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July 10, 2012

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-12194

Subject: MHI's Revised Response to US-APWR DCD RAI No. 523-4246 Revision 2 (SRP 11.02)

Reference: 1) "Request for Additional Information No. 523-4246 Revision 2, SRP Section 11.02 –Liquid Waste Management System: 11.2", dated January 26, 2010 (ML100320056).
1) "MHI Response to US-APWR DCD RAI No. 523-4246 Revision 2, MHI letter UAP-HF-10072, dated March 15, 2010 (ML100770379).

With this letter, Mitsubishi Heavy Industries, Ltd. ("MHI") transmits to the U.S. Nuclear Regulatory Commission ("NRC") a document entitled "Revised Response to Request for Additional Information No. 523-4246 Revision 2 (SRP 11.02)."

Enclosed is the revised response to Question 11.02-32 contained within Reference 1. The enclosed response supersedes the previous response to Question 11.02-32 transmitted in Reference 2 in its entirety. The responses to the other questions contained within Reference 2 are not altered by this submission.

Please contact Mr. Joseph Tapia, General Manager of Licensing Department, Mitsubishi Nuclear Energy Systems, Inc. if the NRC has questions concerning any aspect of this submittal. His contact information is provided below.

Sincerely,

Y. Ogata

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

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NRO

Enclosure:

1. Revised Response to Request for Additional Information No. 523-4246 Revision 2 (SRP 11.02)

CC: J. A. Ciocco
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Enclosure 1

UAP-HF-12194
Docket No. 52-021

Revised Response to Request for Additional Information
No. 523-4246 Revision 2 (SRP 11.02)

July 2012

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

7/10/2012

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 523-4246 REVISION 2**
SRP SECTION:	**11.02 – Liquid Waste Management System**
APPLICATION SECTION:	**11.2**
DATE OF RAI ISSUE:	**01/26/2010**

QUESTION NO. : 11.02-32

Staff review of DCD Tier 1, Revision 2, Section 2.7.4.1 and Table 2.7.4.1-1 found that information on ITAAC for the LWMS to demonstrate compliance with 10 CFR 52.47(b)(1) and to provide reasonable assurance that a plant that incorporates the US-APWR design certification and operates in accordance with the design certification will meet the provisions of the Atomic Energy Act and NRC regulations was not fully described. Without confirming the initial introduction of the proper types and amounts of filtration and adsorbent media, the LWMS would fail to meet the design criteria in the DCD Tier 2, Revision 2, Section 11.2.1.2. As a result, liquid releases could exceed 10 CFR 20, Appendix B, Table 2, effluent concentration and dose limits, and 10 CFR 50, Appendix I dose objectives. The staff requests the applicant to address the following:

1. Describe in DCD Tier 1, Section 2.7.4.1.1, how the LWMS is designed to process liquid waste prior to release and ensure compliance with 10 CFR 20, Appendix B, Table 2 effluent concentration and dose limits, and 10 CFR 50, Appendix I dose objectives for liquid effluents when the plant is operational.

2. Describe in DCD Tier 1, Section 2.7.4.1.1, the process design of the LWMS subsystems and how the initial loading of the subsystem demineralizers and vessels includes the appropriate of types of filtration and adsorption media that will meet or exceed the decontamination factors listed in DCD Tier 2, Revision 2, Table 11.2-7. Provide in DCD Tier 1, Table 2.7.4.1-1, the assigned ITAAC to confirm the filter efficiency and demineralizer media.

3. Provide in DCD Tier 1, Table 2.7.4.1-1, the assigned ITAAC to confirm the radiation monitor and dual isolation valves installed on the sole discharge line to monitor and control effluents to the environment, source test of the radiation monitor, alarms, indications, and automatic initiation functions as described in DCD Tier 1, Revision 2, Section 2.7.4.1.1 and DCD Tier 2, Revision 2, Sections 11.2.2.1 and 11.5.2.5.1.

Please revise the DCD to include this information and provide a markup.

ANSWER:

The LWMS is designed to use cartridge filter (Ultipleat Filter by Pall Corporation, or approved equivalent) with a nominal micron rating of 6 to remove suspended particulates followed by ion exchange to remove dissolved ions. The design uses mixed cation and anion resin in proper ratios (Dowex MR-3 LC NG, or approved equivalent) in the mixed bed ion exchange columns. The filtration and ion exchange technologies have been in use in the nuclear industry and their performances on removal of contaminants are commercially proven. To insure operability and adequate removal to meet 10 CFR Part 20, Appendix B and 10 CFR Part 50, Appendix I, multiple filter and ion exchange columns, and their associated piping and instrumentation are included in the design and the columns are located inside shielded cubicles for ALARA considerations The LWMS shall have sampling provision to confirm the treated effluent meeting 10 CFR Part 20, Appendix B, Table 2 before discharge. The LWMS shall also have recycle capability in order to reprocess liquid in the event that it does not meet the Appendix B requirements. In addition, the LWMS shall have radiation element to monitor discharge. In the event that the effluent exceeds a predetermined setpoint, the radiation element shall close the discharge valves and initiates an alarm for operator actions.

