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December 18, 2008

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

Attention: Mr. Jeffrey A. Ciocco,

Docket No. 52-021
MHI Ref: UAP-HF-08287

Subject: MHI's Responses to US-APWR DCD RAI No.102-1391 Revision 0

References: 1) "Request for Additional Information No.102-1391 Revision 0, SRP Section: 14.02 – Initial Plant Test Program – Design Certification and New License Applicants, Application Section: 14.2," dated November 20, 2008.
2) "MHI's Amended Response to US-APWR DCD RAI No.7 Revision 0 (MHI Ref: UAP-HF-08288)" dated December 18, 2008.

With this letter, Mitsubishi Heavy Industries, Ltd. ("MHI") transmits to the U.S. Nuclear Regulatory Commission ("NRC") a document entitled "Responses to Request for Additional Information No.102-1391 Revision 0."

Enclosed are the responses to Questions 14.02-91 through 14.02-106 that are contained within Reference 1.

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

Sincerely,

Y. Ogata

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

Enclosure:
1. Responses to Request for Additional Information No.102 Revision 0

CC: J. A. Ciocco
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NRO

Enclosure 1

UAP-HF-08287
Docket No. 52-021

Responses to Request for Additional Information No.102-1391
Revision 0

December 2008

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

12/18/2008

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 102-1391 REVISION 0**
SRP SECTION:	**14.02 – Initial Plant Test Program – Design Certification and New License Applicants**
APPLICATION SECTION:	**14.2**
DATE OF RAI ISSUE:	**11/20/2008**

QUESTION NO.: 14.02-91

RAI 1391 Question 4917 follows up MHI's response to RAI 7 Question 14.02-1.

MHI's response to RAI 7 Question 14.02-1 noted in part that Table 1.9.1-1 of the USAPWR DCD would be changed to status RG 1.37 as: "Conformance with no exceptions identified." Instead, Revision 1 to Table 1.9.1-1 of the DCD statuses RG 1.37 as: "Conformance with exception. Programmatic/operational aspect is not applicable to USAPWR design certification." The Revision 1 status of RG 1.37 in Table 1.9.1-1 of the DCD is not consistent with the status of other RGs to be used for the construction and preoperational phases of a US-APWR plant. MHI needs to revise Table 1.9.1-1 of the DCD to status RG 1.37 in accordance with MHI's initial response to RAI 7 Question 14.02-1.

(BNL 14.02-1, Sup. 1)

ANSWER:

RG 1.37 is one of several regulatory guides in Table 1.9.1-1 where MHI indicates an exception to the items that apply during plant operation and require an operational quality assurance program. Chapter 17, Quality Assurance, is limited to describing a quality assurance program for the design certification (DCD) process only. Chapter 17, Quality Assurance, section 17.5 includes COL Action COL 17.5(1): The COL applicant shall develop and implement a Quality Assurance Program Description for site-specific design activities and for plant construction and operation. Table 1.9.1-1 indicates an exception to RG 1.33, Quality Assurance Program Requirements (Operation) with the following statement: "Implementation of RG applies to a site specific operational program for which COL Applicant will be responsible".

MHI considers that full compliance with these regulatory guides into plant operation requires an additional programmatic commitment by the COL applicant/licensee. Accordingly, MHI has modified Table 1.9.1-1 in Revision 1 of the DCD to provide this clarification by identifying exceptions to RG compliance for operational programmatic aspects.

MHI also indicates in Table 1.9.1-1 exceptions similar to that described for RG 1.37, i.e.

"programmatic/operational aspect is not applicable to US-APWR design certification" for RGs 1.12, 1.16, 1.30, 1.37, 1.54, 1.68, 1.139, and 8.10.

MHI will revise the response to RAI-7 Question 14.02-1 in order to clearly document this position.

Impact on DCD

There is no impact on the DCD. This is consistent with the revised response to RAI-7 Question 14.02-1.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

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APPLICATION SECTION:	**14.2**
DATE OF RAI ISSUE:	**11/20/2008**

QUESTION NO.: 14.02-92

RAI 1391 Question 4918 follows up MHI's response to RAI 33 Question 14.02-28.

Section 14.2.10.2 of the US-APWR DCD includes general descriptions of the conditions required for plant initial criticality. RG 1.68, App. A.3, "Initial Criticality," cautions that: "all systems required for startup or protection of the plant should be operable and in a state of readiness." The RG 1.68 statement includes, but is not limited to, two specific examples: "the reactor protection system and emergency shutdown system". MHI is correct that the two specific examples from the more general RG 1.68 statement are addressed in DCD Section 14.2.10.2. However, DCD Section 14.2.10.2 does not include the RG 1.68 general prerequisite. MHI needs to include the RG 1.68, App. A.3, general prerequisite that: "all systems required for startup or protection of the plant should be operable and in a state of readiness" in Section 14.2.10.2 of the DCD.

(BNL 14.02-28, Sup. 1)

ANSWER:

MHI will revise Subsection 14.2.10.2 of the DCD to include the RG 1.68, App. A.3, general prerequisite that: "all systems required for startup or protection of the plant should be operable and in a state of readiness".

Impact on DCD

This revision impacts Revision 1 of the DCD in Subsection 14.2.10.2 on page 14.2-20, third paragraph, as follows:

The following conditions exist prior to initial criticality:

- The reactor coolant system (RCS) is filled and vented.
- The operation of the control rod drive mechanism (CRDM) is verified.
- Rod control and position indication systems are operational.
- Rod drop time under hot full flow and no flow conditions meet design requirements.
- The protection and safety monitoring system and plant control and monitoring system are operable.
- Reactor trip breakers are operable.
- The RCS is at hot no-load temperature and pressure.

- The reactor coolant boron concentration is adequate for the shutdown margin requirements of the Technical Specifications to be satisfied for the hot standby condition.
- **All systems required for startup or protection of the plant are operable and in a state of readiness.**

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

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SRP SECTION:	**14.02 – Initial Plant Test Program – Design Certification and New License Applicants**
APPLICATION SECTION:	**14.2**
DATE OF RAI ISSUE:	**11/20/2008**

QUESTION NO.: 14.02-93

RAI 1391 Question 4921 follows up MHI's original response to RAI 33 Question 14.02-31.

MHI's response to of RAI 33 Question 14.02-31 is satisfactory (pending confirmation of the associated revision to the US-APWR DCD) with the exception of providing for an Accumulator Hot Flow Test per RG 1.79 Section C.1c.(3).

Please provide for an Accumulator Hot Flow Test in Section 14.2 of the DCD per RG 1.79 Section C.1c.(3).

(BNL 14.02-31, Sup. 1)

ANSWER:

The Accumulator Hot Flow Test information that is omitted in the response to RAI 33 Question 14.02-31 will be included in Section 14.2 of the DCD.

