UNITED STATES - ADVANCED PRESSURIZED WATER REACTOR ASME CLASS 1, 2, AND 3 COMPONENTS, COMPONENT SUPPORTS, AND CORE SUPPORT STRUCTURES DESIGN AND PROCUREMENT SPECIFICATIONS AUDIT REPORT

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1.0 SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) staff conducted an audit via an electronic reading room between February 3 - 6, 2014, in accordance with the NRC Office of New Reactors (NRO) Office Instruction NRO-REG-108, "Regulatory Audits." The audit plan can be found in the Agencywide Document Access and Management System (ADAMS) under accession number ML13353A159 dated December 23, 2013. A list of audit findings can be found in ADAMS under accession number ML14077A311. A list of attendees can be found in ADAMS under accession number ML14077A482. A list of documents reviewed by the NRC staff can be found in ADAMS under accession number ML14077A537.

Following the audit, the NRC staff reviewed Mitsubishi Heavy Industries, Ltd.'s (MHI's) revised specifications via electronic reading room. In addition, the NRC staff held a phone call on February 26, 2014, to address several audit findings. The reviews confirmed limited specifications were correctly revised and these are identified in the list of audit findings. The list of audit findings also identifies the interactions of the NRC staff with MHI and the resolution of the audit findings.

2.0 PURPOSE

The purpose of the audit was to verify that the United States - Advanced Pressurized Water Reactor (US-APWR) component design and qualification are being performed in accordance with the methodology and criteria described in the US-APWR design control document (DCD) in support of the design certification (DC) application.

3.0 BACKGROUND

Title 10 of the *Code of Federal Regulations* (10 CFR) Part 52, Section 47, "Contents of applications; technical information," states that:

> The application must contain a level of design information sufficient to enable the Commission to judge the applicant's proposed means of assuring that construction conforms to the design and to reach a final conclusion on all safety questions associated with the design before the certification is granted. The

> information submitted for a design certification must include performance requirements and design information sufficiently detailed to permit the preparation of acceptance and inspection requirements by the NRC [U.S. Nuclear Regulatory Commission], and procurement specifications and construction and installation specifications by an applicant. The Commission will require, before design certification, that information normally contained in certain procurement specifications and construction and installation specifications be completed and available for audit if the information is necessary for the Commission to make its safety determination.

In 2007, MHI submitted a DC application for the US-APWR design. Subsequently, MHI provided a list of risk significant components for which the design specifications of risk significant components would be completed and available for the NRC audit. The list of risk significant components is included in the MHI Letter UAP-HF-13043, "List of Risk Significant American Society of Mechanical Engineers (ASME) Section III Piping Systems and Components Associated with Revised Design Completion Plan for US-APWR Piping Systems and Components", dated March 1, 2013.

The NRC staff requested that MHI provide ASME component design specifications for NRC audit prior to certification. These specifications would demonstrate that the components are ready for procurement, and that the design methodologies and criteria that are described in US-APWR final safety analysis report (FSAR) are adequately reflected in the associated ASME component design specifications. Request for additional information (RAI) 1015-7054, Question 03.09.03-31 tracks the need for MHI to make available for audit design specifications and other design documents for ASME Class 1, 2, and 3 components.

Subsequently, MHI provided design documents for the NRC audit. Between February 3 - 6, 2014, NRC staff from the NRO Division of Engineering Mechanical Engineering Branch (MEB) conducted a regulatory audit of US-APWR design and procurement specifications, including valves, pumps, component supports, dynamic restraints, equipment qualification, and component classifications. The audit was conducted under Standard Review Plan (SRP) Sections 3.2.1, 3.2.2, 3.9.3, 3.9.4, 3.9.5, 3.9.6, and 3.11

