

REQUEST FOR ADDITIONAL INFORMATION 523-4246 REVISION 2

1/26/2010

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

SRP Section: 11.02 - Liquid Waste Management System

Application Section: 11.2

QUESTIONS for Health Physics Branch (CHPB)

11.02-28

Staff review of DCD Tier 2, Revision 2, and the RATAF code input/output files for the failed tank evaluation (10 liquid containing tanks) in Sections 11.2.3 and 2.4.13 (RAI 403-3027, Question 11.02-20, item 4, dated July 15, 2009) found that information on liquid containing tanks for compliance with 10 CFR 50.34a, 10 CFR 20.1301 and 20.1302, and Appendix B, Table 2 of 10 CFR 20, and Appendix I to 10 CFR 50 was not fully described. The staff requests the applicant to address the following:

1. Please provide details on the design features such as structure, capacity, etc. (or pointers to DCD sections and/or tables) on the boric acid evaporator (1,770 gal BA Evap) and primary water makeup tank (140,000 gal PMT) evaluated using the RATAF code.
2. The RWSAT volume is inconsistent with the input volume used in the RATAF code, the volume in DCD Tier 2, Revision 2, Section 6.3.2.2.3, and the volume calculated from the tank radius and length in DCD Tier 2, Revision 2, Table 12.1-1. Please clarify the RWSAT volume.
3. Describe the design features used to minimize facility and environment contamination for liquid containing tanks given the guidance of RG 4.21 and acceptance criteria of SRP Section 11.2 and BTP 11-6.
4. The RATAF code referenced in NUREG-0133 in BTP 11-6 calculates liquid tank and receptor concentrations based on 1% failed fuel. Further reducing RATAF liquid tank concentrations to 0.12% for an evaluation of the respective radionuclide ECLs at the critical receptor does not ensure that the "highest potential radioactive material inventory is selected among the expected types of liquid and wet waste streams processed by the LWMS," and neither results in the "highest concentrations of radioactive materials at the nearest potable water supply located in an unrestricted area" in accordance with BTP 11-6. Independent staff calculations on evaporator tank concentrations using the US-APWR design basis source term corrected for a fuel defect of 0.12%, information from applicant responses, and guidance in SRP Sections 11.2 and 2.4.13, BTP 11-6, NUREG-0133 and NUREG-0017 result in higher tank inventories and ECL fractions. For the US-APWR design and site-specific applications, the staff requests that the applicant add in Table 11.2-17 the failed tank concentrations calculated by the RATAF code based on 1% failed fuel for the HT, WHT, and BAT, identify the corresponding RATAF calculated ECL fractions at the critical receptor, and discuss these results in Sections 11.2.3.2 and 2.4.13 for the failed liquid tank evaluation.

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

11.02-29

Staff review of DCD Tier 2, Revision 2, Sections 11.4.6 and responses to the staff's questions (RAI 401-3031, Revision 0, Question 11.04-18, dated July 15, 2009; RAI 403-3027, Revision 0, Questions 11.02-18 and 11.02-19, dated July 15, 2009) found that information on the concrete epoxy coating systems used to line equipment and tank cubicles in the LWMS (Section 11.2), and tank cubicles and SRST rooms in the SWMS (Section 11.4) for compliance with 10 CFR 50.34a and 10 CFR 20.1406 was not fully described. In the responses, it states that the DCD will be revised to establish upper tier maintenance and inspection criteria for Service Level II coatings used in the LWMS cubicles and SWMS rooms consistent with RG 1.54, Revision 1. The staff requests the applicant to address the following:

1. The responses provide design information on typical Service Level concrete coating systems such as coating types, dry film coating thicknesses, and specific permeabilities, etc. that will be considered, but this information was not included in the proposed revisions of DCD Tier 2, Revision 2, Sections 11.2 and 11.4. Please include this design information on the coating systems.
2. The responses state that an Initial Test Program (ITP) will be utilized for the coating systems using normal construction testing practices with qualified coating inspections in guidance with ASTM D4537-04a, but this information was not included in the proposed revision of DCD Tier 2, Revision 2, Chapter 14. Please clarify the statement in utilizing an ITP on the coating systems in DCD Tier 2, Chapter 14.
3. Please describe in DCD Tier 2 Sections 11.2 and 11.4 how the technical procurement and the construction and inspection activities for coating systems, and the operational maintenance and assessment program (i.e., in-service coatings monitoring program) will be addressed by the COL applicant using guidance in ASTM D5144-08, ASTM D3843-00 (Reapproved 2008), ASTM D4537-04a, ASTM D5163-03 (Reapproved 2008), ASTM D1653-08, ASTM D5163-03 (Reapproved 2008), RG 1.54, and EPRI Report TR-109937.
4. DCD Tier 2, Revision 2, Section 11.4.6 (with pointer in Section 11.4.1.3) describes testing and inspection requirements for the SWMS such as preoperational tests, initial testing, and epoxy coating requirements such as QA, selection, qualification, testing, maintenance and inspection, conformance to guidance documents, etc., but a similar section which describes testing and inspection requirements is absent for the LWMS. Please include a Testing and Inspection Requirements section in Section 11.2.

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

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11.02-30

Staff review of DCD Tier 2, Revision 2, Sections 11.2.3 and 11.3.3, and Tables 11.2-9 and 11.3-4 found that the basis for applying the built-in plant capacity factor value of 0.8 (80%) in the PWR-GALE and RATAF computer codes for compliance with 10 CFR 50.34a, 10 CFR 20.1301 and 20.1302, and Appendix B to 10 CFR 20, and Appendix I to 10 CFR 50 was not fully described. Please discuss the impacts on the calculated annual radioactive effluent release rates and radionuclide concentrations, and the subsequent public doses from normal routine releases and AOOs from applying the built-in plant capacity factor of 80% in the PWR-GALE and RATAF codes. Similarly, please discuss these impacts on the failed liquid tank evaluation. The discussions should identify the expected plant capacity factor for the US-APWR design, acknowledge that the current fleet of operating reactors is operating at factors in excess of 90%, and address whether the calculated annual radioactive effluent release rates, radionuclide concentrations, and subsequent public doses need to be increased due to a higher plant capacity factor. Please revise the DCD to include this information and provide a markup.

11.02-31

Staff review of DCD Tier 2, Revision 2, Sections 11.2.2.1 and 14.2.12.1.80 found that information on the Test Method and Acceptance Criteria in the ITP for the LWMS was not fully described. Section 11.2.2.1 describes verification of manual and automatic system controls on key system alarms such as high-level alarms associated with liquid tanks simultaneously activated in the MCR, and other alarms such as radiation monitor and dual isolation valves to monitor and control effluent discharge to the environment and other indications; however, verification of response to response to normal control, alarms, and indications are not identified in Section 14.2.12.1.80. Please revise the DCD to include this information and provide a markup. (See DCD Tier 2, Revision 2, Sections 14.2.12.1.81, 14.2.12.1.82, and 14.2.12.1.83 as examples.)

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,

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- 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.