Impact on DCD

This revision impacts Revision 1 of the DCD in Subsection 14.2.12.1.57 on pages 14.2-82 and 14.2-83 as follows:

1) Add the following to item A., Objectives:

3. **To verify flow and verify valve operability for the accumulator injection line at operating pressure and temperature conditions.**

2) Revise the following in item B., Prerequisites:

6. The reactor vessel head and reactor internals are removed, and provisions are provided to remove water from the vessel during the **low pressure injection** test.

3) Add the following to item C., Test Method:

4. During hot operating conditions, small amounts of water are injected into the reactor coolant system by the accumulator (in accordance with RG 1.79).

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

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DATE OF RAI ISSUE:	**11/20/2008**

QUESTION NO.: 14.02-94

RAI 1391 Question 4922 follows up MHI's original response to RAI 33 Question 14.02-32.

Item (a) of MHI's response to RAI 33 Question 14.02-32 addresses verification of the reactor coolant pump (RCP) design flow rate. MHI refers to test 14.2.12.2.4.12, "RCS Flow Measurement Test," which states that: *"RCS flow rate is determined based on the correlation between data obtained by measuring RCP motor input power and the differential pressure across the reactor coolant line elbow tap, for the purpose of confirming reactor coolant flow is equal to or greater than the design flow specified in Section 5.1."* It would appear that the full flow reference point should be established as part of the ITP. Please provide more information to explain how the actual value of RCS flow is determined. Is the elbow flow measurement device factory calibrated before installation? Is it calibrated after installation into the RCS using some certified reference standard?

Items (e) and (i) of MHI's response to the RAI relate to testing of component cooling water (CCW) cooling to the RCP. The MHI response refers to test 14.2.12.1.87 for the CCW System, but that test only seems to verify flow rates and not cooled component temperatures. MHI needs to add a step to the RCP test to verify temperatures and adequate cooling to the thermal barrier heat exchange (HX) and the motor air coolers or explain where that is verified.

(BNL 14.02-32, Sup. 1)

ANSWER:

RCP Flow: An outline of RCS Flow Rate Evaluation using the correlation between the RCP motor input power and the elbow tap differential pressure is shown in Figure 1.
As shown in Figure 1, the elbow tap differential pressure is used to obtain the relative flow rate data. The actual flow rate is evaluated using the RCP factory data and the RCS flow measurement test data. Therefore, the elbow tap flow element is not specially calibrated before the test for the purpose of obtaining the actual flow rate.

RCP Cooling: In addition to factory testing of RCP operating temperatures and cooling capabilities, CCW cooling flows are verified prior to hot functional testing in Subsection 14.2.12.1.87, Component Cooling Water System Preoperational Test. The RCPs are monitored for operating temperatures during hot functional testing in 14.2.12.1.3 (item C.2) and acceptance criteria provided in item D.2: "the RCP and pump seals operating characteristics are within design specifications as described in Subsection 5.4.1."

MHI considers that this criterion includes the cooling capability of the thermal barrier heat exchanger and motor external water/air coolers, as well as the external upper bearing oil cooler and integral lower bearing oil cooler. However, MHI will revise Subsection 14.2.12.1.3 to clarify the requirement to verify RCP operating temperatures during Hot Functional testing.

Impact on DCD

This revision impacts Revision 1 of the DCD in Subsection 14.2.12.1.3, Item C., Test Method, item 2. on page 14.2-32 as follows:

2 The RCPs and associated oil lift pumps are operated during hot functional testing, and operating data, including seal parameters **and temperatures at the thermal barrier, motor, motor air cooler and oil coolers**, are recorded at various temperature plateaus.

Impact on COLA

There is no impact on the COLA.

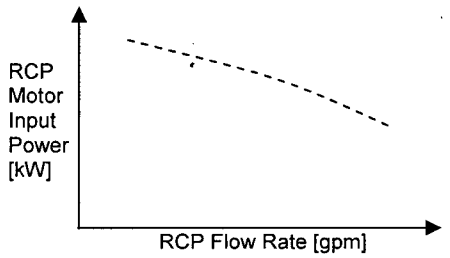
Impact on PRA

There is no impact on the PRA.

Figure 1 Outline of RCS Flow Rate Evaluation

STEP 1

P-F Curve based on Factory Test Data of RCP



STEP 2

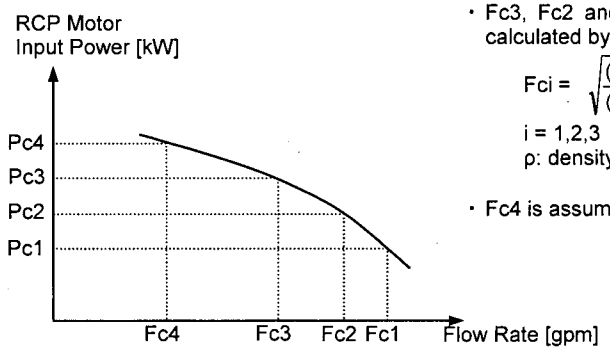
RCS Flow Measurement Test Data

Number of the operating RCP	Differential pressure across the elbow tap [psid]	RCP Motor Input power [kW]	
		Measured data	Conversion data (Note1)
4	dP4	P4	Pc4
3	dP3	P3	Pc3
2	dP2	P2	Pc2
1	dP1	P1	Pc1

Note1: Conversion from the measured data to the corresponding data in the factory test condition by using water density of each condition.

STEP 3

P-F Curve based on RCS Flow Measurement Test Data



- Fc3, Fc2 and Fc1 are correlated flow rate calculated by the following equation.

$$Fci = \sqrt{\frac{(dPi) \times \rho 4}{(dP4) \times \rho i}} \times Fc4$$

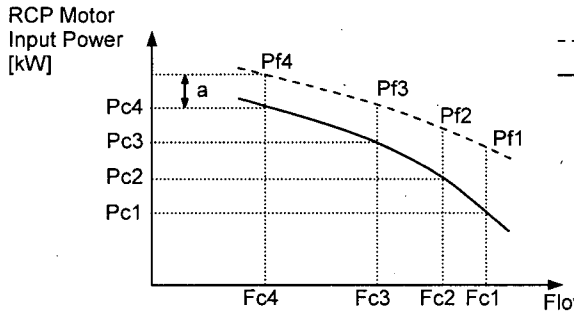
i = 1,2,3

ρ: density [lbm/ft^3]

- Fc4 is assumed value.

