(2) | ASME IST Category | Inservice Testing Type and Frequency | IST Notes | |
|---|---|---|---|---|---|---|---|---|
| CVS-VLV-202 | Reactor coolant pump seal return line containment isolation check | Check | Maintain Close<br>Transfer Close | Active<br>Containment Isolation Safety<br>Seat Leakage | AC | Containment isolation Leak Test | 5 | |
| SIS-MOV-001A | Safety injection pump suction isolation | Remote MO Gate | Maintain Open<br>Maintain Close<br>Transfer Close | Active<br>Containment Isolation<br>Remote Position | A | Remote Position Indication, Exercise/ 2 Years<br>Leak Test/ Refueling Outage | | DCD_03.09.06-57 (g) |
| SIS-MOV-001B | Safety injection pump suction isolation | Remote MO Gate | Maintain Open<br>Maintain Close<br>Transfer Close | Active<br>Containment Isolation<br>Remote Position | A | Remote Position Indication, Exercise/ 2 Years<br>Leak Test/ Refueling Outage | | DCD_03.09.06-57 (g) |
| SIS-MOV-001C | Safety injection pump suction isolation | Remote MO Gate | Maintain Open<br>Maintain Close<br>Transfer Close | Active<br>Containment Isolation<br>Remote Position | A | Remote Position Indication, Exercise/ 2 Years<br>Leak Test/ Refueling Outage | | DCD_03.09.06-57 (g) |
| SIS-MOV-001D | Safety injection pump suction isolation | Remote MO Gate | Maintain Open<br>Maintain Close<br>Transfer Close | Active<br>Containment Isolation<br>Remote Position | A | Remote Position Indication, Exercise/ 2 Years<br>Leak Test/ Refueling Outage | | DCD_03.09.06-57 (g) |
| SIS-VLV-004A | Safety injection pump discharge check | Check | Transfer Open | Active | BC | Check Exercise/ Refueling Outage | 3 | |
| SIS-VLV-004B | Safety injection pump discharge check | Check | Transfer Open | Active | BC | Check Exercise/ Refueling Outage | 3 | |

**Table 3.9-14 Valve Inservice Test Requirements (Sheet 17 of 119)**

| Valve Tag Number | Description | Valve/ Actuator Type | Safety-Related Missions | Safety Functions(2) | ASME IST Category | Inservice Testing Type and Frequency | IST Notes | |
|---|---|---|---|---|---|---|---|---|
| SIS-VLV-004C | Safety injection pump discharge check | Check | Transfer Open | Active | BC | Check Exercise/ Refueling Outage | 3 | |
| SIS-VLV-004D | Safety injection pump discharge check | Check | Transfer Open | Active | BC | Check Exercise/ Refueling Outage | 3 | |
| SIS-MOV-009A | Safety injection pump discharge containment isolation | Remote MO Globe | Maintain Open<br>Maintain Close<br>Transfer Close | Active<br>Containment Isolation<br>Remote Position | A | Remote Position Indication, Exercise/ 2 Years<br>Leak Test/ Refueling Outage<br>Excercise Full Stroke/ Quarterly Operability Test | | DCD_03.09.06-57 (g) |
| SIS-MOV-009B | Safety injection pump discharge containment isolation | Remote MO Globe | Maintain Open<br>Maintain Close<br>Transfer Close | Active<br>Containment Isolation<br>Remote Position | A | Remote Position Indication, Exercise/ 2 Years<br>Leak Test/ Refueling Outage<br>Excercise Full Stroke/ Quarterly Operability Test | | DCD_03.09.06-57 (g) |
| SIS-MOV-009C | Safety injection pump discharge containment isolation | Remote MO Globe | Maintain Open<br>Maintain Close<br>Transfer Close | Active<br>Containment Isolation<br>Remote Position | A | Remote Position Indication, Exercise/ 2 Years<br>Leak Test/ Refueling Outage<br>Excercise Full Stroke/ Quarterly Operability Test | | DCD_03.09.06-57 (g) |

**Table 3.9-14 Valve Inservice Test Requirements (Sheet 18 of 119)**

| Valve Tag Number | Description | Valve/ Actuator Type | Safety-Related Missions | Safety Functions(2) | ASME IST Category | Inservice Testing Type and Frequency | IST Notes |
|---|---|---|---|---|---|---|---|
| SIS-MOV-009D | Safety injection pump discharge containment isolation | Remote MO Globe | Maintain Open<br>Maintain Close<br>Transfer Close | Active<br>Containment Isolation<br>Remote Position | A | Remote Position Indication, Exercise/ 2 Years<br>Leak Test/ Refueling Outage<br>Excercise Full Stroke/ Quarterly Operability Test | |
| SIS-VLV-010A | Safety injection pump discharge containment isolation check | Check | Maintain Close<br>Transfer Open<br>Transfer Close | Active<br>Containment Isolation | AC | Leak Test/ Refueling Outage<br>Check Exercise/ Refueling Outage | 3 |
| SIS-VLV-010B | Safety injection pump discharge containment isolation check | Check | Maintain Close<br>Transfer Open<br>Transfer Close | Active<br>Containment Isolation | AC | Leak Test/ Refueling Outage<br>Check Exercise/ Refueling Outage | 3 |
| SIS-VLV-010C | Safety injection pump discharge containment isolation check | Check | Maintain Close<br>Transfer Open<br>Transfer Close | Active<br>Containment Isolation | AC | Leak Test/ Refueling Outage<br>Check Exercise/ Refueling Outage | 3 |
| SIS-VLV-010D | Safety injection pump discharge containment isolation check | Check | Maintain Close<br>Transfer Open<br>Transfer Close | Active<br>Containment Isolation | AC | Leak Test/ Refueling Outage<br>Check Exercise/ Refueling Outage | 3 |

DCD_03.09.06-57 (g)

**Table 3.9-14 Valve Inservice Test Requirements (Sheet 21 of 119)**

| Valve Tag Number | Description | Valve/ Actuator Type | Safety-Related Missions | Safety Functions(2) | ASME IST Category | Inservice Testing Type and Frequency | IST Notes | |
|---|---|---|---|---|---|---|---|---|
| SIS-VLV-013D | Direct vessel injection line check | Check | Maintain Close<br>Transfer Open | Active<br>RCS Pressure Boundary<br>Safety Seat Leakage | AC | Check Exercise/ Refueling Outage<br>Pressure Isolation Leak Test/ Refueling Outage | 3 | |
| SIS-MOV-014A | Hot leg injection line isolation | Remote MO Globe | Maintain Close<br>Transfer Open | Active<br>RCS Pressure Boundary<br>Remote Position | B | Remote Position Indication, Exercise/ 2 Years<br>Exercise Full Stroke/ Cold Shutdown<br>Operability Test<br>Leak Test/ Refueling Outage | 8<br>15 | DCD_03.09.06-57 (i)<br>DCD_03.09.06-57 (i) |
| SIS-MOV-014B | Hot leg injection line isolation | Remote MO Globe | Maintain Close<br>Transfer Open | Active<br>RCS Pressure Boundary<br>Remote Position | B | Remote Position Indication, Exercise/ 2 Years<br>Exercise Full Stroke/ Cold Shutdown<br>Operability Test<br>Leak Test/ Refueling Outage | 8<br>15 | DCD_03.09.06-57 (i)<br>DCD_03.09.06-57 (i) |
| SIS-MOV-014C | Hot leg injection line isolation | Remote MO Globe | Maintain Close<br>Transfer Open | Active<br>RCS Pressure Boundary<br>Remote Position | B | Remote Position Indication, Exercise/ 2 Years<br>Exercise Full Stroke/ Cold Shutdown<br>Operability Test<br>Leak Test/ Refueling Outage | 8<br>15 | DCD_03.09.06-57 (i)<br>DCD_03.09.06-57 (i) |

**Table 3.9-14 Valve Inservice Test Requirements (Sheet 22 of 119)**

| Valve Tag Number | Description | Valve/ Actuator Type | Safety-Related Missions | Safety Functions(2) | ASME IST Category | Inservice Testing Type and Frequency | IST Notes |
|---|---|---|---|---|---|---|---|
| SIS-MOV-014D | Hot leg injection line isolation | Remote MO Globe | Maintain Close<br>Transfer Open | Active<br>RCS Pressure Boundary<br>Remote Position | B | Remote Position Indication, Exercise/ 2 Years<br>Exercise Full Stroke/ Cold Shutdown<br>Operability Test<br>Leak Test/ Refueling Outage | 8<br>15<br>DCD_03.09.06-57 (i)<br>DCD_03.09.06-57 (i) |
| SIS-VLV-015A | Hot leg injection line check | Check | Maintain Close<br>Transfer Open | Active<br>RCS Pressure Boundary<br>Safety Seat Leakage | AC | Check Exercise/ Refueling Outage<br>Pressure Isolation Leak Test/ Refueling Outage | 3 |
| SIS-VLV-015B | Hot leg injection line check | Check | Maintain Close<br>Transfer Open | Active<br>RCS Pressure Boundary<br>Safety Seat Leakage | AC | Check Exercise/ Refueling Outage<br>Pressure Isolation Leak Test/ Refueling Outage | 3 |
| SIS-VLV-015C | Hot leg injection line check | Check | Maintain Close<br>Transfer Open | Active<br>RCS Pressure Boundary<br>Safety Seat Leakage | AC | Check Exercise/ Refueling Outage<br>Pressure Isolation Leak Test/ Refueling Outage | 3 |
| SIS-VLV-015D | Hot leg recirculation line check | Check | Maintain Close<br>Transfer Open | Active<br>RCS Pressure Boundary<br>Safety Seat Leakage | AC | Check Exercise/ Refueling Outage<br>Pressure Isolation Leak Test/ Refueling Outage | 3 |

**Table 3.9-14 Valve Inservice Test Requirements (Sheet 23 of 119)**

| Valve Tag Number | Description | Valve/ Actuator Type | Safety-Related Missions | Safety Functions(2) | ASME IST Category | Inservice Testing Type and Frequency | IST Notes | |
|---|---|---|---|---|---|---|---|---|
| SIS-MOV-031A | Emergency letdown line isolation (first) | Remote MO Gate | Maintain Close<br>Transfer Open<br>Transfer Close | Active<br>RCS Pressure Boundary<br>Remote Position | B | Remote Position Indication, Exercise/ 2 Years<br>Exercise Full Stroke / Cold Shutdown<br>Operability Test<br>Leak Test/ Refueling Outage | 2<br>15 | DCD_03.09.06-57 (j)<br>DCD_03.09.06-57 (j) |
| SIS-MOV-031D | Emergency letdown line isolation (first) | Remote MO Gate | Maintain Close<br>Transfer Open<br>Transfer Close | Active<br>RCS Pressure Boundary<br>Remote Position | B | Remote Position Indication, Exercise/ 2 Years<br>Exercise Full Stroke / Cold Shutdown<br>Operability Test<br>Leak Test/ Refueling Outage | 2<br>15 | DCD_03.09.06-57 (j)<br>DCD_03.09.06-57 (j) |
| SIS-MOV-032A | Emergency letdown line isolation (second) | Remote MO Globe | Maintain Close<br>Transfer Open<br>Transfer Close | Active<br>RCS Pressure Boundary<br>Remote Position | B | Remote Position Indication, Exercise/ 2 Years<br>Exercise Full Stroke / Cold Shutdown<br>Operability Test<br>Leak Test/ Refueling Outage | 2<br>15 | DCD_03.09.06-57 (j)<br>DCD_03.09.06-57 (j) |
| SIS-MOV-032D | Emergency letdown line isolation (second) | Remote MO Globe | Maintain Close<br>Transfer Open<br>Transfer Close | Active<br>RCS Pressure Boundary<br>Remote Position | B | Remote Position Indication, Exercise/ 2 Years<br>Exercise Full Stroke / Cold Shutdown<br>Operability Test<br>Leak Test/ Refueling Outage | 2<br>15 | DCD_03.09.06-57 (j)<br>DCD_03.09.06-57 (j) |