4.0 AUDIT RESULTS

4.1 ASME Code Components and Component Supports

In general, the design specifications meet the ASME boiler and pressure vessel (BPV) Code, Section III, NCA-3250 requirements. The NRC staff found that the design specifications incorporated the provisions specified in the US-APWR FSAR and addressed current RAI open items. The NRC staff findings are listed the list of audit findings, and the planned resolution of issues are discussed below:

Core Support Structure Design Specification, Document No. N0-EC40001

The design parameters of core support structure design included 4,451 Megawatt-thermal (MWt) power, 4 inlet nozzles, 4 outlet nozzles, 1200 rpm pump rotating speed at 60 Hz, and 257 fuel assemblies (17 x 17 x active fuel length 14 ft). The core support structure is designed for

650 °F and 87 psi design pressure difference. The fatigue evaluation for Class CS are performed in accordance with ASME Section III Subsection NG-3200. All combinations of design and service loadings, including operating differential pressure and thermal effects, flow induced vibrations and acoustic resonances, seismic loads, and transient pressure loads of postulated loss-of-coolant accident (LOCA), shall be accounted for in the design of the core support structures. The NRC staff found that the loads and load combinations of core support structure design are acceptable.

Reactor Vessel Design Specification, Document No. N0-F100L01:

a) In the Reactor Vessel Design Specification, the seal ledge is a safety related component, Quality Group (QG) A, seismic Category 1, 10 CFR Part 50 Appendix B. The seal ledge is a part of permanent cavity seal (PCS). The NRC staff found that the design of seal ledge does not specify the codes and standards, but indicated "applicable industry standards." The applicant stated that as described in DCD Tier 2, Subsection 9.1.4.2.1.13, although PCS is considered to be a non-ASME Code Section III component and ASME Code certification is not required, the stress limits of ASME Code Section III, Subsection ND, are used for design of the PCS. In addition, material selection, fabrication, and examination of the PCS are in accordance with requirements of ASME Code Section II, Section IX, and Section V. Also, as described in the response to RAI 976-6934, the weld connecting the Seal Ledge to the Reactor Vessel is considered part of the attachment (Seal Ledge) and the weld will conform to ASME NB-4430. In the next design specification revision, MHI will address the above requirements for the Seal Ledge. The NRC staff will conduct a follow-up audit of the revised design specifications when MHI notifies the NRC staff that the revised specifications are available. This finding was identified as Item No. 56 in the list of audit findings.

b) In the Reactor Vessel Design Specification, Section 3.7.1 stated that "The loads from the PCS acting on the [Reactor Vessel] Shell flange and the load from the lower reactor internal acting on outlet nozzles and [Direct Vessel Injection] nozzle are considered as negligible." This statement should be revised to clarify the type of load that is negligible and add figures to show the load is negligible. MHI will revise Section 3.7.1 in the design specification, N0-F100L01, to clarify the type of load that is negligible and add figures which describe the gap dimension. The NRC staff will conduct a follow-up audit of the revised design specifications when MHI notifies the NRC staff that the revised specifications are available. This finding was identified as Item No. 57 in the list of audit findings.

Reactor Internals Function Requirements, Document No. N0-EC40002:

The staff found that in Section 2.1, "Codes and Standards," 10 CFR Part 50, Appendix A, General Design Criteria (GDC) 10 is not included as a reference. In its response to this audit finding, MHI revised N0-EC40002 to add the missing reference, 10 CFR Part 50 Appendix A GDC 10, to the U.S. code lists. During this audit, the NRC staff confirmed that the revised specification, N0-EC40002 contained the reference, 10 CFR Part 50 Appendix A GDC 10, and was added to the U.S. code lists. This audit finding is resolved. This finding was identified as Item No. 17 in the list of audit findings.