STEP 4

Comparison between Factory Test Data and RCS Flow Measurement Test Data



--- Factory Test Data

—— RCS Flow Measurement Test Data

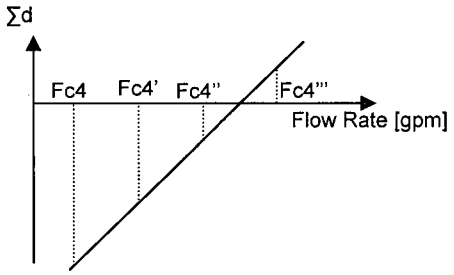
a = Pf4 − Pc4

- In the next step, the value, a, is used to offset the difference of the input power between factory test data and RCS flow measurement test data due to measurement error.

Iterative solution of Fc4

STEP 5

Evaluation of RCS Flow Rate



- Calculation of the summation of the difference, ∑d, in the assumed Fc4

$$\sum d = \sum_{i=1}^{4} (Pci + a - Pfi)$$

- Iterative solution of Fc4
- The flow rate that should be solved is at ∑d = 0.

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DATE OF RAI ISSUE:	**11/20/2008**

QUESTION NO.: 14.02-95

RAI 1391 Question 4923 follows up MHI's original response to RAI 33 Question 14.02-34.

MHI's response to RAI 33 Question 14.02-34 did not address part of the question. RG 1.68, App. A, Item 1.a(2)(d) calls for a check of the "pressure relief valves ... supports and restraints for discharge piping." This check should be done after the valves have actuated and relieved. Please address this RG 1.68 guidance in the appropriate DCD test abstracts.
(BNL 14.02-34, Sup. 1)

ANSWER:

MHI considers that the RG 1.68 Appendix A item 1.a(2) test recommendation is met by testing operation of the Pressurizer Safety Depressurization Valves (SDVs), including checks of the supports and restraints for discharge piping, during hot functional testing.

DCD Subsection 14.2.12.1.1, RCS Hot Functional Preoperational Test, as revised by response to RAI-33 Question 14.02-31, includes coordination of hot functional testing with preoperational test 14.2.12.1.4, Pressurizer Safety Depressurization Valve (SDV) Preoperational Test, 14.2.12.1.50, Dynamic State Vibration Monitoring of Safety Related and High Energy Piping, and 14.2.12.1.52, Thermal Expansion Test.

DCD Subsection 14.2.12.1.50, Dynamic State Vibration Monitoring of Safety Related and High Energy Piping, as revised by response to RAI-33 Question 14.02-57, also includes the following:

3. Dynamic response monitoring is performed in conjunction with preoperational test 14.2.12.1.24 and during hot functional testing per 14.2.12.1.1 and the tests coordinated by 14.2.12.1.1.

Therefore, based upon the coordination provided by 14.2.12.1.1, preoperational test 14.2.12.1.4 operates (opens) the SDVs under hot conditions while preoperational test 14.2.12.1.50 monitors dynamic vibration of the discharge piping to the PRT and preoperational test 14.2.12.1.52 monitors piping, support and restraint deflections.

Impact on DCD

There is no impact on the DCD.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

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US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 102-1391 REVISION 0**
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APPLICATION SECTION:	**14.2**
DATE OF RAI ISSUE:	**11/20/2008**

QUESTION NO.: 14.02-96

RAI 1391 Question 4924 follows up MHI's original response to RAI 33 Question 14.02-40.
As noted in MHI's response to RAI 33 Question 14.02-40, MHI will revise Subsection 14.2.12.1.12 to include verification for the operability of heat tracing or area heating for portions of the Chemical and Volume Control System (CVCS) that normally contain 4 wt. % of boric acid solution. The purpose of the heat tracing is to assure that boric acid solution temperature does not go below 65 °F. The acceptance criteria states that the related portion of CVCS will operate as described in Subsection 9.3.4.3. However, Subsection 9.3.4.3 does not define the test criteria or methods. Please describe how MHI will test to show that the 65 °F limit is maintained for credible environmental conditions.

(BNL 14.02-40, Sup. 1)

ANSWER:

The response to RAI-33 Question 14.02-40 added acceptance criteria item D.5 to preoperational test abstract 14.2.12.1.12. However, the referenced subsection in Chapter 9 was incorrect.

This response should have referred to Subsection 9.3.4.2.3.1 which states

> "All portions of the CVCS which normally contain 4 weight percent (wt. %) of boric acid solution are maintained at a temperature of greater than or equal to 65 °F. Heat tracing or heated areas are provided for portions of the system which normally contain 4 wt. % of boric acid solution. Temperature alarms are provided to assure that boric acid solution temperature does not go below 65 °F."

MHI will revise Subsection 14.2.12.1.12 item D.5 to reference Subsection 9.3.4.2.3.1.

Impact on DCD

This revision impacts Revision 1 of the DCD in Subsection 14.2.12.1.12 on page 14.2-40, as previously revised in response to RAI-33 Question 14.02-40 by addition of item D.5 with the following changes:

5. Heat tracing or area heating for portions of the system which normally contain 4 wt. % of boric acid solution operate as described in Subsection ~~9.3.4.3~~ **9.3.4.2.3.1**.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

12/18/2008

US-APWR Design Certification

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DATE OF RAI ISSUE:	**11/20/2008**

QUESTION NO.: 14.02-97

RAI 1391 Question 4925 follows up MHI's original responses to RAI 33 Question 14.02-56 and Question 14.02-57.

MHI's original responses to RAI 33 Question 14.02-56 and Question 14.02-57 indicates several changes to DCD Section 14.2.12.1.50, "Dynamic State Vibration Monitoring of Safety Related and High-Energy Piping," and Section 14.2.12.1.51, "Steady State Vibration Monitoring of Safety Related and High-Energy Piping."

(a) In Section A, "Objective," of Subsection 14.2.12.1.50, MHI indicated that the word "specified" would be deleted from the phrase "specified transients." If this subsection is intended to instrument and monitor piping during plant transients experienced during preoperational testing (and listed in the proposed changes to Subsection 14.2.12.1.1, "RCS Preoperational Hot Functional Test,") then the word "specified" should be replaced with the phrase "preoperational test transients." MHI should revise Subsection 14.2.12.1.50 to replace the word "specified" with the phrase "preoperational test transients."

(b) In Section C, "Test Method," of Subsection 14.2.12.1.50, MHI indicated that the requirement to measure piping deflections during various plant transients would be replaced with three (3) specific action items. These specific items are acceptable. However, the dynamic response referred to in MHI's new item (1) and perceptible vibration by visual inspection referred to in MHI's new item (2) should be clearly defined. Deflection measurements may be considered as one of the vibration responses. However, the "Acceptance Criteria" should clearly state the response level at which the High Energy Piping components perform their intended functions. The current DCD Section 14.2.12.1.50 refers to DCD Section 3.9.2, which does not provide any such acceptance criteria for High Energy Piping components. MHI should revise Section 14.2.12.1.50 and Section 12.2.12.1.51 to specify or reference specific acceptance criteria.