**Table 3.9-14 Valve Inservice Test Requirements (Sheet 29 of 119)**

| Valve Tag Number | Description | Valve/ Actuator Type | Safety-Related Missions | Safety Functions(2) | ASME IST Category | Inservice Testing Type and Frequency | IST Notes |
|---|---|---|---|---|---|---|---|
| RHS-MOV-001A | Containment spray/residual heat removal pump hot leg isolation Inner | Remote MO Gate | Maintain Close<br>Transfer Close<br>Transfer Open | Active<br>RCS Pressure Boundary<br>Safety Seat Leakage<br>Remote Position | A | Remote Position Indication, Exercise/ 2 Years<br>Exercise Full Stroke/ Cold Shutdown<br>Pressure Isolation Leak Test/ Refueling Outage<br>Operability Test | 8 |
| RHS-MOV-002A | Containment spray/residual heat removal pump hot leg isolation Outer | Remote MO Gate | Maintain Close<br>Transfer Close<br>Transfer Open | Active<br>RCS Pressure Boundary<br>Containment Isolation<br>Safety Seat Leakage<br>Remote Position | A | Remote Position Indication, Exercise/ 2 Years<br>Exercise Full Stroke/ Cold Shutdown<br>Pressure Isolation Leak Test/ Refueling Outage<br>Operability Test | 8<br>10<br><u>15</u> |
| RHS-MOV-001B | Containment spray/residual heat removal pump hot leg isolation - Inner | Remote MO Gate | Maintain Close<br>Transfer Close<br>Transfer Open | Active<br>RCS Pressure Boundary<br>Safety Seat Leakage<br>Remote Position | A | Remote Position Indication, Exercise/ 2 Years<br>Exercise Full Stroke/ Cold Shutdown<br>Pressure Isolation Leak Test/ Refueling Outage<br>Operability Test | 8 |

DCD_03.09.06-57 (I)

**Table 3.9-14 Valve Inservice Test Requirements (Sheet 30 of 119)**

| Valve Tag Number | Description | Valve/ Actuator Type | Safety-Related Missions | Safety Functions(2) | ASME IST Category | Inservice Testing Type and Frequency | IST Notes |
|---|---|---|---|---|---|---|---|
| RHS-MOV-002B | Containment spray/residual heat removal pump hot leg isolation - outer | Remote MO Gate | Maintain Close<br>Transfer Close<br>Transfer Open | Active<br>RCS Pressure Boundary<br>Containment Isolation<br>Safety Seat Leakage<br>Remote Position | A | Remote Position Indication, Exercise/ 2 Years<br>Exercise Full Stroke/ Cold Shutdown<br>Pressure Isolation Leak Test/ Refueling Outage<br>Operability Test | 8<br>10<br>15 |
| RHS-MOV-001C | Containment spray/residual heat removal pump hot leg isolation inner | Remote MO Gate | Maintain Close<br>Transfer Close<br>Transfer Open | Active<br>RCS Pressure Boundary<br>Safety Seat Leakage<br>Remote Position | A | Remote Position Indication, Exercise/ 2 Years<br>Exercise Full Stroke/ Cold Shutdown<br>Pressure Isolation Leak Test/ Refueling Outage<br>Operability Test | 8 |
| RHS-MOV-002C | Containment spray/residual heat removal pump hot leg isolation outer | Remote MO Gate | Maintain Close<br>Transfer Close<br>Transfer Open | Active<br>RCS Pressure Boundary<br>Containment Isolation<br>Safety Seat Leakage<br>Remote Position | A | Remote Position Indication, Exercise/ 2 Years<br>Exercise Full Stroke/ Cold Shutdown<br>Pressure Isolation Leak Test/ Refueling Outage<br>Operability Test | 8<br>10<br>15 |

DCD_03.09.06-57 (I)

DCD_03.09.06-57 (I)

**Table 3.9-14 Valve Inservice Test Requirements (Sheet 31 of 119)**

| Valve Tag Number | Description | Valve/ Actuator Type | Safety-Related Missions | Safety Functions(2) | ASME IST Category | Inservice Testing Type and Frequency | IST Notes |
|---|---|---|---|---|---|---|---|
| RHS-MOV-001D | Containment spray/residual heat removal pump hot leg isolation inner | Remote MO Gate | Maintain Close<br>Transfer Close<br>Transfer Open | Active<br>RCS Pressure Boundary<br>Safety Seat Leakage<br>Remote Position | A | Remote Position Indication, Exercise/ 2 Years<br>Exercise Full Stroke/ Cold Shutdown<br>Pressure Isolation Leak Test/ Refueling Outage<br>Operability Test | 8 |
| RHS-MOV-002D | Containment spray/residual heat removal pump hot leg isolation outer | Remote MO Gate | Maintain Close<br>Transfer Close<br>Transfer Open | Active<br>RCS Pressure Boundary<br>Containment Isolation<br>Safety Seat Leakage<br>Remote Position | A | Remote Position Indication, Exercise/ 2 Years<br>Exercise Full Stroke/ Cold Shutdown<br>Pressure Isolation Leak Test/ Refueling Outage<br>Operability Test | 8<br>10<br><u>15</u> |
| RHS-SRV-003A | Containment spray/residual heat removal pump suction relief | Relief | Maintain Close<br>Transfer Open<br>Transfer Close | Active<br>Containment Isolation | BC | Class 2/3 Relief Valve Tests/10 Years and 20% in 4 Years | 10 |
| RHS-SRV-003B | Containment spray/residual heat removal pump suction relief | Relief | Maintain Close<br>Transfer Open<br>Transfer Close | Active<br>Containment Isolation | BC | Class 2/3 Relief Valve Tests/10 Years and 20% in 4 Years | 10 |

DCD_03.09.06-57 (I)

**Table 3.9-14 Valve Inservice Test Requirements (Sheet 45 of 119)**

| Valve Tag Number | Description | Valve/ Actuator Type | Safety-Related Missions | Safety Functions(2) | ASME IST Category | Inservice Testing Type and Frequency | IST Notes | |
|---|---|---|---|---|---|---|---|---|
| FWS-SMV-512A | Main feed water isolation | System medium actuated Gate (using valve inside pressure to close) | Maintain Close<br>Transfer Close | Active<br>Active-to-Fail<br>Containment Isolation<br>Remote Position | B | Remote Position Indication, Exercise/2 Years<br>Exercise Full Stroke/ ~~Cold Shutdown~~Hot Standby<br>Operability Test | 11 | DCD_03.09.06-57 (y) |
| FWS-SMV-512B | Main feed water isolation | System medium actuated Gate (using valve inside pressure to close) | Maintain Close<br>Transfer Close | Active<br>Active-to-Fail<br>Containment Isolation<br>Remote Position | B | Remote Position Indication, Exercise/2 Years<br>Exercise Full Stroke/ ~~Cold Shutdown~~Hot Standby<br>Operability Test | 11 | DCD_03.09.06-57 (y) |
| FWS-SMV-512C | Main feed water isolation | System medium actuated Gate (using valve inside pressure to close) | Maintain Close<br>Transfer Close | Active<br>Active-to-Fail<br>Containment Isolation<br>Remote Position | B | Remote Position Indication, Exercise/2 Years<br>Exercise Full Stroke/ ~~Cold Shutdown~~Hot Standby<br>Operability Test | 11 | DCD_03.09.06-57 (y) |

**Table 3.9-14 Valve Inservice Test Requirements (Sheet 46 of 119)**

| Valve Tag Number | Description | Valve/ Actuator Type | Safety-Related Missions | Safety Functions(2) | ASME IST Category | Inservice Testing Type and Frequency | IST Notes |
|---|---|---|---|---|---|---|---|
| FWS-SMV-512D | Main feed water isolation | System medium actuated Gate (using valve inside pressure to close) | Maintain Close<br>Transfer Close | Active<br>Active-to-Fail<br>Containment Isolation<br>Remote Position | B | Remote Position Indication, Exercise/2 Years<br>Exercise Full Stroke/ ~~Cold Shutdown~~Hot Standby<br>Operability Test | 11 |
| FWS-FCV-510, 520, 530, 540 | Main feed water regulation | Remote AO Globe | Transfer Close | Active-to-Fail<br>Remote Position | B | Remote Position Indication, Exercise/2 Years<br>Exercise Full Stroke/ Cold Shutdown<br>Operability Test | 4 |
| FWS-FCV-511, 521, 531, 541 | Main feed water bypass regulation | Remote AO Globe | Transfer Close | Active-to-Fail<br>Remote Position | B | Remote Position Indication, Exercise/2 Years<br>Exercise Full Stroke/ Cold Shutdown<br>Operability Test | 4 |
| FWS-LCV-610, 620, 630, 640 | Steam generator water filling control | Remote AO Globe | Transfer Close | Active-to-Fail<br>Remote Position | B | Remote Position Indication, Exercise/2 Years<br>Exercise Full Stroke/ Cold Shutdown<br>Operability Test | 4 |
| (Deleted) | | | | | | | |

DCD_03.09.06-57 (y)

**Table 3.9-14 Valve Inservice Test Requirements (Sheet 49 of 119)**

| Valve Tag Number | Description | Valve/ Actuator Type | Safety-Related Missions | Safety Functions(2) | ASME IST Category | Inservice Testing Type and Frequency | IST Notes | |
|---|---|---|---|---|---|---|---|---|
| MSS-SMV-515A | Main steam isolation | System medium actuated Gate (using valve inside pressure to close) | Maintain Close<br>Transfer Close | Active-to-Fail<br>Containment Isolation<br>Remote Position | B | Remote Position Indication, Exercise/2 Years<br>Exercise Full Stroke/ ~~Cold Shutdown~~Hot Standby<br>Operability Test | 11 | DCD_03.09.06-57 (y) |
| MSS-SMV-515B | Main steam isolation | System medium actuated Gate (using valve inside pressure to close) | Maintain Close<br>Transfer Close | Active-to-Fail<br>Containment Isolation<br>Remote Position | B | Remote Position Indication, Exercise/2 Years<br>Exercise Full Stroke/ ~~Cold Shutdown~~Hot Standby<br>Operability Test | 11 | DCD_03.09.06-57 (y) |
| MSS-SMV-515C | Main steam isolation | System medium actuated Gate (using valve inside pressure to close) | Maintain Close<br>Transfer Close | Active-to-Fail<br>Containment Isolation<br>Remote Position | B | Remote Position Indication, Exercise/2 Years<br>Exercise Full Stroke/ ~~Cold Shutdown~~Hot Standby<br>Operability Test | 11 | DCD_03.09.06-57 (y) |

**Table 3.9-14 Valve Inservice Test Requirements (Sheet 50 of 119)**

| Valve Tag Number | Description | Valve/ Actuator Type | Safety-Related Missions | Safety Functions(2) | ASME IST Category | Inservice Testing Type and Frequency | IST Notes |
|---|---|---|---|---|---|---|---|
| MSS-SMV-515D | Main steam isolation | System medium actuated Gate (using valve inside pressure to close) | Maintain Close Transfer Close | Active-to-Fail Containment Isolation Remote Position | B | Remote Position Indication, Exercise/2 Years Exercise Full Stroke/ ~~Cold Shutdown~~Hot standby Operability Test | 11 |
| MSS-HCV-565 | Main steam bypass isolation | Remote AO Globe | Maintain Close Transfer Close | Active-To-Fail Containment Isolation Remote Position | B | Remote Position Indication, Exercise/2 Years Exercise Full Stroke/ Cold Shutdown Operability Test | 4 |
| MSS-HCV-575 | Main steam bypass isolation valve | Remote AO Globe | Maintain Close Transfer Close | Active-To-Fail Containment Isolation Remote Position | B | Remote Position Indication, Exercise/2 Years Exercise Full Stroke/ Cold Shutdown Operability Test | 4 |
| MSS-HCV-585 | Main steam bypass isolation | Remote AO Globe | Maintain Close Transfer Close | Active-To-Fail Containment Isolation Remote Position | B | Remote Position Indication, Exercise/2 Years Exercise Full Stroke/ Cold Shutdown Operability Test | 4 |
| MSS-HCV-595 | Main steam bypass isolation | Remote AO Globe | Maintain Close Transfer Close | Active-To-Fail Containment Isolation Remote Position | B | Remote Position Indication, Exercise/2 Years Exercise Full Stroke/ Cold Shutdown Operability Test | 4 |

DCD_03.09.06-57 (y)

**Table 3.9-14 Valve Inservice Test Requirements (Sheet 55 of 119)**

| Valve Tag Number | Description | Valve/ Actuator Type | Safety-Related Missions | Safety Functions(2) | ASME IST Category | Inservice Testing Type and Frequency | IST Notes |
|---|---|---|---|---|---|---|---|
| MSS-SRV-511D | Main steam safety valve | Relief | Maintain Close<br>Transfer Open<br>Transfer Close | Active<br>Containment Isolation<br>Remote Position | BC | Remote Position Indication, Alternate/2 Years<br>Class 2/3 Relief Valve Tests/5 Years and 20% in 2 Years | 1 |
| MSS-SRV-512D | Main steam safety valve | Relief | Maintain Close<br>Transfer Open<br>Transfer Close | Active<br>Containment Isolation<br>Remote Position | BC | Remote Position Indication, Alternate/2 Years<br>Class 2/3 Relief Valve Tests/5 Years and 20% in 2 Years | 1 |
| MSS-SRV-513D | Main steam safety valve | Relief | Maintain Close<br>Transfer Open<br>Transfer Close | Active<br>Containment Isolation<br>Remote Position | BC | Remote Position Indication, Alternate/2 Years<br>Class 2/3 Relief Valve Tests/5 Years and 20% in 2 Years | 1 |
| MSS-SRV-514D | Main steam safety valve | Relief | Maintain Close<br>Transfer Open<br>Transfer Close | Active<br>Containment Isolation<br>Remote Position | BC | Remote Position Indication, Alternate/2 Years<br>Class 2/3 Relief Valve Tests/5 Years and 20% in 2 Years | 1 |
| MSS-VLV-516A | Main steam check | Check | Maintain Close<br>Transfer Close | Active | B | Check Exercise (Alternative method) ~~/Refueling Outage~~Cold Shutdown (of sufficient duration) | 12 |