In regards to the basis for load and displacement limits in DCD Tier 2, Table 3.9-2, “Reactor Internals Interface Load and Displacement Limits,” the table notes that some loads and displacements are defined in the design specification. Document No. N0-EC40045, “Additional Design Requirements for Reactor Internals,” states that the actual value of the core drop load is identified in Reference (2), N0-EC40002, “Reactor Internals Function Requirements Specifications.” However, the NRC staff found that this reference does not contain the actual value. In its response to this audit finding, MHI revised N0-EC40045 with the actual value of the core drop load. During this audit, the NRC staff confirmed that the revised specification, N0-EC40045, contained the actual value of the core drop load. This audit finding is resolved. This finding was identified as Item No.19 in the list of audit findings.

Control Rod Drive Mechanism Design Specification, Document No. N0-EC50001:

The NRC staff found that in Section 2.1, “Codes and Standards,” there did not appear to be any references listed in Section 2.1, with the exception of code case N-782. MHI stated that Section 2.0, specifies applicable references in the reference document N0-FB10L01 “General Design Specification for class 1 component.” The control rod drive mechanism (CRDM) design specification shows only additional references to avoid overlap. However, the NRC staff found the references were not included in Section 2.1.3 of the general design specifications for class 1 components, N0-FB10L01, and also were not found in N0-EC50001. In its response to this audit finding, MHI revised N0-EC50001 to add the missing references, 10 CFR Part 50, Appendix A, GDC 26, 27, 29 to the U.S. code lists. This audit finding is resolved. This finding was identified as Item No. 17 in the list of audit findings.

In DCD Tier 2, Section 3.9.4.2.1, the operating temperature for the CRDM pressure housing and internals parts is listed as 617 °F. However, during the audit the staff found the CRDM design specification listed the operating temperature as 550.6 ºF. The NRC staff issued RAI 1083-7433, Question 03.09.04-15, to request the applicant to clarify the reason for this discrepancy and provide a DCD markup as applicable. RAI 1083-7433, Question 03.09.04-15, will remain an open item pending the response from the applicant. This finding was identified as Item No. 18 in the list of audit findings.

4.2 <u>ASME Pumps, Valves, and Dynamic Restraints and Environmental Qualification</u>

Based on the February 2014, audit, the NRC staff concludes that MHI is developing design and procurement specifications for pumps, valves, and dynamic restraints, and equipment qualification, consistent with the provisions in US-APWR DCD Tier 1 and 2.

The NRC staff found that the US-APWR design and procurement specifications require the use of ASME Standard QME-1-2007, “Qualification of Active Mechanical Equipment Used in Nuclear Power Plants,” as accepted in Revision 3 to Regulatory Guide (RG) 1.100, “Seismic Qualification of Electrical and Active Mechanical Equipment and Functional Qualification of Active Mechanical Equipment for Nuclear Power Plants.” For example, the power-operated valve specifications include conservative assumptions for gate valve disc friction coefficients and butterfly valve bearing friction coefficients, guidance for actuator sizing calculations, and degraded voltage and elevated temperature considerations. The specifications indicate that potential pressure locking and thermal binding of valves must be addressed as part of their

procurement. The pump specifications include the consideration of uncertainties in the Net Positive Suction Head (NPSH) required and design values. The NPSH for the safety injection (SI) and containment spray/ residual heat removal (CS/RHR) pumps contains margin/uncertainty as specified in Section 3.6.2.1(f) of MHI Techinal Report MUAP-08001 (R7), "US-APWR Sump Strainer Performance." The specifications for check valves require functional qualification testing in the forward and reverse flow directions. The equipment qualification specifications are intended to address seismic, environmental, and functional qualification. The specifications require the environmental qualification of nonmetallic materials in accordance with Nonmandatory Appendix QR-B, "Guide for Qualification of Nonmetallic Parts," in ASME QME-1-2007. RG 1.100 (Revision 3) specifies that where a commitment is made to a nonmandatory QME-1 appendix, the criteria and procedures delineated in that appendix become part of the requirements of the qualification program, unless specific deviations are requested and justified. The specifications require the preparation of qualification plans and reports as specified in ASME QME-1-2007. The specifications indicate that applicable inspections, tests, analyses, and acceptance criteria (ITAAC) for as-built US-APWR components must be satisfied. The specifications require pumps, including mechanical seals, to be designed and qualified for post-LOCA debris operation. The specifications require pump testing to verify operation under low flow recirculation cavitation conditions and air ingestion testing in accordance with RG 1.82 (Revision 4), "Water Sources for Long-Term Recirculation Cooling Following a Loss-of-Coolant Accident." The specifications contain testing provisions to confirm acceptable CS and RHR pump mid-loop performance.

