

**REQUEST FOR ADDITIONAL INFORMATION 801-5897 REVISION 3**

8/5/2011

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

SRP Section: 03.09.06 - Functional Design Qualification and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints  
Application Section: 3.9.6

QUESTIONS for Component Integrity, Performance, and Testing Branch 1 (AP1000/EPR Projects)  
(CIB1)

03.09.06-49

This question is a follow-up to question 03.09.06-1, RAI 228-2274.

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.

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

## REQUEST FOR ADDITIONAL INFORMATION 801-5897 REVISION 3

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.

03.09.06-51

This question is a follow-up to question RAI 03.09.06-3, RAI 228-2274.

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.

03.09.06-52

This question is a follow-up to question RAI 03.09.06-4, RAI 228-2274.

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

## REQUEST FOR ADDITIONAL INFORMATION 801-5897 REVISION 3

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.

03.09.06-53

This question is a follow-up to question RAI 03.09.06-7, RAI 228-2274.

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. To fully describe the pump IST program, the applicant would need to provide additional specification such as a summary of OM Code ISTA/ISTB overall requirement and reference values and their maintenance.

03.09.06-54

This question is a follow-up to question RAI 03.09.06-9, RAI 228-2274.

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

### REQUEST FOR ADDITIONAL INFORMATION 801-5897 REVISION 3

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.

03.09.06-55

This question is a follow-up to question RAI 03.09.06-10, RAI 228-2274.

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 US-APWR DCD to fully describe the IST program for valves in its COL application. To fully describe the valve IST program, the applicant would need to provide additional specification such as a summary of OM Code ISTA/ISTC overall requirement, reference values and their maintenance, and avoidance of preconditioning.

## REQUEST FOR ADDITIONAL INFORMATION 801-5897 REVISION 3

03.09.06-56

This question is a follow-up to question RAI 03.09.06-11, RAI 228-2274.

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.

03.09.06-57

This question is a follow-up to question 03.09.06-12, RAI 228-2274.

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

### REQUEST FOR ADDITIONAL INFORMATION 801-5897 REVISION 3

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

### REQUEST FOR ADDITIONAL INFORMATION 801-5897 REVISION 3

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

## REQUEST FOR ADDITIONAL INFORMATION 801-5897 REVISION 3

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.

03.09.06-58

This question is a follow-up to question 03.09.06-13, RAI 228-2274.

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).

## REQUEST FOR ADDITIONAL INFORMATION 801-5897 REVISION 3

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 US-APWR DCD, or specify that the COL applicant will be responsible for supplementing the US-APWR DCD in support of the COL application.

03.09.06-59

This question is a follow-up to question 03.09.06-14, RAI 228-2274.

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.

03.09.06-60

This question is a follow-up to question 03.09.06-16, RAI 228-2274.

## REQUEST FOR ADDITIONAL INFORMATION 801-5897 REVISION 3

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 (RG 1.206 and SECY 95-132) for check valve testing for new plants.

03.09.06-61

This question is a follow-up to question 03.09.06-23, RAI 228-2274.

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 to two parts of the response to RAI 03.09.06-23:

(c) 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 a follow-up 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.

(e) 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 a follow-up 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.

03.09.06-62

This question is a follow-up to question 03.09.06-24, RAI 228-2274.

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,

## REQUEST FOR ADDITIONAL INFORMATION 801-5897 REVISION 3

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.

03.09.06-63

This question is a follow-up to question 03.09.06-34, RAI 228-2274.

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.

03.09.06-64

This question is a follow-up to question 03.09.06-36, RAI 228-2274.

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.

03.09.06-65

This question is a follow-up to question 03.09.06-40, RAI 228-2274.

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

### REQUEST FOR ADDITIONAL INFORMATION 801-5897 REVISION 3

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.

03.09.06-66

This question is a follow-up to question 03.09.06-43, RAI 228-2274.

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). To fully describe the dynamic restraints IST program, the applicant would need to provide additional specification such as a summary of OM Code ISTD overall requirement and clarification of references to nonmandatory appendices and IST program plans.

## REQUEST FOR ADDITIONAL INFORMATION 801-5897 REVISION 3

03.09.06-67

This question is a follow-up to question 03.09.06-47, RAI 228-2274.

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.

03.09.06-68

This question is a follow-up to question 03.09.06-48, RAI 228-2274.

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).