DCD_03.09.06-57 (z)

**Table 3.9-14 Valve Inservice Test Requirements (Sheet 56 of 119)**

| Valve Tag Number | Description | Valve/ Actuator Type | Safety-Related Missions | Safety Functions(2) | ASME IST Category | Inservice Testing Type and Frequency | IST Notes | |
|---|---|---|---|---|---|---|---|---|
| MSS-VLV-516B | Main steam check | Check | Maintain Close<br>Transfer Close | Active | B | Check Exercise (Alternative method) /~~Refueling Outage~~Cold Shutdown (of sufficient duration) | 12 | DCD_03.09.06-57 (z) |
| MSS-VLV-516C | Main steam check | Check | Maintain Close<br>Transfer Close | Active | B | Check Exercise (Alternative method) /~~Refueling Outage~~Cold Shutdown (of sufficient duration) | 12 | DCD_03.09.06-57 (z) |
| MSS-VLV-516D | Main steam check | Check | Maintain Close<br>Transfer Close | Active | B | Check Exercise (Alternative method) /~~Refueling Outage~~Cold Shutdown (of sufficient duration) | 12 | DCD_03.09.06-57 (z) |
| MSS-MOV-701A | Main steam drain line isolation | Remote MO Globe | Maintain Close<br>Transfer Close | Active-to-Fail Containment Isolation<br>Remote Position | B | Remote Position Indication, Exercise/2 Years<br>Exercise Full Stroke/ Cold Shutdown Operability Test | 6 | |
| MSS-MOV-701B | Main steam drain line isolation | Remote MO Globe | Maintain Close<br>Transfer Close | Active-to-Fail Containment Isolation<br>Remote Position | B | Remote Position Indication, Exercise/2 Years<br>Exercise Full Stroke/ Cold Shutdown Operability Test | 6 | |
| MSS-MOV-701C | Main steam drain line isolation | Remote MO Globe | Maintain Close<br>Transfer Close | Active-to-Fail Containment Isolation<br>Remote Position | B | Remote Position Indication, Exercise/2 Years<br>Exercise Full Stroke/ Cold Shutdown Operability Test | 6 | |

**Table 3.9-14 Valve Inservice Test Requirements (Sheet 65 of 116)**

| Valve Tag Number | Description | Valve/ Actuator Type | Safety-Related Missions | Safety Functions(2) | ASME IST Category | Inservice Testing Type and Frequency | IST Notes | |
|---|---|---|---|---|---|---|---|---|
| NCS-MOV-537 | Letdown heat exchanger component cooling water return containment isolation | Remote MO Gate | Maintain Close<br>Transfer Close | Active<br>Containment Isolation<br>Safety Seat Leakage<br>Remote Position | A | Remote Position Indication, Exercise/2 Years<br>Containment Isolation Leak Test<br>Exercise Full Stroke/ Cold Shutdown<br>Operability Test | 4<br>5 | |
| NCS-VLV-231A | A, B-reactor coolant pump supply line check | Check | Maintain Open<br>Transfer Close | Active | BC | Check Exercise/ Refueling Outage | 3 | DCD_09.02.02-56 |
| NCS-VLV-231B | A, B-reactor coolant pump supply line check | Check | Maintain Open<br>Transfer Close | Active | BC | Check Exercise/ Refueling Outage | 3 | DCD_09.02.02-56 |
| NCS-MOV-232A | Cross-connection between A,B-reactor coolant pump and C,D-reactor coolant pump component cooling water ~~return~~supply line isolation | Remote MO Gate | Maintain Close<br>Transfer Open | Active<br>Remote Position | B | Remote Position Indication, Exercise/2 Years<br>Exercise Full Stroke/ Cold Shutdown<br>Operability Test | 7 | DCD_03.09.06-64 |

**Table 3.9-14 Valve Inservice Test Requirements (Sheet 66 of 119)**

| Valve Tag Number | Description | Valve/ Actuator Type | Safety-Related Missions | Safety Functions(2) | ASME IST Category | Inservice Testing Type and Frequency | IST Notes |
|---|---|---|---|---|---|---|---|
| NCS-MOV-232B | Cross-connection between A,B-reactor coolant pump and C,D-reactor coolant pump component cooling water ~~return~~supply line isolation | Remote MO Gate | Maintain Close Transfer Open | Active Remote Position | B | Remote Position Indication, Exercise/2 Years Exercise Full Stroke/ Cold Shutdown Operability Test | 7 |
| NCS-MOV-233A | Cross-connection between A,B-reactor coolant pump and C,D-reactor coolant pump component cooling water return line isolation | Remote MO Gate | Maintain Close Transfer Open | Active Remote Position | B | Remote Position Indication, Exercise/2 Years Exercise Full Stroke/ Cold Shutdown Operability Test | 7 |
| NCS-MOV-233B | Cross-connection between A,B-reactor coolant pump and C,D-reactor coolant pump component cooling water return line isolation | Remote MO Gate | Maintain Close Transfer Open | Active Remote Position | B | Remote Position Indication, Exercise/2 Years Exercise Full Stroke/ Cold Shutdown Operability Test | 7 |

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**Table 3.9-14 Valve Inservice Test Requirements (Sheet 98 of 119)**

| Valve Tag Number | Description | Valve/ Actuator Type | Safety-Related Missions | Safety Functions(2) | ASME IST Category | Inservice Testing Type and Frequency | IST Notes | |
|---|---|---|---|---|---|---|---|---|
| RWS-MOV-002 | Refueling water storage pit purification line containment isolation | Remote MO Gate | Maintain Close<br>Transfer Close | Active-to-Fail<br>Containment Isolation<br>Safety Seat Leakage<br>Remote Position | A | Remote Position Indication, Exercise/2 Years<br>Containment Isolation Leak Test<br>Exercise Full Stroke/ Quarterly<br>Operability Test | 5 | |
| RWS-AOV-022 | Refueling water storage pit purification return line containment isolation | Remote AO weir type diaphragm | Maintain Close<br>Transfer Close | Active-to-Fail<br>Containment Isolation<br>Safety Seat Leakage<br>Remote Position | A | Remote Position Indication, Exercise/2 Years<br>Containment Isolation Leak Test<br>Exercise Full Stroke/ Quarterly<br>Operability Test | 5 | |
| RWS-VLV-023 | Refueling water storage pit purification return line containment isolation | Check | Maintain Close<br>Transfer Close | Active<br>Containment Isolation<br>Safety Seat Leakage<br>~~Remote Position~~ | AC | Containment Isolation Leak Test<br>Check Exercise/ Refueling Outage | 3<br>5 | DCD_03.09.06-57 (g) |
| RWS-VLV-003 | Refueling water storage pit purification line containment isolation check | Check | Maintain Close | ~~Passive~~Active<br>Containment Isolation<br>Safety Seat Leakage | A | Containment Isolation Leak Test<br>Check Exercise/ Refueling Outage | 3<br>5 | DCD_03.09.06-57 (w)<br>DCD_03.09.06-57 (w) |

**Table 3.9-14 Valve Inservice Test Requirements (Sheet 99 of 119)**

| Valve Tag Number | Description | Valve/ Actuator Type | Safety-Related Missions | Safety Functions(2) | ASME IST Category | Inservice Testing Type and Frequency | IST Notes |
|---|---|---|---|---|---|---|---|
| RWS-VLV-012A | Refueling water recirculation pump discharge check | Check | Transfer Open | Active | BC | Check Exercise/ Refueling Outage | |
| RWS-VLV-012B | Refueling water recirculation pump discharge check | Check | Transfer Open | Active | BC | Check Exercise/ Refueling Outage | |
| DWS-VLV-004 | Demineralized water supply containment isolation | Manual | Maintain Close | Passive Containment Isolation Safety Seat Leakage | A | Containment Isolation Leak Test | 5 |
| DWS-VLV-005 | Demineralized water supply containment isolation check | Check | Maintain Close | ~~Passive~~Active Containment Isolation Safety Seat Leakage | AC | Containment Isolation Leak Test<br>Check Exercise/ Refueling Outage | 3<br>5<br>DCD_03.09.06-57 (w)<br>DCD_03.09.06-57 (w) |

**Table 3.9-14 Valve Inservice Test Requirements (Sheet 100 of 119)**

| Valve Tag Number | Description | Valve/ Actuator Type | Safety-Related Missions | Safety Functions(2) | ASME IST Category | Inservice Testing Type and Frequency | IST Notes |
|---|---|---|---|---|---|---|---|
| CAS-MOV-002 | Instrument air supply outside containment isolation | Remote MO Globe | Maintain Close<br>Transfer Close | Active<br>Containment Isolation<br>Safety Seat Leakage<br>Remote Position | A | Remote Position Indication, Exercise/2 Years<br>Containment Isolation Leak Test<br>Exercise Full Stroke/ Refueling Outage<br>Operability Test | 5<br>6 |
| CAS-VLV-003 | Instrument air supply containment isolation | Check | Maintain Close<br>Transfer Close | Active<br>Containment Isolation<br>Safety Seat Leakage | AC | Containment Isolation Leak Test<br>Check Exercise/ Refueling Outage | 3<br>5 |
| CAS-VLV-101 | Station service air supply line containment isolation | Manual | Maintain Close | Containment Isolation<br>Safety Seat Leakage | A | Containment Isolation Leak Test | 5 |
| CAS-VLV-103 | Station service air supply line containment isolation check | Check | Maintain Close | Active<br>Containment Isolation<br>Safety Seat Leakage | AC | Containment Isolation Leak Test<br>Check Exercise/ Refueling Outage | 3<br>5 |
| IGS-AOV-001 | ICIGS line containment isolation | Remote AO weir type diaphragm | Maintain Close<br>Transfer Close | Active-to-Fail<br>Containment Isolation<br>Safety Seat Leakage<br>Remote Position | A | Remote Position Indication, Exercise/2 Years<br>Containment Isolation Leak Test<br>Exercise Full Stroke/ Cold Shut down<br>Operability Test | 5<br>6 |

DCD_03.09.06-57 (w)

DCD_03.09.06-57 (w)

**Table 3.9-14 Valve Inservice Test Requirements (Sheet 102 of 119)**

| Valve Tag Number | Description | Valve/ Actuator Type | Safety-Related Missions | Safety Functions(2) | ASME IST Category | Inservice Testing Type and Frequency | IST Notes |
|---|---|---|---|---|---|---|---|
| FSS-VLV-006 | FPWSS line to reactor cavity containment isolation check | Check | Maintain Close | Active<br>Containment Isolation<br>Safety Seat Leakage | AC | Containment Isolation Leak Test<br>Check Exercise/ Refueling Outage | 3<br>5 |
| VCS-AOV-304 | Containment High Volume Purge Supply Line Containment Isolation Outside of CV | Remote AO Butterfly | Maintain Close<br>Transfer Close | Active-to-Failed<br>Containment Isolation<br>Safety Seat Leakage<br>Remote Position | A | Remote Position Indication, Exercise/2 Years<br>Containment Isolation Leak Test<br>Exercise Full Stroke/ Cold Shutdown<br>Operability Test | 5 |
| VCS-AOV-305 | Containment High Volume Purge Supply Line Containment Isolation Inside of CV | Remote AO Butterfly | Maintain Close<br>Transfer Close | Active-to-Failed<br>Containment Isolation<br>Safety Seat Leakage<br>Remote Position | A | Remote Position Indication, Exercise/ 2 Years<br>Containment Isolation Leak Test<br>Exercise Full Stroke/ Cold Shutdown<br>Operability Test | 5 |
| VCS-AOV-306 | Containment High Volume Purge Exhaust Line Containment Isolation Inside of CV | Remote AO Butterfly | Maintain Close<br>Transfer Close | Active-to-Failed<br>Containment Isolation<br>Safety Seat Leakage<br>Remote Position | A | Remote Position Indication, Exercise/2 Years<br>Containment Isolation Leak Test<br>Exercise Full Stroke/ Cold Shutdown<br>Operability Test | 5 |

DCD_03.09.06-57 (w)

DCD_03.09.06-57 (w)

**Table 3.9-14 Valve Inservice Test Requirements (Sheet 119 of 119)**

| Valve Tag Number | Description | Valve/ Actuator Type | Safety-Related Missions | Safety Functions(2) | ASME IST Category | Inservice Testing Type and Frequency | IST Notes | |
|---|---|---|---|---|---|---|---|---|
| DS-VLV-001C | C-Safeguard component area floor drain isolation valve | Manual | Maintain Close | Passive Safety Seat Leakage | A | Seat Leak Test by Water Addition or Pressurized Air / Refueling outage | | |
| DS-VLV-001D | D-Safeguard component area floor drain isolation valve | Manual | Maintain Close | Passive Safety Seat Leakage | A | Seat Leak Test by Water Addition or Pressurized Air / Refueling outage | | |
| RCS-MOV-118 | Depressurization valve for severe accident | Remote MO Globe | Maintain Close<br>Transfer Open<br>Transfer Close | Active<br>RCS Pressure Boundary<br>Remote Position | B | Remote Position Indication, Exercise/ 2 Years<br>Exercise Full Stroke/ Cold Shutdown<br>Operability Test<br>Leak Test/ Refueling Outage | 2<br>15 | DCD_03.09.06-57 (d) |
| RCS-MOV-119 | Depressurization valve for severe accident | Remote MO Globe | Maintain Close<br>Transfer Open<br>Transfer Close | Active<br>RCS Pressure Boundary<br>Remote Position | B | Remote Position Indication, Exercise/ 2 Years<br>Exercise Full Stroke/ Cold Shutdown<br>Operability Test<br>Leak Test/ Refueling Outage | 2<br>15 | DCD_03.09.06-57 (d) |

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.
4. Test of these valves at power will result in an undesirable transient on the reactor coolant system or the steam generator secondary system. Therefore, exercise testing will be performed at cold shutdown to avoid impact on power operation.
5. Containment isolation valves leakage test frequency will be conducted in accordance with the "primary containment leakage rate test program" in accordance with 10 CFR 50 Appendix J.