Specific findings related to the NRC staff review of the US-APWR design and procurement specifications are discussed below:

Equipment Qualification Program Specification, Document No. N0-AA32060:

a) The NRC staff found that Specification N0-AA32060 on the Equipment Qualification Program is not always clear regarding the scope of Equipment Qualification (such as the definition specified for Equipment Qualification). In response to this audit finding, MHI indicated that Specification N0-AA32060 will be revised in the Definition section and Section 2.0, "Scope," to clarify that the scope of Equipment Qualification of the US-APWR includes environmental qualification, seismic qualification, and functional qualification. As a follow-up to this audit, the NRC staff will confirm that Specification N0-AA32060 indicates that the scope of Equipment Qualification includes seismic, environmental, and functional qualification. This finding was identified as Item No. 2 in the list of audit findings.

b) The NRC staff found that Specification N0-AA32060 includes a sample data package in Attachment D that focuses on seismic and environmental qualification. In its response to this audit finding, MHI indicated that Attachment D to N0-AA32060 will be revised to clarify that scope of the equipment qualification data package includes environmental qualification, seismic qualification, and functional qualification. As a follow-up to this audit, the NRC staff will confirm that Attachment D to Specification N0-AA32060 addresses

environmental qualification, seismic qualification, and functional qualification. This finding was identified as Item No. 4 in the list of audit findings.

General Motor Operated Valve Procurement Specification (Safety Related), Document No. N0-GC00026:

a) The NRC staff found that Specification N0-GC00026 for motor-operated valves (MOVs) allows the use of the Electric Power Research Institute (EPRI) MOV Performance Prediction Methodology (PPM) and the applicable NRC safety evaluations in the MOV qualification process, but did not discuss the responsibility of the user in addressing MOV actuator output. In its response to this audit finding, MHI indicated that Specification N0-GC00026 will be revised to clarify that the user will be responsible for demonstrating the MOV actuator output when applying the EPRI MOV PPM. As a follow-up to this audit, the NRC staff will confirm that Specification N0-GC00026 indicates that the user is responsible for actuator output capability where the EPRI MOV PPM is used in the qualification process. This finding was identified as Item No. 6 in the list of audit findings.

b) The NRC staff found that Specification N0-GC00026 (MOVs) was not clear regarding whether valves are required by the specification to be within the scope of the Joint Owners' Group (JOG) Program on MOV Periodic Verification Specification. In its response to this audit finding, MHI indicated that Specification N0-GC00026 will be revised to clarify that the procured MOVs will be within the scope of the JOG program. As a follow-up to this audit, the NRC staff will confirm that Specification N0-GC00026 specifies that procured valves are to be within the scope of the JOG Program on MOV Periodic Verification. This finding was identified as Item No. 8 in the list of audit findings.

c) Specification N0-GC00026 (MOVs) in Section 3.1.3.6 discusses the weak link analysis for the valve assembly. The NRC staff found that the specification did not discuss the use of a stem friction coefficient (for example, 0.1) that will result in a worst-case actuator output as part of the weak link analysis. In its response to this audit finding, MHI indicated that Specification N0-GC00026 will be revised to incorporate the consideration of the stem friction coefficient assumption as part of the weak link analysis to be performed by analytically examining all of the structurally loaded parts (both pressure retaining and non-pressure retaining) to determine the component that would be expected to fail at the lowest thrust or torque in both the opening and closing stroke directions. As a follow-up to this audit, the NRC staff will confirm that Specification N0-GC00026 addresses the assumption for stem friction coefficient to determine the worst-case MOV actuator output in weak link calculations. This finding was identified as Item No. 29 in the list of audit findings.