(BNL 14.02-56/57, Sup. 1)

ANSWER:

(a) MHI confirms that Subsection 14.2.12.1.50 is intended to instrument and monitor piping during plant transients experienced during preoperational testing. MHI will revise Subsection 14.2.12.1.50 to replace the word "specified" with the phrase "preoperational test transients."

(b) The test method of the vibration testing of piping system follows "Standard and Guides for

Operation and Maintenance of Nuclear Power Plants", ASME OM. The specific acceptance criteria for piping vibration testing conform to the guidance of ASME OM, and detailed methodologies for the evaluation follow ASME OM as addressed in Subsection 3.9.2. The specific qualitative acceptance criteria are to be specified in the test procedure.

Impact on DCD

This revision impacts Revision 1 of the DCD as follows:

Revise Subsection 14.2.12.1.50 on page 14.2-76 as shown below (only affected portions shown, with previous revisions per RAI-33 response to Question 14.02-56 and 14.02-57 incorporated). This revision supplements the revision commitment in response to RAI-33, Question 14.02-56 for Section A, item 1:

A. Objective

1. To demonstrate during ~~specified~~ **preoperational test transients** that the systems~~'s~~ monitored parts respond in accordance with design calculations.

C. Test Method

1. The dynamic response of the specified safety-related and high-energy piping is recorded during both steady flow and flow-induced transients.
2. Specified-safety-related and high-energy piping are screened qualitatively for perceptible vibration by visual inspection during the transient events. **Where excessive vibration is observed, deflection amplitudes are recorded for evaluation.**
3. Dynamic response monitoring is performed in conjunction with preoperational test 14.2.12.1.24 and during hot functional testing per 14.2.12.1.1 and the tests coordinated by 14.2.12.1.1.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

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QUESTION NO.: 14.02-98

RAI 1391 Question 4926 follows up MHI's original response to RAI 58 Question 14.02-86.

MHI's response to RAI 58 Question 14.02-86 states that MHI will revise DCD Subsection 3.9.3.4.2.7 to delete the testing program of in-situ snubber dynamic lock-up testing. MHI needs to provide information in the DCD to indicate how the US-APWR will meet the ASME OM Code, Subsection ISTD, Article ISTD 5, "Preservice Operability Testing," for snubbers. This section calls for preservice testing of all snubbers that includes dynamic lockup testing.

(BNL 14.02-86, Sup. 1)

ANSWER:

US-APWR DCD, Subsection 3.9.3.4.2.9, refers to ASME OM Code Subsection ISTD for preservice snubber examination and testing. The general testing provisions of Subsection ISTD state that preservice tests may be performed at the manufacturer's facility. The changes to delete in-situ dynamic testing from Subsection 3.9.3.4.2.7 cited in this question are not in conflict with the ASME OM Code.

By letter dated November 7, 2008 (Reference 1), MHI sent the NRC a set of changes to the US-APWR DCD based on MHI's review of COL holder items in the DCD. Reference 1 includes changes to Subsection 3.9.6.4, "IST Program for Dynamic Restraints." Details specific to preservice examination and testing requirements are included in Reference 1 as follows:

"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:

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, adiusted, 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."

MHI will revise DCD Subsection 3.9.3.4.2.9 to refer to the more detailed snubber IST program requirements of Subsection 3.9.6.4. Also, MHI identified an editorial correction to DCD Reference 3.9-13 that is provided below.

Impact on DCD

This revision impacts Revision 1 of the DCD. MHI will revise Subsection 3.9.3.4.2.9 as follows:

3.9.3.4.2.9 Snubber Examination and Testing

Snubber IST Program requirements, which apply ~~P~~prior to and after plant operation, ~~snubbers~~ are ~~required by Technical Specifications to be examined and tested~~ in accordance with the ASME Code OM, Subsection ISTD (Reference 3.9-13). Program details are provided in Subsection 3.9.6.4. ~~The examination determines that appropriate snubber orientation and condition, cold settings, snubber reservoir fluid level and connections, and assures that snubbers are designed and installed in accordance with the manufacturer's recommendations.~~

MHI will revise DCD Reference 3.9-13 as follows:

3.9-13 ~~Requirements for Preoperational and Initial Startup Vibration Testing of Nuclear Power Plant Piping Systems.~~ Code ~~of~~ for Operation and Maintenance of Nuclear Power Plants, American Society of Mechanical Engineers (ASME OM Code), 1995 Edition through 2003 Addenda.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

Reference:

1) MHI Letter to NRC Document Control Desk dated November 7, 2008, "Transmittal of COL Information Update for US-APWR Design Control Document Revision 1," MHI Ref: UAP-HF-08259. (Accession No.: ML083170228)

12/18/2008

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 102-1391 REVISION 0**
SRP SECTION:	**14.02 – Initial Plant Test Program – Design Certification and New License Applicants**
APPLICATION SECTION:	**14.2**
DATE OF RAI ISSUE:	**11/20/2008**

QUESTION NO.: 14.02-99

RAI 1391 Question 4927 follows up MHI's original response to RAI 33 Question 14.02-64.

As noted in MHI's response to RAI 33 Question 14.02-64, MHI will be revising Subsection 14.2.12.1.59, "Refueling Water Storage System Preoperational Test," of the US-APWR DCD to clarify the test acceptance criteria and include references to appropriate subsections of the DCD. However, the DCD subsections do not include the alarm setting for the high, below normal and low levels in the refueling water storage pit (RWSP). These alarm levels should be included in DCD Subsection 14.2.12.1.59. Additionally, please reference DCD Section 6.3.2.2.3 in DCD Subsection 14.2.12.1.59.

(BNL 14.02-64, Sup. 1)

ANSWER:
The revision to DCD Revision 0 for subsection 14.2.12.1.59 identified in response to RAI-33 Question 14.02-64 was not incorporated into Revision 1 of the DCD, since the RAI-33 response was still in progress when Revision 1 of the DCD was prepared. DCD Revision 1 revised the Acceptance Criterion item 1. in Subsection 14.2.12.1.59 to change the referenced subsections of Chapter 6 to Subsections 6.3.2.2.4 and 6.3.2.2.3. Incorporation of RAI-33 Question 14.02-64 in Revision 2 of the DCD will result in the following:

D. Acceptance Criterion

1. The RWSP system components controls, including alarms operate as designed (see Subsections 6.2.2.2.5, 6.3.2.2.4 and 6.3.2.2.3).

Reference to Subsection 6.3.5.4 was removed from this item in Revision 1; however, Subsection 6.3.5.4 includes a description of the RWSP level alarms.