1. As part of the Tier 1 improvement effort, DCD Revision 3 incorporated many changes to Tier 1, including Section 2.7.4.1. These changes were made to improve the inspectability of the ITAAC, to align the Tier 1 information with Tier 2 information, and to ensure that Tier 1 was consistent with NRC SRP guidance and NRC RIS 2008-05 R1. Additionally, changes will be made to ITAAC Table 2.7.4.1-1, item 6 in response to NRC RAI 942-6476, question 14.03.07-74 to focus on verifying that as-built filter sizes, types and volumes and as-built demineralizer decontamination factors (DFs) meet the design basis. The DCD Revision 3, Tier 1, Section 2.7.4.1 with the additional changes incorporated to address RAI 942-6476 question 14.03.07-74 are shown in Attachment 1. These changes provide adequate verification of key design features of the LWMS to ensure that liquid effluent releases meet regulatory requirements, namely that the filters and demineralizers can provide the DFs specified in the design basis (i.e., Tier 2)..

2. The demineralizers are procured with a certain capability to remove ionic species and impurities to meet requirements in NRC Regulations 10 CFR Part 20 and 10 CFR Part 50, Appendix I, to ensure that the decontamination factors for effluent meet or exceed the recommended values provided in NUREG 0017 (repeated in DCD Table 11.2-7). Thus, initial filtration and ion exchange media are specified to be provided by the equipment manufacturers; performance data (including decontamination factors) of the media in similar nuclear applications, and/or media test reports are also required to be submitted by the equipment manufacturers during bid evaluation processes. In addition, engineering review of the vendor design, and pressure and/or hydrostatic tests are also specified. During equipment delivery, inspection of the types, the quality, and the volume of filtration and demineralizer media will be conducted for acceptance. Procedures for loading the media will be prepared to insure that the media loading meets the design and the corresponding vendor specifications for the filter and demineralizer capabilities. These key design features are verified in ITAAC Table 2.7.4.1-1 item 6 as described above in item 1. Corresponding changes were made to Tier 2 Section 11.2.1.4 in DCD Rev.3.

3. Liquid radwaste discharge monitor RMS-RE-035 is identified in DCD Tier 1 Table 2.7.6.6-1 of Process Effluent Radiation Monitoring and Sampling System (PERMS) equipment, and is subject to the functional arrangement ITAAC Item 1 of Table 2.7.6.6-2. Table 2.7.4.1-1 ITAAC Item 2 requires the LWMS discharge valves to close in response to an LWMS effluent discharge isolation signal.

Impact on DCD

As part of the DCD Tier 1 improvement effort, DCD Revision 3 incorporated many changes to the Tier 1 Section 2.7.4.1.1 Design Description and Table 2.7.4.1-1, Liquid Waste Management System Inspections, Tests, Analyses, and Acceptance Criteria. Additionally, changes to ITAAC Table 2.7.4.1-1, item 6 will be made in response to NRC RAI 942-6476, question 14.03.07-74 to focus on verifying that as-built filter sizes, types and volumes and as-built demineralizer decontamination factors (DFs) meet the design basis. The DCD Revision 3, Tier 1, Section 2.7.4.1 with the additional changes incorporated to address RAI 942-6476 question 14.03.07-74 are shown in Attachment 1.

The following text was added in DCD Tier 2, Revision 3, to the end of Section 11.2.1.4 Method of Treatment:

"The demineralizers are procured with a certain capability to remove ionic species and impurities to meet requirements in NRC Regulations 10 CFR Part 20, Appendix B and 10 CFR Part 50, Appendix I, to ensure that the effluent releases do not exceed regulatory limits (Table 11.2-7). Thus, an inspection of the amount of filtration and demineralizer media will be conducted to verify that the loading meets the vendor recommended loading for the demineralizer capabilities as specified in the vendor material, such as a vendor manual, for the equipment.

Replacement filters, charcoal, and resins will be purchased to meet performance standards which support overall system decontamination factors listed in Table 11.2-7."

Impact on R-COLA

There are no impacts on the R-COLA.

Impact on S-COLA

There are no impacts on the S-COLA.

Impact on PRA

There is no impact on the PRA

Impact on Technical / Topical Reports

There is no impact on the Technical / Topical Reports.

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

2.7.4 Radwaste Systems

2.7.4.1 Liquid Waste Management System (LWMS)

2.7.4.1.1 Design Description

The LWMS is a non safety-related system. The reactor coolant drain tank and the containment vessel sump discharge piping penetrate the PCCV pressure boundary and include safety-related containment isolation valves as described in Section 2.11.2. The LWMS monitors, controls, collects, processes, handles, stores, and disposes of liquid radioactive waste generated during normal operation, including anticipated operational occurrences (AOOs). The LWMS ensures that liquid waste releases comply with 10 CFR 20, Appendix B, Table 2, effluent concentration and dose limits, and 10 CFR 50, Appendix I dose objectives for liquid effluents.

The LWMS is located in the containment, the auxiliary building (A/B), and the reactor building (R/B).

The LWMS subsystems separately process liquid wastes from various sources in the most appropriate manner for each type of waste. These subsystems are interconnected to provide processing flexibility and redundancy.

The LWMS subsystems include:

- Equipment and floor drain subsystem
- Detergent drain subsystem
- Chemical drain subsystem
- Reactor coolant drain subsystem

The LWMS segregates, collects, and treats liquid waste using ion exchanger columns and filters to reduce radioactivity to levels acceptable for release or re-use.

1. The functional arrangement of the LWMS is as described in the Design Description of Subsection 2.7.4.1.1 and Table 2.7.4.1-2.
2. Upon receipt of a high radiation signal above the pre-determined setpoint, the LWMS discharge valves close automatically.
3. Deleted.
4. Deleted.
5. Deleted.
6. LWMS filters and demineralizers identified in Table 2.7.4.1-2 ~~have~~provide the capacity to maintain radioactivity releases within regulatory limits. DCD_11.02-32
7. An alarm from the liquid radwaste discharge radiation monitor is provided in the MCR.

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

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

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