6. Exercising these valves would stop necessary line for operation such as utilities etc. Therefore, exercise testing will be performed at cold shutdown to avoid impact on power operation.
7. Exercising these valves would stop seal injection/ return water or cooling water of the reactor coolant pumps. Such stop of water may result in damage to the reactor coolant pump or reactor trip. These valves are exercised during cold shutdowns when these components do not require the water flow.
8. These valves isolate the low pressure system from the high pressure the reactor coolant system. Opening during normal operation may result in damage of equipment or reactor trip. These valves are exercised during cold shutdowns.
9. Exercising these valves during power operation would cause a loss of necessary safety function for power operation that needs big efforts to recover it. These valves will be exercised during cold shutdowns.
10. The residual heat removal system hot leg suction containment isolation valves and cold leg discharge containment isolation valves are not containment isolation leak tested. The basis for the exception is:
    - Should the valves leak slightly when closed, the fluid seal within the pipe or the closed piping system outside containment would preclude release of containment atmosphere to the environment
    - During post-accident operations, the system is filled with recirculation water. During normal operation, the system is water filled, and degradation of valves or piping is readily detected
    - The residual heat removal system is a closed loop system, seismically-designed and designed as Quality Group B with a portion of outside containment.
    - The residual heat removal system valves are closed when the plant is in modes above hot shutdown.
11. This note applies to the main steam isolation valves and main feed water isolation valves. The valves are not full stroke tested quarterly at power since full valve stroking will result in a plant transient during normal power operation. These valves will be exercised during hot standby condition.
12. Full-stroke exercise of main steam check valves can not be practically established. Main steam check valves are tested by alternate method (disassembly) during refueling outage as described in the Generic Letter 89-04.
13. Exercising these valves during power operation would cause a loss of necessary safety function for power operation that needs big efforts to recover it. These valves will be exercised during hot shutdown before cooling down for refueling outage.
14. This note applies to the air start pilot valves in the GTG starting system. These valves are operated with specific air source installed in the GTG starting system.
15. Technical Specification surveillance requirement SR 3.4.14.1 will be used for the valve leakage acceptance criteria.

DCD_03.09.06-57 (d), (i), (j) and (l)

**Table 6.2.4-3 List of Containment Penetrations and System Isolation Positions (Sheet 1 of 15)**

| Pen NO. | GDC | System Name | Fluid | Line Size (in.) | ESF or Support System | Valve Arragmt Figure 6.2.4-1 | Valve Number | Location of Valve | Type Tests | Type C Test | Length of Pipe (Note 1) | Valve | | Actuation Mode | | Valve Position | | | Power Failure | Actuation Signal | Valve Closure (seconds) | Power Source | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Type | Operator | Primary | Secondary | Normal | Shutdown | Post-Accident | | | | | |
| P247 | 56 | RCS | Nitrogen Gas | 1 | No | Sht. 2 | RCS-VLV-133 | In | C | Y | - | Check | Self | Auto | None | - | - | - | NA | NA | NA | NA | |
| | | | | 1 | | | RCS-AOV-132 | Out | | | 9.0 ft | Dia | Air | Auto | RM | O | C | C | FC | T | 15 | 1E | |
| | | | | 3/4 | | | RCS-VLV-167 | In | | | - | Dia | Manual | Manual | None | C | C | C | NA | NA | NA | NA | |
| P260 | 56 | RCS | Demi. Water | 3 | No | Sht. 3 | RCS-VLV-139 | In | C | Y | - | Check | Self | Auto | None | - | - | - | NA | NA | NA | NA | |
| | | | | 3 | | | RCS-VLV-140 | In | | | - | Dia | Manual | Manual | None | C | C | C | NA | NA | NA | NA | |
| | | | | 3 | | | RCS-AOV-138 | Out | | | 10.0 ft | Globe | Air | Auto | RM | O | C | C | FC | T | 15 | 1E | |
| P276L | 56 | RCS | Nitrogen Gas | 3/4 | No | Sht. 4 | RCS-AOV-147 | In | C | Y | - | Globe | Air | Auto | RM | O | C | C | FC | T | 15 | 1E | |
| | | | | 3/4 | | | RCS-AOV-148 | Out | | | 10.0 ft | Globe | Air | Auto | RM | C | C | C | FC | T | 15 | 1E | |
| P277 | 55 | CVCS | Primary Coolant | 4 | No | Sht. 5 | CVS-AOV-005 | In | C | Y | - | Globe | Air | Auto | RM | O | O | C | FC | T | 20 | 1E | |
| | | | | 4 | | | CVS-AOV-006 | Out | | | 14.0 ft | Globe | Air | Auto | RM | O | O | C | FC | T | 20 | 1E | |
| P278 | 55 | CVCS | Primary Coolant | 4 | No | Sht. 6 | CVS-VLV-153 | In | C | Y | - | Check | Self | Auto | None | - | - | - | NA | NA | NA | NA | |
| | | | | 4 | | | CVS-MOV-152 | Out | | | 14.0 ft | Gate | Motor | Auto | RM | O | O | C | FAI | S | 20 | 1E | |
| | | | | 3/4 | | | CVS-VLV-653 | In | | | - | Globe | Manual | Manual | None | C | C | C | NA | NA | NA | NA | |
| P279 | 56 | CVCS | Primary Coolant | 1 1/2 | No | Sht. 7 | CVS-VLV-179B | In | C | Y | - | Check | Self | Auto | None | - | - | - | NA | NA | NA | NA | |
| | | | | 1 1/2 | | | CVS-MOV-178B | Out | | | 14.0 ft | Globe | Motor | RM | Manual | O | O | O | FAI | RM | 15 | 1E | |
| | | | | 3/4 | | | CVS-VLV-667B | In | | | - | Globe | Manual | Manual | None | C | C | C | NA | NA | NA | NA | |
| P280 | 56 | CVCS | Primary Coolant | 1 1/2 | No | Sht. 7 | CVS-VLV-179D | In | C | Y | - | Check | Self | Auto | None | - | - | - | NA | NA | NA | NA | |
| | | | | 1 1/2 | | | CVS-MOV-178D | Out | | | 14.0 ft | Globe | Motor | RM | Manual | O | O | O | FAI | RM | 15 | 1E | |
| | | | | 3/4 | | | CVS-VLV-667D | In | | | - | Globe | Manual | Manual | None | C | C | C | NA | NA | NA | NA | |
| P281 | 56 | CVCS | Primary Coolant | 1 1/2 | No | Sht. 7 | CVS-VLV-179A | In | C | Y | - | Check | Self | Auto | None | - | - | - | NA | NA | NA | NA | |
| | | | | 1 1/2 | | | CVS-MOV-178A | Out | | | 14.0 ft | Globe | Motor | RM | Manual | O | O | O | FAI | RM | 15 | 1E | |
| | | | | 3/4 | | | CVS-VLV-667A | In | | | - | Globe | Manual | Manual | None | C | C | C | NA | NA | NA | NA | |
| P282 | 56 | CVCS | Primary Coolant | 1 1/2 | No | Sht. 7 | CVS-VLV-179C | In | C | Y | - | Check | Self | Auto | None | - | - | - | NA | NA | NA | NA | |
| | | | | 1 1/2 | | | CVS-MOV-178C | Out | | | 14.0 ft | Globe | Motor | RM | Manual | O | O | O | FAI | RM | 15 | 1E | |
| | | | | 3/4 | | | CVS-VLV-667C | In | | | - | Globe | Manual | Manual | None | C | C | C | NA | NA | NA | NA | |
| P283 | 55 | CVCS | Primary Coolant | 3 | No | Sht. 8 | CVS-MOV-203 | In | C | Y | - | Globe | Motor | Auto | RM | O | O | C | FAI | P,T+UV | 15 | 1E | |
| | | | | 3 | | | CVS-MOV-204 | Out | | | 9.0 ft | Globe | Motor | Auto | RM | O | O | C | FAI | P,T+UV | 15 | 1E | |
| | | | | 3/4 | | | CVS-VLV-202 | In | | | - | Check | Self | Auto | None | - | - | - | NA | NA | NA | NA | |
| P236 | 56 | SIS | Nitrogen Gas | 1 | No | Sht. 9 | SIS-VLV-115 | In | C | Y | - | Check | Self | Auto | None | - | - | - | NA | NA | NA | NA | |
| | | | | 1 | | | SIS-AOV-114 | Out | | | 9.0 ft | Globe | Air | Auto | RM | C | C | C | FC | T | 15 | 1E | |
| | | | | 3/4 | | | SIS-VLV-156 | In | | | - | Globe | Manual | Manual | None | C | C | C | NA | NA | NA | NA | |

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**Table 6.2.4-3 List of Containment Penetrations and System Isolation Positions (Sheet 2 of 15)**