Accordingly, MHI will revise Subsection 14.2.12.1.59 to include reference to Subsection 6.3.5.4.

MHI notes that Subsection 6.3.2.2.3 is already included in Revision 1 of the DCD, Subsection 14.2.12.1.59, item D.1.

Impact on DCD

This revision impacts Revision 1 of the DCD in Subsection 14.2.12.1.59 on page 14.2-85, as previously revised by response to RAI-33 Question 14.02-64, as follows (only affected section shown, with RAI-33 Question 14.02-64 changes incorporated):

D. Acceptance Criterion

1. The RWSP system components **and** controls, including alarms**,** operate as designed (see Subsections **6.2.2.2.5**, 6.3.2.2.4, ~~and~~ 6.3.2.2.3, **and 6.3.5.4**).

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

12/18/2008

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 102-1391 REVISION 0**
SRP SECTION:	**14.02 – Initial Plant Test Program – Design Certification and New License Applicants**
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QUESTION NO.: 14.02-100

RAI 1391 Question 4928 follows up MHI's original response to RAI 33 Question 14.02-66.

MHI did not respond to Item (2) of RAI 33 Question 14.02-66. Please add RGs 1.35 and 1.35.1 to Table 14.2-2 of the DCD or justify their exclusion.

(BNL 14.02-66, Sup. 1)

ANSWER:

Table 1.9.1-1, "US-APWR Conformance with Division 1 Regulatory Guides," states that the US-APWR conforms to RGs 1.35 and 1.35.1 with no exceptions. However, the table includes a note that conformance to RG 1.35 is "limited to design considerations; implementation of ISI physical inspection will be by COL Applicant." This note will be deleted, and Table 1.9.1-1 entries for RGs 1.35 and 1.35.1 will be revised to add references to Subsections 3.8.1.7 "Testing and Inservice Inspection Requirements," and 14.2.7, "Conformance of Test Program with RGs."

MHI will add RGs 1.35 and 1.35.1 to DCD Table 14.2-2 and make editorial changes for consistency as shown below.

Impact on DCD

This revision impacts DCD Revision 1, Tables 1.9.1-1 and 14.2-2.
Table 1.9.1-1 will be revised as follows:

1.35	In-Service Inspection (ISI) of Ungrouted Tendons in Prestressed Concrete Containments (Rev. 3, July 1990)	Conformance with no exceptions identified. ~~Note: limited to design considerations; implementation of ISI physical inspection will be by COL Applicant.~~	3.8.1.2, **3.8.1.7, 14.2.7**
1.35.1	Determining Prestressing Forces for Inspection of Prestressed Concrete Containments (Rev. 0, July 1990)	Conformance with no exceptions identified.	3.8.1.2, **3.8.1.7, 14.2.7**

Table 14.2-2 will be revised by adding the following:

Table 14.2-2 Regulatory Guides Associated with the ITP (Sheet 2 of 2)

22	RG 1.35, "Inservice Inspection Of Ungrouted Tendons In Prestressed Concrete Containments," Rev 3, July 1990
23	RG 1.35.1, "Determining Prestressing Forces For Inspection Of Prestressed Concrete Containments," July 1990

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

12/18/2008

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 102-1391 REVISION 0**
SRP SECTION:	**14.02 – Initial Plant Test Program – Design Certification and New License Applicants**
APPLICATION SECTION:	**14.2**
DATE OF RAI ISSUE:	**11/20/2008**

QUESTION NO.: 14.02-101

RAI 1391 Question 4929 follows up MHI's original response to RAI33 Question 14.02-69.

1. MHI's response to RAI 33 Question 14.02-69 is not complete and does not fully address the determination and correlation of leakage rates between leak detection subsystems. RG 1.45 states (page 7) that: "Evaluating an alarm or indication of leakage is important, and the ability to compare indications of leakage to those of other monitoring methods is necessary." RG 1.45 additionally notes that "plants should formulate functional relationships converting signals from these other leakage monitoring systems to a leakage rate and provide them to the operators." MHI should revise the test procedure to provide for conversion of the various leak detection sub-system measures to RCS leakage rate and comparisons between the leak rates determined by the various sub-systems to ensure consistency within system capability and sensitivity.

2. DCD Subsection 14.2.12.1.71, "RCS leak Rate Preoperational Test," and the newly proposed test 14.2.12.1.xx, address RCS leakage rate systems at the preoperational phase. DCD Subsection 14.2.12.2.1.10, "RCS Final Leak Rate Test," addresses RCS leakage rate after fuel load, but apparently before power operation. Please add the changes that MHI committed to for Test 71 to Test 14.2.12.2.1.10, as well. Also, please perform Test 14.2.12.2.1.10 at full power to provide more appropriate testing of those several leakage detection sub-systems that utilize radiation measurements to detect RCS leakage rate.

(BNL 14.02-69, Sup. 1)

ANSWER:

1. As indicated in DCD Table 1.9.1-1, the US-APWR conforms to RG 1.45 Revision 0 without exception; RG 1.45 Revision 1 was issued after MHI submitted the DCD to NRC. MHI will revise the response to RAI 33 Question 14.02-69, regarding the proposed addition of RG 1.45 Revision 1 to DCD Table 14.2-2. The ability to measure RCS leakage using diverse detection methods is demonstrated by preoperational testing and Technical Specifications (TS). The preoperational tests for RCS leakage detection systems and leak rate measurement, as modified in response to RAI 33, Question 14.02-69, will require construction testing and instrument calibration as test pre-requisites. Calibration of the TS-required RCS leakage detection instrumentation ensures

the sensitivity and response time of leakage detection equipment for unidentified leakage is such that a leakage rate, or its equivalent, of 1 gpm can be detected in less than an hour. The following leakage detection instrumentation will be preoperationally tested and subsequently required operable by TS 3.4.15:

a. One containment sump (level) monitor,
b. One containment atmosphere radioactivity monitor (gaseous or particulate), and
c. One containment air cooler condensate flow rate monitor.

The response to part 2 of this question, below, includes additional discussion of TS and test program applicability to RCS leakage. In addition to the TS-required leakage detection instrumentation, diverse means of detecting and quantifying RCS leakage are provided:

Primary-to-secondary leakage: Following means are provided for detecting primary-to-secondary leakage and quantifying leak rates. These means provide indication that leakage may be occurring, also provide various secondary system radiochemical data to calculate primary-to-secondary leak rates as a quantitative method.

- Steam generator blowdown water radiation monitor
- High sensitivity main steam line monitor
- Condenser vacuum pump exhaust line radiation monitor
- Liquid samples taken from SG blowdown sampling line.

Intersystem Leakage: Surface mounted RTDs with MCR alarms are installed at following location to provide indication that leakage may be occurring as a qualitative method.