Check Valve and Air-Operated Valve Procurement Specifications, Document Nos. N0-GC00065 and N0-GC00015:

a) The NRC staff found that Specifications N0-GC00015 for air-operated valves (AOVs) and N0-GC00065 for check valves were not clear regarding the requirements for nonmetallic equipment qualification. In its response to these audit findings, MHI indicated that Specifications N0-GC00015 and N0-GC00065 will be revised to address the requirements for nonmetallic equipment qualification. As a follow-up to this audit, the NRC staff will confirm that nonmetallic equipment qualification is addressed in Specifications N0-GC00015 and N0-GC00065. These findings were identified as Items No. 11 and 13 in the list of audit findings.

b) The NRC staff found that the data sheets attached to some of the component-specific procurement specifications (for example, N0-GC00065 for check valves) did not include specific details for the procured components. In its response to this audit finding, MHI indicated that the component-specific procurement specifications will include details of the component performance attributes in the data sheets. As a follow-up to this audit, the NRC staff will confirm that the component-specific procurement specifications include the component performance attributes in the data sheets. This finding was identified as Item No. 36 in the list of audit findings.

Class 1E Motor Operated Valve Specification, Document No. N0-FE30022:

The NRC staff found that Specification N0-FE30022 for class 1E MOV actuators did not include the latest lessons learned from MOV operating experience and research programs specified in ASME Standard QME-1-2007. For example, Section 2.1.4 does not address environmental qualification of nonmetallic parts provided in Appendix QR-B in ASME QME-1-2007. Section 2.1.5 for actuator qualification references an Institute of Electrical and Electronics Engineers (IEEE) standard without addressing ASME QME-1-2007. Section 2.3.2 regarding shop testing does not reference the testing provisions of ASME QME-1-2007. The list of actuator data to be provided to the purchaser in Section 2.3.2 does not include torque at maximum torque switch setting and at minimum torque switch setting, and stall torque at elevated voltage, nominal voltage, and at reduced voltage. Section 2.1.1 in item E references the EPRI MOV PPM for actuator sizing, but does not specify that the user is responsible for demonstrating actuator output. Section 2.1.1 in item F specifies qualification for the differential pressure (DP) conditions, but does not address flow conditions. In its response to this audit finding, MHI indicated that Specification N0-FE30022 or Specification N0-GC00026 will be updated to address MOV operating experience and research programs. As a follow-up to this audit, the NRC staff will confirm that Specification N0-FE30022 or Specification N0-GC00026 has been revised to address lessons learned from MOV operating experience and research programs. This finding was identified as Item No. 26 in the list of audit findings.

Safety Injection Pump Specification, Document No. N0-FB34001:

a) The NRC staff found that Section 4.1 of Specification N0-FB34001 for the SI pump states that qualification shall be in accordance with NUREG-0800, SRP Section 3.10. The NRC staff requested MHI to discuss the basis for stating that qualification would be performed in accordance with an SRP section. In its

response, MHI stated that the RGs, ASME QME-1-2007 and IEEE Standards referenced in the specification provide the basis to meet the criteria in SRP Section 3.10. Therefore, MHI indicated that Section 4.1 would be revised to delete the sentence "Qualification shall be in accordance with NUREG 0800, SRP Section 3.10." As a follow-up to this audit, it should be verified that Section 4.1 of Specification N0-FB34001 is revised as indicated. This finding was identified as Item No. 37 in the list of audit findings.