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| Pen NO. | GDC | System Name | Fluid | Line Size (In.) | ESF or Support System | Valve Arragmt Figure 6.2.4-1 | Valve Number | Location of Valve | Type Tests | Type C Test | Length of Pipe (Note 1) | Valve | | Actuation Mode | | Valve Position | | | Power Failure | Actuation Signal | Valve Closure (seconds) | Power Source | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Type | Operator | Primary | Secondary | Normal | Shutdown | Post-Accident | | | | | |
| P210 | 55 | SIS | Borated Water | 4 | Yes | Sht. 10 | SIS-VLV-010A | In | A | N | - | Check | Self | Auto | None | - | - | - | NA | NA | NA | NA | Note 4 |
| | | | | 4 | | | SIS-MOV-009A | Out | | | 9.0 ft | Globe | Motor | RM | Manual | O | O | O | FAI | RM | 20 | 1E | |
| | | | | 3/4 | | | SIS-VLV-058A | In | | | - | Globe | Manual | Manual | None | C | C | C | NA | NA | NA | NA | |
| P227 | 55 | SIS | Borated Water | 4 | Yes | Sht. 10 | SIS-VLV-010B | In | A | N | - | Check | Self | Auto | None | - | - | - | NA | NA | NA | NA | Note 4 |
| | | | | 4 | | | SIS-MOV-009B | Out | | | 9.0 ft | Globe | Motor | RM | Manual | O | O | O | FAI | RM | 20 | 1E | |
| | | | | 3/4 | | | SIS-VLV-058B | In | | | - | Globe | Manual | Manual | None | C | C | C | NA | NA | NA | NA | |
| P258 | 55 | SIS | Borated Water | 4 | Yes | Sht. 10 | SIS-VLV-010C | In | A | N | - | Check | Self | Auto | None | - | - | - | NA | NA | NA | NA | Note 4 |
| | | | | 4 | | | SIS-MOV-009C | Out | | | 9.0 ft | Globe | Motor | RM | Manual | O | O | O | FAI | RM | 20 | 1E | |
| | | | | 3/4 | | | SIS-VLV-058C | In | | | - | Globe | Manual | Manual | None | C | C | C | NA | NA | NA | NA | |
| P274 | 55 | SIS | Borated Water | 4 | Yes | Sht. 10 | SIS-VLV-010D | In | A | N | - | Check | Self | Auto | None | - | - | - | NA | NA | NA | NA | Note 4 |
| | | | | 4 | | | SIS-MOV-009D | Out | | | 9.0 ft | Globe | Motor | RM | Manual | O | O | O | FAI | RM | 20 | 1E | |
| | | | | 3/4 | | | SIS-VLV-058D | In | | | - | Globe | Manual | Manual | None | C | C | C | NA | NA | NA | NA | |
| P152 | 56 | SIS | Borated Water | 10 | Yes | Sht. 11 | SIS-MOV-001A | Out | A | N | 39.0 ft | Gate | Motor | RM | Manual | O | O | O | FAI | RM | 50 | 1E | Note 4<br>Note 7 |
| P153 | 56 | SIS | Borated Water | 10 | Yes | Sht. 11 | SIS-MOV-001B | Out | A | N | 39.0 ft | Gate | Motor | RM | Manual | O | O | O | FAI | RM | 50 | 1E | Note 4<br>Note 7 |
| P156 | 56 | SIS | Borated Water | 10 | Yes | Sht. 11 | SIS-MOV-001C | Out | A | N | 39.0 ft | Gate | Motor | RM | Manual | O | O | O | FAI | RM | 50 | 1E | Note 4<br>Note 7 |
| P157 | 56 | SIS | Borated Water | 10 | Yes | Sht. 11 | SIS-MOV-001D | Out | A | N | 39.0 ft | Gate | Motor | RM | Manual | O | O | O | FAI | RM | 50 | 1E | Note 4<br>Note 7 |
| P209 | 55 | RHRS | Borated Water | 10 | No | Sht. 12 | RHS-MOV-002A | In | A | N | - | Gate | Motor | RM | Manual | C | O | C | FAI | RM | 50 | 1E | Note 4 |
| | | | | 6 | | | RHS-SRV-003A | In | | | - | Relief | Self | Auto | None | C | C | C | NA | NA | NA | NA | Note 6 |
| | | | | 3/4 | | | SIS-VLV-225A | In | | | - | Globe | Manual | Manual | None | C | C | C | NA | NA | NA | NA | |
| P226 | 55 | RHRS | Borated Water | 10 | No | Sht. 12 | RHS-MOV-002B | In | A | N | - | Gate | Motor | RM | Manual | C | O | C | FAI | RM | 50 | 1E | Note 4 |
| | | | | 6 | | | RHS-SRV-003B | In | | | - | Relief | Self | Auto | None | C | C | C | NA | NA | NA | NA | Note 6 |
| | | | | 3/4 | | | SIS-VLV-225B | In | | | - | Globe | Manual | Manual | None | C | C | C | NA | NA | NA | NA | |
| P257 | 55 | RHRS | Borated Water | 10 | No | Sht. 12 | RHS-MOV-002C | In | A | N | - | Gate | Motor | RM | Manual | C | O | C | FAI | RM | 50 | 1E | Note 4 |
| | | | | 6 | | | RHS-SRV-003C | In | | | - | Relief | Self | Auto | None | C | C | C | NA | NA | NA | NA | Note 6 |
| | | | | 3/4 | | | SIS-VLV-225C | In | | | - | Globe | Manual | Manual | None | C | C | C | NA | NA | NA | NA | |
| P273 | 55 | RHRS | Borated Water | 10 | No | Sht. 12 | RHS-MOV-002D | In | A | N | - | Gate | Motor | RM | Manual | C | O | C | FAI | RM | 50 | 1E | Note 4 |
| | | | | 6 | | | RHS-SRV-003D | In | | | - | Relief | Self | Auto | None | C | C | C | NA | NA | NA | NA | Note 6 |
| | | | | 3/4 | | | SIS-VLV-225D | In | | | - | Globe | Manual | Manual | None | C | C | C | NA | NA | NA | NA | |

**Table 6.2.4-3 List of Containment Penetrations and System Isolation Positions (Sheet 3 of 15)**

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| Pen NO. | GDC | System Name | Fluid | Line Size (In.) | ESF or Support System | Valve Arragmt Figure 6.2.4-1 | Valve Number | Location of Valve | Type Tests | Type C Test | Length of Pipe (Note 1) | Valve | | Actuation Mode | | Valve Position | | | Power Failure | Actuation Signal | Valve Closure (seconds) | Power Source | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Type | Operator | Primary | Secondary | Normal | Shutdown | Post-Accident | | | | | |
| P212 | 55 | RHRS | Borated Water | 8 | Yes | Sht. 13 | RHS-VLV-022A | In | A | N | - | Check | Self | Auto | None | - | - | - | NA | NA | NA | NA | Note 4 |
| | | | | 8 | | | RHS-MOV-021A | Out | | | 11.0 ft | Gate | Motor | RM | Manual | C | O | O | FAI | RM | 40 | 1E | |
| | | | | 3/4 | | | RHS-VLV-062A | In | | | - | Globe | Manual | Manual | None | C | C | C | NA | NA | NA | NA | |
| P225 | 55 | RHRS | Borated Water | 8 | Yes | Sht. 13 | RHS-VLV-022B | In | A | N | - | Check | Self | Auto | None | - | - | - | NA | NA | NA | NA | Note 4 |
| | | | | 8 | | | RHS-MOV-021B | Out | | | 11.0 ft | Gate | Motor | RM | Manual | C | O | O | FAI | RM | 40 | 1E | |
| | | | | 3/4 | | | RHS-VLV-062B | In | | | - | Globe | Manual | Manual | None | C | C | C | NA | NA | NA | NA | |
| P259 | 55 | RHRS | Borated Water | 8 | Yes | Sht. 13 | RHS-VLV-022C | In | A | N | - | Check | Self | Auto | None | - | - | - | NA | NA | NA | NA | Note 4 |
| | | | | 8 | | | RHS-MOV-021C | Out | | | 11.0 ft | Gate | Motor | RM | Manual | C | O | O | FAI | RM | 40 | 1E | |
| | | | | 3/4 | | | RHS-VLV-062C | In | | | - | Globe | Manual | Manual | None | C | C | C | NA | NA | NA | NA | |
| P272 | 55 | RHRS | Borated Water | 8 | Yes | Sht. 13 | RHS-VLV-022D | In | A | N | - | Check | Self | Auto | None | - | - | - | NA | NA | NA | NA | Note 4 |
| | | | | 8 | | | RHS-MOV-021D | Out | | | 11.0 ft | Gate | Motor | RM | Manual | C | O | O | FAI | RM | 40 | 1E | |
| | | | | 3/4 | | | RHS-VLV-062D | In | | | - | Globe | Manual | Manual | None | C | C | C | NA | NA | NA | NA | |
| P501 | 57 | FWS | Secondary Coolant | 16 | Yes | Sht. 14 | FWS-SMV-512A | Out | A | N | 37.0 ft | Gate | S/M | Auto | RM | O | O | C | FC | S,RCPS | 5 | 1E | Note 5 |
| | | | | 3 | | | EFS-MOV-019A | Out | | | - | Gate | Motor | Auto | RM | O | O | O | FAI | RCPS | 15 | 1E | |
| P502 | 57 | FWS | Secondary Coolant | 16 | Yes | Sht. 14 | FWS-SMV-512B | Out | A | N | 34.0 ft | Gate | S/M | Auto | RM | O | O | C | FC | S,RCPS | 5 | 1E | Note 5 |
| | | | | 3 | | | EFS-MOV-019B | Out | | | - | Gate | Motor | Auto | RM | O | O | O | FAI | RCPS | 15 | 1E | |
| P503 | 57 | FWS | Secondary Coolant | 16 | Yes | Sht. 14 | FWS-SMV-512C | Out | A | N | 34.0 ft | Gate | S/M | Auto | RM | O | O | C | FC | S,RCPS | 5 | 1E | Note 5 |
| | | | | 3 | | | EFS-MOV-019C | Out | | | - | Gate | Motor | Auto | RM | O | O | O | FAI | RCPS | 15 | 1E | |
| P504 | 57 | FWS | Secondary Coolant | 16 | Yes | Sht. 14 | FWS-SMV-512D | Out | A | N | 37.0 ft | Gate | S/M | Auto | RM | O | O | C | FC | S,RCPS | 5 | 1E | Note 5 |
| | | | | 3 | | | EFS-MOV-019D | Out | | | - | Gate | Motor | Auto | RM | O | O | O | FAI | RCPS | 15 | 1E | |
| P509 | 57 | MSS | Secondary Coolant | 32 | Yes | Sht. 15 | MSS-SMV-515A | Out | A | N | 68.0 ft | Gate | S/M | Auto | RM | O | C | C | FC | RCPS | 5 | 1E | Note 5 |
| | | | | 6 | | | MSS-MOV-507A | Out | | | - | Gate | Motor | RM | Manual | O | O | O | FAI | RM | 30 | 1E | |
| | | | | 6 | | | EFS-MOV-101A | Out | | | - | Gate | Motor | RM | Manual | O | O | O | FAI | RM | 30 | 1E | |
| | | | | 6 | | | MSS-SRV-509A | Out | | | - | Relief | Self | Auto | None | C | C | C | NA | NA | NA | NA | |
| | | | | 6 | | | MSS-SRV-510A | Out | | | - | Relief | Self | Auto | None | C | C | C | NA | NA | NA | NA | |
| | | | | 6 | | | MSS-SRV-511A | Out | | | - | Relief | Self | Auto | None | C | C | C | NA | NA | NA | NA | |
| | | | | 6 | | | MSS-SRV-512A | Out | | | - | Relief | Self | Auto | None | C | C | C | NA | NA | NA | NA | |
| | | | | 6 | | | MSS-SRV-513A | Out | | | - | Relief | Self | Auto | None | C | C | C | NA | NA | NA | NA | |
| | | | | 6 | | | MSS-SRV-514A | Out | | | - | Relief | Self | Auto | None | C | C | C | NA | NA | NA | NA | |
| | | | | 4 | | | MSS-HCV-565 | Out | | | - | Globe | Air | Auto | RM | C | C | C | FC | RCPS | 20 | 1E | |
| | | | | 2 | | | MSS-MOV-701A | Out | | | - | Globe | Motor | RM | Manual | O | O | O | FAI | RM | 15 | 1E | |
| | | | | 3/4 | | | MSS-VLV-533A | Out | | | - | Globe | Manual | Manual | None | C | C | C | NA | NA | NA | NA | |

**Table 6.2.4-3 List of Containment Penetrations and System Isolation Positions (Sheet 4 of 15)**

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| Pen NO. | GDC | System Name | Fluid | Line Size (in.) | ESF or Support System | Valve Arragmt Figure 6.2.4-1 | Valve Number | Location of Valve | Type Tests | Type C Test | Length of Pipe (Note 1) | Valve | | Actuation Mode | | Valve Position | | | Power Failure | Actuation Signal | Valve Closure (seconds) | Power Source | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Type | Operator | Primary | Secondary | Normal | Shutdown | Post-Accident | | | | | |
| P510 | 57 | MSS | Secondary Coolant | 32 | Yes | Sht. 15 | MSS-SMV-515B | Out | A | N | 65.0 ft | Gate | S/M | Auto | RM | O | C | C | FC | RCPS | 5 | 1E | Note 5 |
| | | | | 6 | | | MSS-MOV-507B | Out | | | - | Gate | Motor | RM | Manual | O | O | O | FAI | RM | 30 | 1E | |
| | | | | 6 | | | EFS-MOV-101B | Out | | | - | Gate | Motor | RM | Manual | O | O | O | FAI | RM | 30 | 1E | |
| | | | | 6 | | | MSS-SRV-509B | Out | | | - | Relief | Self | Auto | None | C | C | C | NA | NA | NA | NA | |
| | | | | 6 | | | MSS-SRV-510B | Out | | | - | Relief | Self | Auto | None | C | C | C | NA | NA | NA | NA | |
| | | | | 6 | | | MSS-SRV-511B | Out | | | - | Relief | Self | Auto | None | C | C | C | NA | NA | NA | NA | |
| | | | | 6 | | | MSS-SRV-512B | Out | | | - | Relief | Self | Auto | None | C | C | C | NA | NA | NA | NA | |
| | | | | 6 | | | MSS-SRV-513B | Out | | | - | Relief | Self | Auto | None | C | C | C | NA | NA | NA | NA | |
| | | | | 6 | | | MSS-SRV-514B | Out | | | - | Relief | Self | Auto | None | C | C | C | NA | NA | NA | NA | |
| | | | | 4 | | | MSS-HCV-575 | Out | | | - | Globe | Air | Auto | RM | C | C | C | FC | RCPS | 20 | 1E | |
| | | | | 2 | | | MSS-MOV-701B | Out | | | - | Globe | Motor | RM | Manual | O | O | O | FAI | RM | 15 | 1E | |
| | | | | 3/4 | | | MSS-VLV-533B | Out | | | - | Globe | Manual | Manual | None | C | C | C | NA | NA | NA | NA | |
| P511 | 57 | MSS | Secondary Coolant | 32 | Yes | Sht. 15 | MSS-SMV-515C | Out | A | N | 65.0 ft | Gate | S/M | Auto | RM | O | C | C | FC | RCPS | 5 | 1E | Note 5 |
| | | | | 6 | | | MSS-MOV-507C | Out | | | - | Gate | Motor | RM | Manual | O | O | O | FAI | RM | 30 | 1E | |
| | | | | 6 | | | EFS-MOV-101C | Out | | | - | Gate | Motor | RM | Manual | O | O | O | FAI | RM | 30 | 1E | |
| | | | | 6 | | | MSS-SRV-509C | Out | | | - | Relief | Self | Auto | None | C | C | C | NA | NA | NA | NA | |
| | | | | 6 | | | MSS-SRV-510C | Out | | | - | Relief | Self | Auto | None | C | C | C | NA | NA | NA | NA | |
| | | | | 6 | | | MSS-SRV-511C | Out | | | - | Relief | Self | Auto | None | C | C | C | NA | NA | NA | NA | |
| | | | | 6 | | | MSS-SRV-512C | Out | | | - | Relief | Self | Auto | None | C | C | C | NA | NA | NA | NA | |
| | | | | 6 | | | MSS-SRV-513C | Out | | | - | Relief | Self | Auto | None | C | C | C | NA | NA | NA | NA | |
| | | | | 6 | | | MSS-SRV-514C | Out | | | - | Relief | Self | Auto | None | C | C | C | NA | NA | NA | NA | |
| | | | | 4 | | | MSS-HCV-585 | Out | | | - | Globe | Air | Auto | RM | C | C | C | FC | RCPS | 20 | 1E | |
| | | | | 2 | | | MSS-MOV-701C | Out | | | - | Globe | Motor | RM | Manual | O | O | O | FAI | RM | 15 | 1E | |
| | | | | 3/4 | | | MSS-VLV-533C | Out | | | - | Globe | Manual | Manual | None | C | C | C | NA | NA | NA | NA | |