- RHRS Suction
- SIS/accumulator check valves
- SI pump discharge
- SIS Direct Vessel Injection Line
- RHR Emergency Letdown Lines
- Reactor head seal leakage

Intersystem leakage to CCW: Following means are provided for detecting intersystem leakage to CCW. These means provide indication that leakage may be occurring, also increase of CCW surge tank level provides quantitative leak rate information to the operator.

- CCW radiation monitors
- CCW surge tank level

2. MHI will revise Subsection 14.2.12.2.1.10 to include the committed changes to 14.2.12.1.71 in response to RAI-33 Question 14.02-69.

During power ascension, RCS leakage monitoring is performed in accordance with Technical Specification surveillances SR 3.4.13.1 and SR 3.4.13.2 every 72 hours or in accordance with the Surveillance Frequency Control Program. As discussed in Bases section B 3.4.13 for surveillance SR 3.4.13.1

> An early warning of pressure boundary LEAKAGE or unidentified LEAKAGE is provided by the automatic systems that monitor the containment atmosphere radioactivity and the containment sump level. It should be noted that LEAKAGE past seals and gaskets is not pressure boundary LEAKAGE. These leakage detection systems are specified in LCO 3.4.15, "RCS Leakage Detection Instrumentation."

and SR 3.4.13.2:

> The primary to secondary LEAKAGE is determined using continuous process radiation monitors or radiochemical grab sampling in accordance with the EPRI guidelines (Ref. 5).

LCO 3.4.15 provides for radioactivity monitoring to detect leakage as discussed in Bases section B 3.4.15:

> Radioactivity detection systems are included for monitoring both particulate and gaseous activities because of their sensitivities and rapid responses to RCS LEAKAGE.

Therefore, reperformance of RCS leak testing as a startup test during power ascension is not required since it is already being performed utilizing radioactivity measurements per the Technical Specifications. Note that operability of RCS leakage detection devices are established as required by the Technical Specifications prior to initial criticality and maintained within applicable technical specification requirements thereafter, including surveillances SR 3.4.13.1, 3.4.13.2, 3.4.15.1, 3.4.15.2, 3.4.15.3, 3.4.15.4 and 3.4.15.5.

Impact on DCD

This revision impacts Revision 1 of the DCD in Subsection 14.2.12.2.1.10 as follows:

14.2.12.2.1.10 RCS Final Leak Test

A. Objective

1. To determine the ~~amount of identified and unidentified~~ leakage from the RCS and verify that the leakage is within allowable limits.

B. Prerequisite

1. Fuel loading is completed.

C. Test Method

The ~~identified and unidentified~~ RCS leakage rates are determined by monitoring the following parameters **in conjunction with quantitative leakage detection methods described in Subsection 5.2.5.4.1.1 through 5.2.5.4.1.4** over a specified period of time:

1. RCS pressure and temperature.
2. Pressurizer water level, pressure, and temperature.
3. Volume control tank water level, pressure, and temperature.
4. Pressurizer relief tank and C/V **reactor coolant** drain tank water level, pressure, and temperature.
5. Primary makeup water flow and RCP seal water flow.

D. Acceptance Criteria

1. The amount of leakage from the RCS is within the limits specified in LCO 3.4.13 of Chapter 16.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

12/18/2008

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 102-1391 REVISION 0**
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QUESTION NO.: 14.02-102

RAI 1391 Question 4930 follows up MHI's original response to RAI 33 Question 14.02-78 and Question 14.02-79.

RAI 33 Question 14.02-78 and Question 14.02-79 addressed the testing of the Instrument Air (IA) and the Service Air (SA) Systems as described in DCD Subsections 14.2.12.1.91 and 14.2.12.1.92 respectively. There is currently no test to address the compressed gas system. The RAI responses and the DCD commit to RG 1.68.3 but take exception to items C.7, C.8.b, and C.11. The NRC staff agrees that C.7 is not applicable to the US-APWR but maintains that the rest of the RG should be addressed.

MHI needs to:

(1) Provide a commitment to test the IA, SA, and compressed gas systems to RG 1.68.3 including all sections of the RG except for C.7.

(2) Revise DCD Subsections 14.2.12.1.91 and 14.2.12.1.92 to address all necessary aspects of RG 1.68.3.

(3) Provide a new preoperational test to test the compressed gas system, including the nitrogen, hydrogen, and oxygen sub-systems.

DCD Section 9.3.1.2.1.1, "Instrument Air System," states that: "Provisions are made to cross-connect the IAS and SSAS at the distribution header upstream of the dryers. In event that the instrument air compressors cannot meet the demand for instrument air, the station service air compressors will provide a backup supply of air." The SA System, therefore, falls within the scope of RG 1.68.3 and should be tested to this RG just as the IA System is tested. Further, this statement in the DCD seems to conflict with Acceptance Criterion D.5 of DCD Subsection 14.2.12.1.91, "Instrument Air System Preoperational Test" (refer to Section C.9 of RG 1.68.3).

MHI needs to:

(4) Reconcile the excerpt from DCD Section 9.3.1.2.1.1 with acceptance criterion D.5 of DCD Subsection 14.2.12.1.91.

Section C.8.a of RG 1.68.3 calls for a sudden loss of air pressure test and Section C.8.b calls for a gradual loss of air pressure test to verify that important to safety air-operated loads respond in accordance with their design on a loss of air pressure. The RAI response states that the: "US-APWR does not perform the gradual reduction pressure test because the sudden air pressure shutoff test verifies that the affected components respond properly." The purpose of C.8.b is to verify that the components do in fact operate as designed on a gradual loss of pressure. Just stating that they do operate that way by design does not meet the intent of the RG to verify that by testing.

MHI needs to:

(5) Revise DCD Subsection 14.2.12.1.91 to incorporate the gradual loss of air pressure test recommended in Section C.8.b of RG 1.68.3.

Section C.11 calls for functional testing of air systems important to safety to ensure that credible failures resulting in an increase in the supply system pressure will not cause loss of operability. MHI's response to RAI 33 Question 14.02-78 states that C.11 does not apply because the US-APWR does not have an important-to-safety instrument and control air system. The NRC staff does not agree with this interpretation. First, the set of safety-related components and systems is a subset of the larger set of important-to-safety systems and components. Second, Section A of footnote 1 of RG 1.68.3 describes that the RG applies to compressed air and other compressed gas systems that supply loads that could affect the overall safety and performance of the plant. This certainly applies to the US-APWR Instrument Air, which has safety-related loads listed in Table 9.3.1-1. The Service Air System can also supply these loads. And the Compressed Gas System supplies nitrogen and hydrogen to the safety injection accumulators, the pressurizer relief tank, the radwaste tanks, waste gas analyzer, and the volume control tank (VCT) for injection into the RCS. The staff does note that some testing at overpressure appears to be conducted in DCD Subsection 14.2.12.1.91, step C.5, despite the exception to Section C.11 of RG 1.68.3.