b) Section 3.4.1 of MUAP-08013 (R5), "US-APWR Sump Strainer Downstream Effects," states that the emergency core cooling system (ECCS) SI and CS/RHR pumps, including the mechanical seals, will be qualified in accordance with ASME QME-1-2007 as accepted by RG 1.100, Revision 3, to operate in post-LOCA fluid conditions for at least 30 days. The fluid characteristics listed in MUAP-08013, Table 3.2-3, "Debris Source Term," and Table 3.2-4, "Debris Concentration Components," conservatively represent the post-LOCA fluid conditions that an SI and CS/RHR pump will experience. However, in reviewing Specification N0-FB34001 for the SI pump, the NRC staff found that Data Sheet 1, Note 10, for post-LOCA debris does not appear consistent with the debris listed in MUAP-08013, Tables 3.2-3 and 3.2-4. Therefore, the NRC staff requested MHI to resolve this inconsistency. In its response, MHI stated that debris information in Specification N0-FB34001, Data Sheet 1, Note 10, will be revised to be consistent with that described in MUAP-08013, Tables 3.2-3 and 3.2-4. As a follow-up to this audit, it should be verified that Specification N0-FB34001 is revised as indicated. This finding was identified as Item No. 40 in the list of audit findings.

Individual Pump Specifications:

a) The NRC staff found that some individual pump specifications, such as N0-FB54001 for motor-driven emergency feedwater (EFW) pumps, N0-FB54002 for turbine-driven EFW pumps, and N0-FB44001 for containment spray and RHR pumps, did not appear to include qualification details such as provided in N0-FB34001 for SI pumps. For example, these specifications did not appear to discuss ASME QME-1-2007 Section QP on pump qualification, Appendix QR-A on seismic qualification, and Appendix QR-B on nonmetallic environmental qualification. In its response to this audit finding, MHI indicated that the individual pump specifications, such as N0-FB24001, FB44001, FB54001, FB54002, FC04001, FC14U01, and FC24U01 will be revised to include the qualification details, including the seismic load provision discussed in the previous audit finding. As a follow-up to this audit, the NRC staff will confirm that the individual pump specifications include the qualification details (such as references to ASME QME-1-2007, Section QP, Appendix QR-A, and Appendix QR-B, and seismic load provisions). This finding was identified as Item No. 69 in the list of audit findings.

b) Some individual pump specifications in their Attachment 4, reference Subsection ISTB of the ASME OM Code. In its response to this audit finding, MHI indicated

the individual pump specifications, such as N0-FB24001, FB34001, FB44001, FB54001, FB54002, FC04001, FC14U01, and FC24U01 will be revised to include the references to ASME OM Code (2012 Edition) when incorporated by reference in the NRC regulations. As a follow-up to this audit, the NRC staff will confirm that the individual component specifications reference the most recent accepted ASME OM Code subsection (such as Subsection ISTF for pumps in new reactors). This finding was identified as Item No. 70 in the list of audit findings.

Containment Spray/Residual Heat Removal Pump Specification, Document No. N0-FB44001:

a) The NRC staff found that Section 3.1.1 in N0-FB44001 (Containment Spray and RHR pumps) incorrectly referenced "ASME Code, Section XI," for periodic testing. In its response to this audit finding, MHI indicated that Specification N0-FB44001 will be revised to reference the ASME OM Code for periodic testing. As a follow-up to this audit, the NRC staff will confirm that Specification N0-FB44001 references the ASME OM Code for periodic testing. This finding was identified as Item No. 71 in the list of audit findings.