**Table 6.2.4-3 List of Containment Penetrations and System Isolation Positions (Sheet 5 of 15)**

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| Pen NO. | GDC | System Name | Fluid | Line Size (in.) | ESF or Support System | Valve Arragmt Figure 6.2.4-1 | Valve Number | Location of Valve | Type Tests | Type C Test | Length of Pipe (Note 1) | Valve | | Actuation Mode | | Valve Position | | | Power Failure | Actuation Signal | Valve Closure (seconds) | Power Source | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Type | Operator | Primary | Secondary | Normal | Shutdown | Post-Accident | | | | | |
| P512 | 57 | MSS | Secondary Coolant | 32 | Yes | Sht. 15 | MSS-SMV-515D | Out | A | N | 68.0 ft | Gate | S/M | Auto | RM | O | C | C | FC | RCPS | 5 | 1E | Note 5 |
| | | | | 6 | | | MSS-MOV-507D | Out | | | - | Gate | Motor | RM | Manual | O | O | O | FAI | RM | 30 | 1E | |
| | | | | 6 | | | EFS-MOV-101D | Out | | | - | Gate | Motor | RM | Manual | O | O | O | FAI | RM | 30 | 1E | |
| | | | | 6 | | | MSS-SRV-509D | Out | | | - | Relief | Self | Auto | None | C | C | C | NA | NA | NA | NA | |
| | | | | 6 | | | MSS-SRV-510D | Out | | | - | Relief | Self | Auto | None | C | C | C | NA | NA | NA | NA | |
| | | | | 6 | | | MSS-SRV-511D | Out | | | - | Relief | Self | Auto | None | C | C | C | NA | NA | NA | NA | |
| | | | | 6 | | | MSS-SRV-512D | Out | | | - | Relief | Self | Auto | None | C | C | C | NA | NA | NA | NA | |
| | | | | 6 | | | MSS-SRV-513D | Out | | | - | Relief | Self | Auto | None | C | C | C | NA | NA | NA | NA | |
| | | | | 6 | | | MSS-SRV-514D | Out | | | - | Relief | Self | Auto | None | C | C | C | NA | NA | NA | NA | |
| | | | | 4 | | | MSS-HCV-595 | Out | | | - | Globe | Air | Auto | RM | C | C | C | FC | RCPS | 20 | 1E | |
| | | | | 2 | | | MSS-MOV-701D | Out | | | - | Globe | Motor | RM | Manual | O | O | O | FAI | RM | 15 | 1E | |
| | | | | 3/4 | | | MSS-VLV-533D | Out | | | - | Globe | Manual | Manual | None | C | C | C | NA | NA | NA | NA | |
| P214 | 56 | CSS | Borated Water | 8 | Yes | Sht. 16 | CSS-VLV-005A | In | A | N | - | Check | Self | Auto | None | - | - | - | NA | NA | NA | NA | Note 4 |
| | | | | 8 | | | CSS-MOV-004A | Out | | | 9.0 ft | Gate | Motor | Auto | RM | C | C | O | FAI | P | 40 | 1E | |
| | | | | 3/4 | | | CSS-VLV-023A | In | | | - | Globe | Manual | Manual | None | C | C | C | NA | NA | NA | NA | |
| P224 | 56 | CSS | Borated Water | 8 | Yes | Sht. 16 | CSS-VLV-005B | In | A | N | - | Check | Self | Auto | None | - | - | - | NA | NA | NA | NA | Note 4 |
| | | | | 8 | | | CSS-MOV-004B | Out | | | 9.0 ft | Gate | Motor | Auto | RM | C | C | O | FAI | P | 40 | 1E | |
| | | | | 3/4 | | | CSS-VLV-023B | In | | | - | Globe | Manual | Manual | None | C | C | C | NA | NA | NA | NA | |
| P261 | 56 | CSS | Borated Water | 8 | Yes | Sht. 16 | CSS-VLV-005C | In | A | N | - | Check | Self | Auto | None | - | - | - | NA | NA | NA | NA | Note 4 |
| | | | | 8 | | | CSS-MOV-004C | Out | | | 9.0 ft | Gate | Motor | Auto | RM | C | C | O | FAI | P | 40 | 1E | |
| | | | | 3/4 | | | CSS-VLV-023C | In | | | - | Globe | Manual | Manual | None | C | C | C | NA | NA | NA | NA | |
| P271 | 56 | CSS | Borated Water | 8 | Yes | Sht. 16 | CSS-VLV-005D | In | A | N | - | Check | Self | Auto | None | - | - | - | NA | NA | NA | NA | Note 4 |
| | | | | 8 | | | CSS-MOV-004D | Out | | | 9.0 ft | Gate | Motor | Auto | RM | C | C | O | FAI | P | 40 | 1E | |
| | | | | 3/4 | | | CSS-VLV-023D | In | | | - | Globe | Manual | Manual | None | C | C | C | NA | NA | NA | NA | |
| P151 | 56 | CSS | Borated Water | 14 | Yes | Sht. 18 | CSS-MOV-001A | Out | A | N | 39.0 ft | Gate | Motor | RM | Manual | O | C | O | FAI | RM | 60 | 1E | Note 4 Note 7 |
| P154 | 56 | CSS | Borated Water | 14 | Yes | Sht. 18 | CSS-MOV-001B | Out | A | N | 39.0 ft | Gate | Motor | RM | Manual | O | C | O | FAI | RM | 60 | 1E | Note 4 Note 7 |
| P155 | 56 | CSS | Borated Water | 14 | Yes | Sht. 18 | CSS-MOV-001C | Out | A | N | 39.0 ft | Gate | Motor | RM | Manual | O | C | O | FAI | RM | 60 | 1E | Note 4 Note 7 |
| P158 | 56 | CSS | Borated Water | 14 | Yes | Sht. 18 | CSS-MOV-001D | Out | A | N | 39.0 ft | Gate | Motor | RM | Manual | O | C | O | FAI | RM | 60 | 1E | Note 4 Note 7 |
| P220 | 56 | CSS | Silicone Oil | 3/4 | Yes | Sht. 17 | - | - | A | N | - | - | - | - | - | - | - | - | - | - | - | - | Note 8 |
| P222 | 56 | CSS | Silicone Oil | 3/4 | Yes | Sht. 17 | - | - | A | N | - | - | - | - | - | - | - | - | - | - | - | - | Note 8 |
| P416 | 56 | CSS | Silicone Oil | 3/4 | Yes | Sht. 17 | - | - | A | N | - | - | - | - | - | - | - | - | - | - | - | - | Note 8 |

**Table 6.2.4-3 List of Containment Penetrations and System Isolation Positions (Sheet 6 of 15)**

| Pen NO. | GDC | System Name | Fluid | Line Size (in.) | ESF or Support System | Valve Arragmt Figure 6.2.4-1 | Valve Number | Location of Valve | Type Tests | Type C Test | Length of Pipe (Note 1) | Valve | | Actuation Mode | | Valve Position | | | Power Failure | Actuation Signal | Valve Closure (seconds) | Power Source | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Type | Operator | Primary | Secondary | Normal | Shutdown | Post-Accident | | | | | |
| P417 | 56 | CSS | Silicone Oil | 3/4 | Yes | Sht. 17 | - | - | A | N | - | - | - | - | - | - | - | - | - | - | - | - | Note 8 |
| P405L | 56 | CSS | Silicone Oil | 3/4 | No | Sht. 17 | - | - | A | N | - | - | - | - | - | - | - | - | - | - | - | - | Note 8 |
| P234 | 56 | CCWS | Water with corrosion inhibitor | 8 | Yes | Sht. 19 | NCS-VLV-403A | In | C | Y | - | Check | Self | Auto | None | - | - | - | NA | NA | NA | NA | |
| | | | | 8 | | | NCS-MOV-402A | Out | | | 10.0 ft | Gate | Motor | ~~Auto~~RM | ~~RM~~Manual | O | O | ~~C~~O | FAI | ~~P~~NA | 40 | 1E | |
| | | | | ~~4~~ | | | ~~NCS-MOV-445A~~ | ~~Out~~ | | | | ~~Globe~~ | ~~Motor~~ | ~~Manual~~ | ~~None~~ | ~~C~~ | ~~C~~ | ~~O~~ | ~~FAI~~ | ~~NA~~ | ~~20~~ | ~~1E~~ | |
| | | | | 3/4 | | | NCS-VLV-452A | In | | | - | Globe | Manual | Manual | None | C | C | C | NA | NA | NA | NA | |
| P249 | 56 | CCWS | Water with corrosion inhibitor | 8 | Yes | Sht. 19 | NCS-VLV-403B | In | C | Y | - | Check | Self | Auto | None | - | - | - | NA | NA | NA | NA | |
| | | | | 8 | | | NCS-MOV-402B | Out | | | 10.0 ft | Gate | Motor | ~~Auto~~RM | ~~RM~~Manual | O | O | ~~C~~O | FAI | ~~P~~NA | 40 | 1E | |
| | | | | ~~4~~ | | | ~~NCS-MOV-445B~~ | ~~Out~~ | | | | ~~Globe~~ | ~~Motor~~ | ~~Manual~~ | ~~None~~ | ~~C~~ | ~~C~~ | ~~O~~ | ~~FAI~~ | ~~NAI~~ | ~~20~~ | ~~1E~~ | |
| | | | | 3/4 | | | NCS-VLV-452B | In | | | - | Globe | Manual | Manual | None | C | C | C | NA | NA | NA | NA | |
| P232 | 56 | CCWS | Water with corrosion inhibitor | 8 | Yes | Sht. 20 | NCS-MOV-436A | In | C | Y | - | Gate | Motor | ~~Auto~~RM | ~~RM~~None | O | O | ~~C~~O | FAI | ~~P~~NA | 40 | 1E | |
| | | | | 8 | | | NCS-MOV-438A | Out | | | 10.0 ft | Gate | Motor | ~~Auto~~RM | ~~RM~~Manual | O | O | ~~C~~O | FAI | ~~P~~NA | 40 | 1E | |
| | | | | ~~4~~ | | | ~~NCS-MOV-447A~~ | ~~In~~ | | | | ~~Globe~~ | ~~Motor~~ | ~~Manual~~ | ~~None~~ | ~~C~~ | ~~C~~ | ~~O~~ | ~~FAI~~ | ~~NA~~ | ~~20~~ | ~~1E~~ | |
| | | | | ~~4~~ | | | ~~NCS-MOV-448A~~ | ~~Out~~ | | | | ~~Globe~~ | ~~Motor~~ | ~~Manual~~ | ~~None~~ | ~~C~~ | ~~C~~ | ~~O~~ | ~~FAI~~ | ~~NA~~ | ~~20~~ | ~~1E~~ | |
| | | | | 3/4 | | | NCS-VLV-437A | In | | | - | Check | Self | Auto | None | - | - | - | NA | NA | NA | NA | |
| P251 | 56 | CCWS | Water with corrosion inhibitor | 8 | Yes | Sht. 20 | NCS-MOV-436B | In | C | Y | - | Gate | Motor | ~~Auto~~RM | ~~RM~~None | O | O | ~~C~~O | FAI | ~~P~~NA | 40 | 1E | |
| | | | | 8 | | | NCS-MOV-438B | Out | | | 10.0 ft | Gate | Motor | ~~Auto~~RM | ~~RM~~Manual | O | O | ~~C~~O | FAI | ~~P~~NA | 40 | 1E | |
| | | | | ~~4~~ | | | ~~NCS-MOV-447B~~ | ~~In~~ | | | ~~-~~ | ~~Globe~~ | ~~Motor~~ | ~~Manual~~ | ~~None~~ | ~~C~~ | ~~C~~ | ~~O~~ | ~~FAI~~ | ~~NA~~ | ~~20~~ | ~~1E~~ | |
| | | | | ~~4~~ | | | ~~NCS-MOV-448B~~ | ~~Out~~ | | | ~~-~~ | ~~Globe~~ | ~~Motor~~ | ~~Manual~~ | ~~None~~ | ~~C~~ | ~~C~~ | ~~O~~ | ~~FAI~~ | ~~NA~~ | ~~20~~ | ~~1E~~ | |
| | | | | 3/4 | | | NCS-VLV-437B | In | | | - | Check | Self | Auto | None | - | - | - | NA | NA | NA | NA | |
| P233 | 57 | CCWS | Water with corrosion inhibitor | 4 | No | Sht. 21 | NCS-MOV-511 | Out | A | N | 9.0 ft | Gate | Motor | Auto | RM | O | O | C | FAI | T | 20 | 1E | Note 5 |
| P235 | 57 | CCWS | | 4 | No | Sht. 21 | NCS-MOV-517 | Out | A | N | 9.0 ft | Gate | Motor | Auto | RM | C | C | C | FAI | T | 20 | 1E | Note 5 |
| P252 | 57 | CCWS | | 8 | No | Sht. 22 | NCS-MOV-531 | Out | A | N | 9.0 ft | Gate | Motor | Auto | RM | O | O | C | FAI | T | 40 | 1E | Note 5 |
| P250 | 57 | CCWS | | 8 | No | Sht. 22 | NCS-MOV-537 | Out | A | N | 9.0 ft | Gate | Motor | Auto | RM | O | O | C | FAI | T | 40 | 1E | Note 5 |
| P276R | 56 | WMS | Gas | 3/4 | No | Sht. 23 | LMS-AOV-052 | In | C | Y | - | Dia | Air | Auto | RM | O | O | C | FC | T | 15 | 1E | |
| | | | | 3/4 | | | LMS-AOV-053 | Out | | | 11.0 ft | Dia | Air | Auto | RM | C | C | C | FC | T | 15 | 1E | |
| P284 | 56 | WMS | Gas | 2 | No | Sht. 24 | LMS-AOV-055 | In | C | Y | - | Dia | Air | Auto | RM | O | O | C | FC | T | 15 | 1E | |
| | | | | 2 | | | LMS-AOV-056 | Out | | | 16.0 ft | Dia | Air | Auto | RM | O | O | C | FC | T | 15 | 1E | |
| | | | | 2 | | | LMS-AOV-060 | Out | | | - | Dia | Air | Auto | RM | O | O | C | FC | T | 15 | 1E | |
| P205 | 56 | WMS | Borated Water | 3 | No | Sht. 25 | LMS-LCV-010A | In | C | Y | - | Dia | Air | Auto | RM | C | C | C | FC | T | 15 | 1E | |
| | | | | 3 | | | LMS-LCV-010B | Out | | | 9.0 ft | Dia | Air | Auto | RM | O | O | C | FC | T | 15 | 1E | |