MHI needs to:

(6) Revise DCD Subsections 14.2.12.1.91 and 14.2.12.1.92 as required to document conformance to the guidance of Section C.11 of RG 1.68.3.

Further, MHI's response to RAI 33 Question 14.02-78 states that it is not necessary to reference RG 1.68.3 within the test abstracts because the recommendations of the RG are incorporated into the test abstracts. However, that is not completely the case. For example, most of the sections of the RG are addressed in Test 91 but most are not addressed in Test 92. Also, items C.8a and C.8b are not addressed in the test method section of Test 91. The staff notes that there is a statement in Test 91, "Verification of safety-related containment isolation valve position on loss of pressure is described in Subsection 14.2.12.1.62." However, Test 62 does not perform this test, rather lists it as a prerequisite. Also, the containment isolation valves are only a subset of all the safety related air-operated valves of Table 9.3.1-1. There may be additional important-to-safety air-operated valves that need testing that are not listed in this Table.

MHI needs to:

(7) Reference RG 1.68.3 in DCD Subsections 14.2.12.1.91 and 14.2.12.1.92.

(8) Revise the reference to DCD Subsection 14.2.12.1.62 in DCD Subsection 14.2.12.1.91 to reconcile the statement that: "Verification of safety-related containment isolation valve position on loss of pressure is described in Subsection 14.2.12.1.62."

(9) Revise Tests 91 and 92 to include testing of RG 1.68.3 items C.8a and C.8b for all valves and

other components within the scope of the RG; or reference where they are tested.

(BNL 14.02-78/79, Sup. 1)

ANSWER:

(1) With respect to the Instrument Air System (IAS), DCD Subsection 14.2.12.1.91 will be revised to add the requirement that the test is to be in accordance with RG 1.68.3 except for C.7.

With respect to the station service air system (SSAS), MHI considers that the SSAS does not need to be tested in accordance with RG 1.68.3. The reasons are :

- When instrument air is provided from the SSAS using the cross connection, air from SSAS passes through the filter system and dryer system of IAS. By passing through these systems, the air from SSAS can meet the air quality requirements of ANSI/ISA S7.3-R1981.
- SSAS itself does not affect the safety of the plant.
- SSAS does not directly supply loads in specific systems that are important to safety.
- There is no system important to safety that uses Station Service Air.

As for CGS, CGS supplies various systems, but does not have any safety function other than containment isolation. . MHI considers that CGS does not need to be tested in accordance with RG 1.68.3.

(2) As described above, DCD Subsection 14.2.12.1.91 (IAS) will be revised to address all necessary aspects of RG 1.68.3.

(3) Since MHI considers CGS is not needed to be in accordance with RG 1.68.3 as described in (1), a preoperational test for CGS is not needed to address in DCD.

(4) As described in (1): air quality when instrument air is provided from SSAS is assured by using the filter system and the dryer system of IAS. As described in DCD Subsection 9.3.1.2.2, SSAS and IAS compressor units have similar features to deliver high quality air (e.g., oil free rotary screw compressors, moisture separators, automatic air receiver condensate drain). However, SSAS does not supply air directly to IAS components and station service air itself is not required to meet the air quality for IAS. MHI considers C.9 of RG 1.68.3 requires that unqualified air shall not be supplied to IAS components, which is demonstrated by testing the IAS. Therefore, it does not conflict with Acceptance Criterion D.5 of DCD Subsection 14.2.12.1.91.

(5) MHI is in agreement with the NRC's view. DCD Subsection 14.2.12.1.91 will be revised to incorporate the gradual loss of air pressure test.

(6) MHI is in agreement with the NRC's view. DCD Subsection 14.2.12.1.91 C.5 already includes the system pressure increase test. As described in (1), SSAS does not directly supply loads in specific systems that are important to safety. Therefore, DCD Subsection 14.2.12.1.92 need not include a pressure increase test because it would be redundant to the IAS test.

(7) MHI is in agreement with the NRC's view. DCD Subsection 14.2.12.1.91 will be revised to refer to RG 1.68.3. For the reasons stated in (1), DCD Subsection 14.2.12.1.92 need not reference RG 1.68.3.

(8) MHI is in agreement with the NRC's view. The reference to DCD Subsection 14.2.12.1.62 will be revised. The statement "Verification of safety-related containment isolation valve position on loss of pressure is described in Subsection 14.2.12.1.62." will be deleted and the description of the test for all the safety related air-operated components in Table 9.3.1-1 will be added.

(9) As discussed in (1) and (8) above, item A of Subsection 14.2.12.1.91 will be revised to state

that tests are in accordance with RG 1.68.3 except for C.7,and item D will be revised to include the description of the tests for all the safety related air-operated components in Table 9.3.1-1.

Impact on DCD

Revise Subsection 14.2.12.1.91 as follows:

1) Revise the following sentence to item A., Objectives:

~~Verification of safety-related containment isolation valve position on loss of pressure is described in Subsection 14.2.12.1.62.~~
Tests are in accordance with RG 1.68.3 except for C.7.

2) Add the following to item C., Test Method:

6. Test is performed to verify the fail-safe position of safety-related air-operated components for sudden loss of instrument air or gradual loss of pressure as described in Table 9.3.1-1.

3) Add the following to item D., Acceptance Criteria:

7. Positions of safety-related air-operated components are same as shown in Table 9.3.1-1 for sudden loss of instrument air or gradual loss of pressure.

Also, revise DCD Table 1.9.1-1 as follows:

Reg Guide Number	Title	Status	Corresponding Chapter/Section /Subsection
1.68.3	Preoperational Testing of Instrument and Control Air Systems (Rev. 0, April 1982)	Conformance with exceptions. C.7~~, C.11~~: This criterion applies to redundant components and air supplies to meet single failure criteria. This feature does not apply to the US-APWR design because air-operated components important to safety fail to the safe position.~~C.8.b: US-APWR does not perform the gradual reduction pressure test because suddenly air pressure shutoff test can be verified that the affected components respond properly.~~	9.3.1.4, 14.2.7

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

12/18/2008

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 102-1391 REVISION 0**
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QUESTION NO.: 14.02-103

RAI 1391 Question 4931 follows up MHI's original response to RAI 33 Question 14.02-83.

While DCD Table 1.1.1-1 commits to RG 1.140 with no exceptions, DCD Subsection 14.2.12.1.103 for the TSC HVAC System does not commit to fully testing per RG 1.140. There appear to be some areas where the RG is not implemented in the Initial Test Program. MHI needs to revise Subsection 14.2.12.1.103 to commit to full testing per RG 1.140 or explain the reason for areas not met or where alternative standards are used.