b) In its response to RAI 998-7025, Question 05.04.07-16, regarding the susceptibility of the RHR system to potential vortex induced air ingestion and the impact to CS/RHR pump performance and reliability, MHI provided on March 27, 2013, a detailed testing methodology and acceptance criteria to confirm performance and reliability of the CS/RHR pump during mid-loop operation. The testing methodology described by MHI specifies both vendor and pre-operational testing for the CS/RHR pump. However, in reviewing the design specification requirements for the CS/RHR pump, the NRC staff noted that Specification N0-FB44001 does not address the methodology and acceptance criteria for this testing. Therefore, the NRC staff requested MHI to discuss specific testing and acceptance criteria required by the vendor during qualification testing to confirm performance and reliability of the CS/RHR pump during mid-loop operation. In its response, MHI stated that the contents of the response are not fully reflected in Specification N0-FB44001. Although air-ingested factory testing is required for the first pump in Paragraph 6.5 of the specification, detailed requirements as stated in the RAI response are not yet included. The detailed contents on vendor/factory tests in the response will be reflected in the next revision of the specification. As a follow-up to this audit, it should be verified that Specification N0-FB44001 is revised to include the detailed testing requirements to confirm performance and reliability of the CS/RHR pump during mid-loop operation. This finding was identified as Item No. 74 in the list of audit findings.

Pump Equipment Qualification Specification, Document No. N0-FB00100:

Specification N0-FB00100 for pump qualification in Section 3.5.4.2, allows static equivalent loads for seismic qualification to be applied at the center of gravity. The NRC staff found that the specification was not clear regarding a requirement for this load to be applied along the least rigid axis. In its response to this audit finding, MHI revised N0-FB00100 to clarify Section

3.5.4.2.2 to require that the horizontal loads be assumed to act in any direction, including the least rigid axis. During this audit, the NRC staff confirmed that the revised Specification N0-FB00100 specifies that loading for seismic qualification testing will be applied, as a minimum, along the least rigid axis. This audit finding is resolved. This finding was identified as Item No. 67 in the list of audit findings.

General Design Specification for Class 1 Components, Document No. N0-FB10L01:

Specification N0-FB10L01 for Class 1 components in Section 5.4.1, provides a list of prohibited materials. The NRC staff discussed with MHI, the use of lubricants Neolube No. 1 and No. 2, which are not recommended for high temperature applications, and Neolube No. 650, which is appropriate for high temperature applications. MHI indicated that it will evaluate appropriate lubricants, including the applicability of Neolube, with consideration of potential adverse effects on components due to lubricant deterioration in high temperature applications. The staff found MHI's response to be acceptable. This finding was identified as Item No. 28 in the list of audit findings.

Risk-informed Special Treatment in US-APWR Design and Procurement Specifications:

The NRC staff noted that some individual pump specifications referenced 10 CFR 50.69 regarding risk-informed special treatment programs for plant equipment. In its response, MHI indicated that risk-informed programs under 10 CFR 50.69 will not be used in the US-APWR pump qualification process. This finding was identified as Item No. 72 in the list of audit findings.

4.3 Equipment Classifications

In general, the NRC staff found that the design and procurement specifications incorporated the provisions specified in the US-APWR FSAR. The NRC staff findings are listed in the List of Audit Findings, and specific NRC staff findings and their planned resolution regarding Seismic and Quality Group Classifications are discussed below:

US-APWR Standard Design, Check valve Procurement Specification (Safety Related) Document No. N0-GC00065:

The NRC staff was unable to verify the Seismic Category/Quality Group classification of valves in valve procurement specification N0-GC00065 Revision 1 as it contains blank Valve Data Sheets. In its response, MHI indicated that it will add the details to the data sheets and make them available in a future follow-up audit as sample data sheets. The details for the data sheets will be finalized during the site design and procurement stages. The NRC staff will conduct a follow-up audit of the revised design specifications when MHI notifies the NRC staff that the revised specifications are available. This finding was identified as Item No. 25 in the list of audit findings.