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**Table 6.2.4-3 List of Containment Penetrations and System Isolation Positions (Sheet 7 of 15)**

| Pen NO. | GDC | System Name | Fluid | Line Size (In.) | ESF or Support System | Valve Arragmt Figure 6.2.4-1 | Valve Number | Location of Valve | Type Tests | Type C Test | Length of Pipe (Note 1) | Valve | | Actuation Mode | | Valve Position | | | Power Failure | Actuation Signal | Valve Closure (seconds) | Power Source | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Type | Operator | Primary | Secondary | Normal | Shutdown | Post-Accident | | | | | |
| P207 | 56 | WMS | Primary Coolant | 2 | No | Sht. 26 | LMS-AOV-104 | In | C | Y | - | Dia | Air | Auto | RM | C | C | C | FC | T | 15 | 1E | |
| | | | | 2 | | | LMS-AOV-105 | Out | | | 9.0 ft | Dia | Air | Auto | RM | C | C | C | FC | T | 15 | 1E | |
| P267L | 55 | PSS | Primary Coolant | 3/4 | No | Sht. 27 | PSS-AOV-003 | In | C | Y | - | Globe | Air | Auto | RM | C | C | C | FC | T | 15 | 1E | |
| | | | | 3/4 | | | PSS-MOV-006 | In | | | - | Globe | Motor | Auto | RM | O | O | C | FAI | T | 15 | 1E | |
| | | | | 3/4 | | | PSS-MOV-013 | In | | | - | Globe | Motor | Auto | RM | C | C | C | FAI | T | 15 | 1E | |
| | | | | 3/4 | | | PSS-MOV-031A | Out | | | 14.0 ft | Globe | Motor | Auto | RM | O | O | C | FAI | T | 15 | 1E | |
| P269R | 55 | PSS | Primary Coolant | 3/4 | No | Sht. 28 | PSS-MOV-023 | In | C | Y | - | Globe | Motor | Auto | RM | O | O | C | FAI | T | 15 | 1E | |
| | | | | 3/4 | | | PSS-MOV-031B | Out | | | 14.0 ft | Globe | Motor | Auto | RM | O | O | C | FAI | T | 15 | 1E | |
| P267R | 56 | PSS | Borated Water | 3/4 | No | Sht. 29 | PSS-AOV-062A | In | C | Y | - | Globe | Air | Auto | RM | C | C | C | FC | T | 15 | 1E | |
| | | | | 3/4 | | | PSS-AOV-062B | In | | | - | Globe | Air | Auto | RM | C | C | C | FC | T | 15 | 1E | |
| | | | | 3/4 | | | PSS-AOV-062C | In | | | - | Globe | Air | Auto | RM | C | C | C | FC | T | 15 | 1E | |
| | | | | 3/4 | | | PSS-AOV-062D | In | | | - | Globe | Air | Auto | RM | C | C | C | FC | T | 15 | 1E | |
| | | | | 3/4 | | | PSS-AOV-063 | Out | | | 13.0 ft | Globe | Air | Auto | RM | O | O | C | FC | T | 15 | 1E | |
| P270 | 56 | PSS | Containment Atmosphere | 3/4 | No | Sht. 30 | PSS-VLV-072 | In | C | Y | - | Check | Self | Auto | None | - | - | - | NA | NA | NA | NA | |
| | | | | 3/4 | | | PSS-VLV-091 | In | | | - | Globe | Manual | Manual | None | C | C | C | NA | NA | NA | NA | |
| | | | | 3/4 | | | PSS-MOV-071 | Out | | | 9.0 ft | Globe | Motor | RM | Manual | C | C | C | FAI | RM | 15 | 1E | |
| P237R | 57 | SGBDS | Secondary | 3/4 | No | Sht. 31 | SGS-AOV-031A | Out | A | N | 11.0 ft | Globe | Air | Auto | RM | O | O | C | FC | T | 15 | 1E | Note 5 |
| P237L | 57 | SGBDS | Coolant | 3/4 | No | Sht. 31 | SGS-AOV-031B | Out | A | N | 12.0 ft | Globe | Air | Auto | RM | O | O | C | FC | T | 15 | 1E | Note 5 |
| P239R | 57 | SGBDS | Secondary | 3/4 | No | Sht. 31 | SGS-AOV-031C | Out | A | N | 11.0 ft | Globe | Air | Auto | RM | O | O | C | FC | T | 15 | 1E | Note 5 |
| P239L | 57 | SGBDS | Coolant | 3/4 | No | Sht. 31 | SGS-AOV-031D | Out | A | N | 12.0 ft | Globe | Air | Auto | RM | O | O | C | FC | T | 15 | 1E | Note 5 |
| P505 | 57 | SGBDS | Secondary | 4 | No | Sht. 31 | SGS-AOV-001A | Out | A | N | 22.0 ft | Globe | Air | Auto | RM | O | O | C | FC | T | 20 | 1E | Note 5 |
| P506 | 57 | SGBDS | Coolant | 4 | No | Sht. 31 | SGS-AOV-001B | Out | A | N | 26.0 ft | Globe | Air | Auto | RM | O | O | C | FC | T | 20 | 1E | Note 5 |
| P507 | 57 | SGBDS | | 4 | No | Sht. 31 | SGS-AOV-001C | Out | A | N | 26.0 ft | Globe | Air | Auto | RM | O | O | C | FC | T | 20 | 1E | Note 5 |
| P508 | 57 | SGBDS | | 4 | No | Sht. 31 | SGS-AOV-001D | Out | A | N | 22.0 ft | Globe | Air | Auto | RM | O | O | C | FC | T | 20 | 1E | Note 5 |
| P161 | 56 | RWS | Borated Water | 6 | No | Sht. 32 | RWS-MOV-002 | In | C | Y | - | Gate | Motor | Auto | RM | O | O | C | FAI | T | 30 | 1E | |
| | | | | 6 | | | RWS-MOV-004 | Out | | | 19.0 ft | Gate | Motor | Auto | RM | O | O | C | FAI | T | 30 | 1E | |
| | | | | 3/4 | | | RWS-VLV-003 | In | | | - | Check | Self | Auto | None | - | - | - | NA | NA | NA | NA | |
| P162 | 56 | RWS | Borated | 4 | No | Sht. 33 | RWS-VLV-023 | In | C | Y | - | Check | Self | Auto | None | - | - | - | NA | NA | NA | NA | |
| | | | Water | 4 | | | RWS-AOV-022 | Out | | | 29.0 ft | Dia | Air | Auto | RM | O | O | C | FC | T | 20 | 1E | |
| | | | | 3/4 | | | RWS-VLV-073 | In | | | - | Globe | Manual | Manual | None | C | C | C | NA | NA | NA | NA | |

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**Table 6.2.4-3 List of Containment Penetrations and System Isolation Positions (Sheet 8 of 15)**