(BNL 14.02-83, Sup. 1)

ANSWER:

MHI will revise the DCD changes proposed in response to RAI 33, Question 14.02-83, to clarify RG 1.140 applicability to the TSC HVAC system.

Impact on DCD

This revision impacts Revision 1 of the DCD in Subsection 14.2.12.1.103 on page 14.2-120, as previously revised in response to RAI-33 Question 14.02-83, by addition of item C.5 with the following changes:

5. Testing of ~~prefilters, fans and fan motors, heaters, dampers, and ductwork~~ **the TSC HVAC system** is performed in accordance with RG 1.140 (Reference 14.2-25), and standards referenced by RG 1.140.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

12/18/2008

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 102-1391 REVISION 0**
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QUESTION NO.: 14.02-104

(1) In DCD Section 14.2.12.2.3.8, Item D.2, the word "responses" should be "respond."

(2) In DCD Section 14.2.12.2.4.9, the title of the test abstract is "Operational Alignment of Process Temperature Instrumentation at Power Test." However, in Table 14A-1, items 5.y and 5.s, the test abstract is cited as "Operational Alignment of Process Temperature Instrumentation Test." Please revise Table 14A-1, items 5.y and 5.s to document the proper title of the test abstract in DCD Section 14.2.12.2.4.9.

The test title should be consistent, particularly since there are two tests with similar titles.

(BNL 14.2-75)

ANSWER:

(1) MHI will revise Subsection 14.2.12.2.3.8 to clarify the intended criteria.

(2) MHI will revise Table 14A-1 to correct the test abstract titles for the 5.s and 5.y entries.

Impact on DCD

This revision impacts Revision 1 of the DCD in Subsection 14.2.12.2.3.8 on page 14.2-144 and Table 14A-1 on page 14A-19 and 14A-20

(1) Revise 14.2.12.2.3.8 as indicated (only affected section shown):

D. Acceptance Criteria

1. The spray bypass valves are throttled so that the minimum flow necessary to keep the spray line warm is achieved.

2. The pressurizer **pressure** ~~pressures which~~ responses to the opening of the pressurizer spray valves and to the actuation of all pressurizer heaters are within the limits described in Subsection 5.4.10.

(2) Revise Table 14A-1 as shown (only affected entries shown):

RG 1.68 Appendix A	Section Number	Typical Test
5.s	14.2.12.2.4.8 14.2.12.2.4.9 14.2.12.2.4.10 14.2.12.2.4.16	Automatic Rod Control System Test Operational Alignment of **Process** ~~process~~ Temperature Instrumentation **at Power** Test Thermal Power Measurement and Statepoint ~~Date~~ **Data** Collection Test Load Swing Test Exception The verification of the boron addition systems and emergency feedwater control systems are not performed because the control of these systems is performed by manual control.
5.y	14.2.12.2.4.8 14.2.12.2.4.9 14.2.12.2.4.10 14.2.12.2.4.12 14.2.12.2.4.3	Automatic Rod Control System Test Operational Alignment of **Process** ~~process~~ Temperature Instrumentation **at Power** Test Thermal Power Measurement and Statepoint Data Collection Test RCS Flow Measurement Test Axial Flux Difference Instrumentation Calibration Test and Axial Distribution Oscillation Test

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

12/18/2008

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 102-1391 REVISION 0**
SRP SECTION:	**14.02 – Initial Plant Test Program – Design Certification and New License Applicants**
APPLICATION SECTION:	**14.2**
DATE OF RAI ISSUE:	**11/20/2008**

QUESTION NO.: 14.02-105

The test described in DCD Subsection 14.2.12.2.1.14, "Operational Alignment of Process Temperature Instrumentation Test," was added to the US-APWR DCD as part of Revision 1 to address the alignment of process instrumentation under isothermal conditions prior to criticality. This test is linked to a similar at-power test described in DCD Subsection 14.2.12.2.4.9. However, DCD Subsection 14.2.12.2.1.14 does not appear in Table 14A-1, which cross-references RG 1.68, Appendix A to the US-APWR test abstracts. Please reference DCD Subsection 14.2.12.2.1.14 in Table 14A-1 under items 5.y and 5.s.

(BNL 14.2-76)

ANSWER:

RG 1.68 Appendix A section 5 identifies tests that "should be included in the power ascension test phase". Startup test 14.2.12.2.1.14, Operational Alignment of Process Temperature Instrumentation Test, is performed after fuel loading and prior to initial criticality and is therefore not relevant to items 5.s and 5.y. RG 1.68 Appendix A section 2, Initial Fuel Loading and Precritical Tests, does not include an item related to testing of process temperature instrumentation.

Impact on DCD

There is no impact on the DCD.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

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QUESTION NO.: 14.02-106

RAI 1391 Question 5150 follows up MHI's original response to RAI 12 Question 14.02-3.

DCD, Section 14.2.1, has a paragraph that provides the relevant requirements to which the test program conforms.

Bullet #4 refers to Section III.A.4 of 10CFR50, App. J, but that section does not exist.
Please update by referring to App. J, Option B.

Bullet #5 refers to 10CFR52.79, but that section is for COL applications. Please correct to 52.47 for design certification applications.

(BNL 14.02-3, Sup. 1)

ANSWER:

Response to Bullet #4 Question: MHI will revise Subsection 14.2.1 to reference 10 CFR 50 Appendix J Option B.

Response for Bullet #5 Question: 10 CFR 52.79 lists the requirements for final safety analysis reports. Where a COL incorporates a DCD by reference, the FSAR is composed of the DCD, deviations from the DCD and site-specific details. Therefore, to the extent possible, the DCD is prepared to comply with 10 CFR 52.79 using the guidance provided by RG 1.206. RG 1.206 identifies the recommended content of FSARs, and includes 10 CFR 52.79 in section C.I.14.1. 10 CFR 52.79 requires that the FSAR include "Plans for preoperational testing and initial operations" in item (a)(28). 10 CFR 52.47 does not identify a similar requirement for DCDs. Therefore, MHI considers that the DCD description of the Initial Test Program in section 14.2 conforms to the requirement of 10 CFR 52.79 as it relates to preoperational testing and initial operations, as stated in subsection 14.2.1 and consistent with RG 1.206.

Impact on DCD

This revision impacts Revision 1 of the DCD in Subsection 14.2.1, second paragraph, fourth bullet

on page 14.2-1 as follows:

- **Option B** ~~Section III.A.4~~ of Appendix J of 10 CFR 50 (Reference 14.2-4) as it relates to preoperational leakage rate testing of the containment.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.