US-APWR Standard Design, Prestressed Concrete Containment Vessel (PCCV) Design Specification, Document No. N0-FH00001:

While reviewing Design Specification Doc. No. N0-FH00001 Revision 4, the NRC staff found that Table 1 attached to the Audit Plan lists “CC” as ASME Code Class for the Containment Vessel in the Containment System. Whereas, DCD Tier 2, Table 3.2-2 lists the ASME Code Class as “MC.” In its response, MHI stated that in DCD Tier 2, Table 3.2-2, “MC” is just one of the applicable codes for the Containment Vessel. All the applicable codes are described in Table 3.1 of N0-FH00001, Revision 4. The NRC staff and MHI agreed that the applicable codes and standards for the Containment System in DCD Tier 2, Table 3.2-2 should be corrected. The staff will issue a follow-up RAI to address the issue. In addition, MHI will update N0-FH00001 and make it available for the NRC staff to review in a future follow-up audit. The NRC staff will conduct a follow-up audit of the revised design specifications when MHI notifies the NRC staff that the revised specifications are available. This finding was identified as Item No. 83 in the list of audit findings.

While reviewing Design Specification Doc. No. N0-FH00001 Revision 4, the NRC staff found a discrepancy between Design Specification and Design Document. Section 3.2.2, “ASME Code and Plant Classifications,” of the Design Specification lists “B” as Quality Group for Containment Vessel in Containment System. Whereas, DCD Tier 2, Table 3.2-2 listed “N/A” as the Quality Group. In its response, MHI stated that in the DCD, Quality Group was changed to N/A from B to reflect the RAI 914-3665, Question No. 03.02.02-22, response. The design specification will be updated to be consistent with the DCD, and MHI will provide a revised design specification with corrected Section 3.2.2 and make it available for the NRC staff review in a future follow-up audit. The NRC staff will conduct a follow-up audit of the revised design specifications when MHI notifies the NRC staff that the revised specifications are available. This finding was identified as Item No. 84 in the list of audit findings.

5.0 CONCLUSION

Based on the audit, the NRC staff has the following conclusions:

1) The NRC staff concludes that MHI is developing design specifications for ASME class 1, 2 and 3 components, component supports, and core support structures that meet the ASME BPV Code, Section III, NCA-3250 requirements and are consistent with the methodology and criteria described in the US-APWR DCD.

2) The NRC staff concludes that MHI is developing design and procurement specifications for pumps, valves, and dynamic restraints, and equipment qualification that are consistent with the provisions in US-APWR DCD Tier 1 and 2.

3) The NRC staff concludes that the equipment classifications are consistent with the US-APWR DCD and regulatory guidance.

MHI indicated that the NRC staff findings from this audit will be addressed in updates to the design and procurement specifications for follow-up review by the NRC staff. The NRC staff will conduct a follow-up audit of the revised design and procurement specifications when MHI notifies the NRC staff that the revised specifications are available.

Based on the results of this audit, the NRC staff concludes that the open items regarding the audit of the US-APWR design and procurement specifications for the US-APWR design certification application can be updated to confirmatory items.

6.0 References

1. NRO Office Instruction NRO-REG-108 (Revision 0), “Regulatory Audits.”

2. MHI Letter UAP-HF-13043, “List of Risk Significant ASME Section III Piping Systems and Components Associated with Revised Design Completion Plan for US-APWR Piping Systems and Components” dated March 1, 2013.

3. ASME Boiler and Pressure Vessel Code, Section III, Division 1, “Rules for Construction of Nuclear Facility Components.”

4. SRP Section 3.9.3, “ASME Code Class 1, 2, and 3 Components and Component Supports, and Core Support Structures.”

5. SRP Section 3.9.4, “Control Rod Drive Systems.”

6. SRP Section 3.9.5, “Reactor Pressure Vessel Internals.”

7. SRP Section 3.9.6, “Functional Design, Qualification, and In-service Testing Programs for Pumps, Valves, and Dynamic Restraints.”

8. SRP Section 3.11, “Environmental Qualification of Mechanical and Electrical Equipment.”

9. SRP Section 3.2.1, “Seismic Classification.”

10. SRP Section 3.2.2, “System Quality Group Classification.”