| Pen NO. | GDC | System Name | Fluid | Line Size (In.) | ESF or Support System | Valve Arragmt Figure 6.2.4-1 | Valve Number | Location of Valve | Type Tests | Type C Test | Length of Pipe (Note 1) | Valve | | Actuation Mode | | Valve Position | | | Power Failure | Actuation Signal | Valve Closure (seconds) | Power Source | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Type | Operator | Primary | Secondary | Normal | Shutdown | Post-Accident | | | | | |
| P253 | 56 | PMWS | Demin'ralized Water | 2 | No | Sht. 34 | DWS-VLV-005 | In | C | Y | - | Check | Self | Auto | None | - | - | - | NA | NA | NA | NA | |
| | | | | 2 | | | DWS-VLV-004 | Out | | | 9.0 ft | Dia | Manual | Manual | None | C | C | C | NA | NA | NA | NA | |
| | | | | 3/4 | | | DWS-VLV-006 | In | | | - | Dia | Manual | Manual | None | C | C | C | NA | NA | NA | NA | |
| P245 | 56 | IAS | Compressed Air | 2 | No | Sht. 35 | IAS-VLV-003 | In | C | Y | - | Check | Self | Auto | None | - | - | - | NA | NA | NA | NA | |
| | | | | 2 | | | IAS-MOV-002 | Out | | | 9.0 ft | Globe | Motor | Auto | RM | O | O | C | FAI | T | 15 | 1E | |
| | | | | 3/4 | | | IAS-VLV-004 | In | | | - | Globe | Manual | Manual | None | C | C | C | NA | NA | NA | NA | |
| P248 | 56 | FSS | Fire Water | 3 | No | Sht. 36 | FSS-VLV-003 | In | C | Y | - | Check | Self | Auto | None | - | - | - | NA | NA | NA | NA | |
| | | | | 3 | | | FSS-AOV-001 | Out | | | 9.0 ft | Globe | Air | Auto | RM | C | C | C | FC | T | 15 | 1E | |
| | | | | 3/4 | | | FSS-VLV-002 | In | | | - | Globe | Manual | Manual | None | C | C | C | NA | NA | NA | NA | |
| P238 | 56 | FSS | Fire Water | 6 | No | Sht. 37 | FSS-VLV-006 | In | C | Y | - | Check | Self | Auto | None | - | - | - | NA | NA | NA | NA | |
| | | | | 6 | | | FSS-MOV-004 | Out | | | 10.0 ft | Gate | Motor | Auto | RM | C | C | C | FAI | RM | 30 | 1E | |
| | | | | 3/4 | | | FSS-VLV-005 | In | | | - | Globe | Manual | Manual | None | C | C | C | NA | NA | NA | NA | |
| P230 | 56 | SSAS | Compressed Air | 2 | No | Sht. 38 | SAS-VLV-103 | In | C | Y | - | Check | Self | Auto | None | - | - | - | NA | NA | NA | NA | |
| | | | | 2 | | | SAS-VLV-101 | Out | | | 9.0 ft | Globe | Manual | Manual | None | C | C | C | NA | NA | NA | NA | |
| | | | | 3/4 | | | SAS-VLV-102 | In | | | - | Globe | Manual | Manual | None | C | C | C | NA | NA | NA | NA | |
| P200 | - | - | (Fuel Transfer Tube) | 22 | No | Sht. 39 | - | - | B | N | - | Flange | NA | - | - | C | C | C | NA | NA | NA | NA | |
| P451 | 56 | HVAC | Containment Atmosphere | 36 | No | Sht. 40 | VCS-AOV-305 | In | C | Y | - | B-fly | Air | Auto | RM | C | O | C | FC | V | 5 | 1E | |
| | | | | 36 | | | VCS-AOV-304 | Out | | | 13.0 ft | B-fly | Air | Auto | RM | C | O | C | FC | V | 5 | 1E | |
| P452 | 56 | HVAC | Containment Atmosphere | 36 | No | Sht. 40 | VCS-AOV-306 | In | C | Y | - | B-fly | Air | Auto | RM | C | O | C | FC | V | 5 | 1E | |
| | | | | 36 | | | VCS-AOV-307 | Out | | | 9.0 ft | B-fly | Air | Auto | RM | C | O | C | FC | V | 5 | 1E | |
| P410 | 56 | HVAC | Containment Atmosphere | 8 | No | Sht. 41 | VCS-AOV-356 | In | C | Y | - | B-fly | Air | Auto | RM | C | C | C | FC | V | 5 | 1E | |
| | | | | 8 | | | VCS-AOV-357 | Out | | | 10.0 ft | B-fly | Air | Auto | RM | C | C | C | FC | V | 5 | 1E | |
| P401 | 56 | HVAC | Containment Atmosphere | 8 | No | Sht. 41 | VCS-AOV-355 | In | C | Y | - | B-fly | Air | Auto | RM | C | C | C | FC | V | 5 | 1E | |
| | | | | 8 | | | VCS-AOV-354 | Out | | | 10.0 ft | B-fly | Air | Auto | RM | C | C | C | FC | V | 5 | 1E | |
| P262R | 56 | HVAC | Silicone Oil | 3/4 | No | Sht. 42 | - | - | A | N | - | - | - | - | | - | - | - | - | - | - | - | Note 8 |
| P262L | 56 | HVAC | Silicone Oil | 3/4 | No | Sht. 42 | - | - | A | N | - | - | - | - | | - | - | - | - | - | - | - | Note 8 |
| P408 | 56 | VWS | Chilled Water | 10 | No | Sht. 43 | VWS-VLV-421 | In | C | Y | - | Check | Self | Auto | None | - | - | - | NA | NA | NA | NA | |
| | | | | 10 | | | VWS-MOV-403 | Out | | | 9.0 ft | Gate | Motor | Auto | RM | O | C | C | FAI | T | 50 | 1E | |
| | | | | 3/4 | | | VWS-VLV-426 | In | | | - | Globe | Manual | Manual | None | C | C | C | NA | NA | NA | NA | |
| P409 | 56 | VWS | Chilled Water | 10 | No | Sht. 43 | VWS-MOV-422 | In | C | Y | - | Gate | Motor | Auto | RM | O | O | C | FAI | T | 50 | 1E | |
| | | | | 10 | | | VWS-MOV-407 | Out | | | 9.0 ft | Gate | Motor | Auto | RM | O | C | C | FAI | T | 50 | 1E | |
| | | | | 3/4 | | | VWS-VLV-423 | In | | | - | Check | Self | Auto | None | - | - | - | NA | NA | NA | NA | |

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**Table 6.2.4-3 List of Containment Penetrations and System Isolation Positions (Sheet 9 of 15)**

| Pen NO. | GDC | System Name | Fluid | Line Size (in.) | ESF or Support System | Valve Arragmt Figure 6.2.4-1 | Valve Number | Location of Valve | Type Tests | Type C Test | Length of Pipe (Note 1) | Valve | | Actuation Mode | | Valve Position | | | Power Failure | Actuation Signal | Valve Closure (seconds) | Power Source | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Type | Operator | Primary | Secondary | Normal | Shutdown | Post-Accident | | | | | |
| P265 | 56 | RMS | Containment Atmosphere | 1 | No | Sht. 44 | RMS-VLV-005 | In | C | Y | - | Check | Self | Auto | None | - | - | - | NA | NA | NA | NA | |
| | | | | 1 | | | RMS-MOV-003 | Out | | | 9.0 ft | Globe | Motor | Auto | RM | O | O | C | FAI | T | 15 | 1E | |
| | | | | 3/4 | | | RMS-VLV-004 | In | | | - | Globe | Manual | Manual | None | C | C | C | NA | NA | NA | NA | |
| P266 | 56 | RMS | Containment Atmosphere | 1 | No | Sht. 44 | RMS-MOV-001 | In | C | Y | - | Globe | Motor | Auto | RM | O | O | C | FAI | T | 15 | 1E | |
| | | | | 1 | | | RMS-MOV-002 | Out | | | 9.0 ft | Globe | Motor | Auto | RM | O | O | C | FAI | T | 15 | 1E | |
| P231 | 56 | ICIGS | Carbon Dioxide | 3/4 | No | Sht. 45 | IGS-AOV-002 | In | C | Y | - | Dia | Air | Auto | RM | C | C | C | FC | T | 15 | 1E | |
| | | | | 3/4 | | | IGS-AOV-001 | Out | | | 9.0 ft | Dia | Air | Auto | RM | C | C | C | FC | T | 15 | 1E | |
| P405R | 56 | LTS | Containment Atmosphere | 3/4 | No | Sht. 47 | LTS-VLV-002 | In | C | Y | - | Globe | Manual | Manual | None | C | C | C | NA | NA | NA | NA | |
| | | | | | | | LTS-VLV-001 | Out | | | 9.0 ft | Globe | Manual | Manual | None | C | C | C | NA | NA | NA | NA | |
| P223 | 56 | LTS | Containment Atmosphere | 3/4 | No | Sht. 47 | - | In | B | N | - | Flange | NA | Manual | None | C | C | C | NA | NA | NA | NA | |
| | | | | | | | - | Out | | | - | Flange | NA | Manual | None | C | C | C | NA | NA | NA | NA | |
| P216 | 56 | LTS | Containment Atmosphere | 3/4 | No | Sht. 46 | - | In | B | N | - | Flange | NA | Manual | None | C | C | C | NA | NA | NA | NA | |
| | | | | | | | - | Out | | | - | Flange | NA | Manual | None | C | C | C | NA | NA | NA | NA | |
| P218 | 56 | LTS | Containment Atmosphere | 3/4 | No | Sht. 46 | - | In | B | N | - | Flange | NA | Manual | None | C | C | C | NA | NA | NA | NA | |
| | | | | | | | - | Out | | | - | Flange | NA | Manual | None | C | C | C | NA | NA | NA | NA | |
| P418R | 56 | RLS | Containment Atmosphere | 1 1/2 | No | Sht. 48 | - | In | B | N | - | Flange | NA | Manual | None | C | C | C | NA | NA | NA | NA | |
| | | | | | | | - | Out | | | - | Flange | NA | Manual | None | C | C | C | NA | NA | NA | NA | |
| P418L | 56 | RLS | Containment Atmosphere | 1 1/2 | No | Sht. 48 | - | In | B | N | - | Flange | NA | Manual | None | C | C | C | NA | NA | NA | NA | |
| | | | | | | | - | Out | | | - | Flange | NA | Manual | None | C | C | C | NA | NA | NA | NA | |
| P520 | 56 | - | - | - | - | Sht. 49 | - | NA | B | N | - | None | None | Manual | Manual | C | C | C | NA | NA | NA | NA | |
| P530 | 56 | - | - | - | - | Sht. 49 | - | NA | B | N | - | None | None | Manual | Manual | C | C | C | NA | NA | NA | NA | |
| P540 | 56 | - | - | - | - | Sht. 50 | - | NA | B | N | - | None | None | Manual | Manual | C | C | C | NA | NA | NA | NA | |
| P208 | - | (Spare) | - | - | - | Sht. 52 | - | - | A | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| P213 | - | (Spare) | - | - | - | Sht. 52 | - | - | A | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| P215 | - | (Spare) | - | - | - | Sht. 52 | - | - | A | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| P246 | - | (Spare) | - | - | - | Sht. 52 | - | - | A | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| P254 | - | (Spare) | - | - | - | Sht. 52 | - | - | A | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| P268 | - | (Spare) | - | - | - | Sht. 52 | - | - | A | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| P269L | - | (Spare) | - | - | - | Sht. 52 | - | - | A | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| P275 | - | (Spare) | - | - | - | Sht. 52 | - | - | A | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| P285 | - | (Spare) | - | - | - | Sht. 52 | - | - | A | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| P301 | - | (Spare) | - | - | - | Sht. 52 | - | - | A | N | - | - | - | - | - | - | - | - | - | - | - | - | |

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**Table 6.2.4-3 List of Containment Penetrations and System Isolation Positions (Sheet 10 of 15)**

| Pen NO. | GDC | System Name | Fluid | Line Size (in.) | ESF or Support System | Valve Arragmt Figure 6.2.4-1 | Valve Number | Location of Valve | Type Tests | Type C Test | Length of Pipe (Note 1) | Valve | | Actuation Mode | | Valve Position | | | Power Failure | Actuation Signal | Valve Closure (seconds) | Power Source | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Type | Operator | Primary | Secondary | Normal | Shutdown | Post-Accident | | | | | |
| P406 | - | (Spare) | - | - | - | Sht. 52 | - | - | A | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| P407 | - | (Spare) | - | - | - | Sht. 52 | - | - | A | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| P419 | - | (Spare) | - | - | - | Sht. 52 | - | - | A | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| P420 | - | (Spare) | - | - | - | Sht. 52 | - | - | A | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E601 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E602 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E603 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E604 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E605 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E606 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E607 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E608 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E609 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E610 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E611 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E612 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E613 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E614 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E615 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E616 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E617 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| | | | | | | | | | | | | | | | | | | | | | | | |
| E620 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E621 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E622 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E623 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E624 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E625 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E627 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E628 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E629 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E630 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |

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**Table 6.2.4-3 List of Containment Penetrations and System Isolation Positions (Sheet 11 of 15)**

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| Pen NO. | GDC | System Name | Fluid | Line Size (In.) | ESF or Support System | Valve Arragmt Figure 6.2.4-1 | Valve Number | Location of Valve | Type Tests | Type C Test | Length of Pipe (Note 1) | Valve | | Actuation Mode | | Valve Position | | | Power Failure | Actuation Signal | Valve Closure (seconds) | Power Source | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Type | Operator | Primary | Secondary | Normal | Shutdown | Post-Accident | | | | | |
| E631 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E632 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E633 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E634 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E635 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E636 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E637 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E638 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E639 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
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| E650 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E651 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E652 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E653 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E654 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E655 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E656 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E657 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E658 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
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| E661 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E662 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E663 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E664 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E665 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E666 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E667 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E668 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| | | | | | | | | | | | | | | | | | | | | | | | |
| E701 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E702 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E703 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |

**Table 6.2.4-3 List of Containment Penetrations and System Isolation Positions (Sheet 12 of 15)**

| Pen NO. | GDC | System Name | Fluid | Line Size (in.) | ESF or Support System | Valve Arragmt Figure 6.2.4-1 | Valve Number | Location of Valve | Type Tests | Type C Test | Length of Pipe (Note 1) | Valve | | Actuation Mode | | Valve Position | | | Power Failure | Actuation Signal | Valve Closure (seconds) | Power Source | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Type | Operator | Primary | Secondary | Normal | Shutdown | Post-Accident | | | | | |
| E704 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| | | | | | | | | | | | | | | | | | | | | | | | |
| E709 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E710 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E711 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
| E712 | - | (Electric) | - | - | - | Sht. 51 | - | - | B | N | - | - | - | - | - | - | - | - | - | - | - | - | |
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