REQUEST FOR ADDITIONAL INFORMATION NO. 186-2009 REVISION 1

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US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

SRP Section: 11.02 - Liquid Waste Management System
Application Section: 11.2 - Liquid Waste Management System

QUESTIONS for Balance of Plant Branch 1 (AP1000/EPR Projects) (SBPA)

11.02-8

Standard Review Plan Section 11.2, Acceptance Criteria 5 states, “The LWMS should be designed to meet the anticipated processing requirements of the plant…Systems that have adequate capacity to process the anticipated wastes and that are capable of operating within the design objectives during normal operation, including anticipated operational occurrences, are acceptable.” The staff has reviewed Figure 11.2-1, Sheet 1 of 3 and has identified the following inconsistencies:

A) Node 5 (upstream of the waste holding tanks) has a design flow rate of 50 – 100 gpm and a design temperature of 175 °F. The Containment Vessel Reactor Coolant Drain Tank input to this Node Point has a design flow rate of 120 – 240 gpm and a design temperature of 200 °F. Justify and explain why Node 5 of Figure 11.2-1, Sheet 1 of 3, has a lower design flow rate and design temperature than the containment vessel reactor coolant drain tank input from Figure 11.2-1, Sheet 3 of 3.

B) Node 6 (upstream of waste effluent inlet filters) has a design temperature of 175 °F. Node 7 (downstream of waste effluent inlet filters) has a design temperature of 150 °F. Node 8 (downstream of activated carbon filter) has a design temperature of 175 °F. Justify and explain why Node 7 of Figure 11.2-1, Sheet 1 of 3, has a lower design temperature than Nodes 6 and 8 of Figure 11.2-1, Sheet 1 of 3,

C) Node 8 (downstream of the waste holdup tank (WHT) pumps) has a design flow rate of 90 gpm. Table 11.2-4 states that each of the two WHT pumps has a design flow rate of 200 gpm. Justify and explain why Node 8 of Figure 11.2-1, Sheet 1 of 3, has a lower design flow rate than the two WHT pumps.

D) Node 9 (upstream of the waste monitor tanks (WMT)) has a design temperature of 175 °F. Table 11.2-3 states that the WMT have a design temperature of 150 °F. Justify and explain why Node 9 of Figure 11.2-1, Sheet 1 of 3, has a higher design temperature than provided for the WMT in Table 11.2-3.

E) Node 10 (downstream of the WMT pumps) has a design flow rate of 90 gpm. Table 11.2-4 states that each of the two WMT pumps has a flow rate of 200 gpm. Justify and explain why Node 10 of Figure 11.2-1, Sheet 1 of 3, has a lower design flow rate than provided for the WMT pumps in Table 11.2-4.

F) The piping upstream of Node Point 12 has design temperatures from 150 °F to 200 °F. Node 12 has a design temperature of 175 °F. Explain why Node 12 of Figure 11.2-1, Sheet 1 of 3, has a lower design temperature than its upstream piping.

G) Node 12 has a design flow rate of 30 - 100 gpm. The flow inputs into Node 12 have design flow rates ranging from 15 gpm to 100 gpm. Justify how a design flow rate of 100 gpm is sufficient for Node 12 on Figure 11.2-1, Sheet 1 of 3, given the ranges of inputs.

H) Section 11.2.2 of the DCD states, "The liquid waste processing system equipment drainage and floor drainage processing subsystem consists of four WHTs, two waste holdup tank pumps, two liquid filters, an activated charcoal filter, four ion exchange columns, two waste monitor tanks, and two waste monitor tank pumps to collect treated fluid for analysis." Some of these equipment names are not the same names as those used on Figure 11.2-1, Sheet 1 of 3, of the DCD. Explain why different names are used in Section 11.2.2 of the DCD and in Figure 11.2-1, Sheet 1 of 3.

I) Section 11.2.2.2.5 states, "Spent filter media is transferred as slurry with primary make-up water to the LWMS for further processing and packaging." Justify why this transfer is not shown on Figure 11.2-1, Sheet 1 of 3.

Address the items identified above, and include a markup in the DCD.

11.02-9

Standard Review Plan Section 11.2, Acceptance Criteria 5 states, "The LWMS should be designed to meet the anticipated processing requirements of the plant…Systems that have adequate capacity to process the anticipated wastes and that are capable of operating within the design objectives during normal operation, including anticipated operational occurrences, are acceptable." The staff has reviewed Figure 11.2-1, Sheet 2 of 3 and has identified the following inconsistencies:

A) Table 11.2-4 states that the detergent drain tank pump has a flow rate of 20 gpm and Table 11.2-5 states that the detergent drain filter has a design flow rate of 10 gpm. Explain how the detergent drain filter can have a lower design flow rate than the upstream detergent drain tank pump.

B) The neutralizing agent measuring tank is not listed in Table 11.2-3. Explain why the neutralizing agent measuring tank is not included in Table 11.2-3.

C) Neither Section 11.2.2 of the DCD nor any of the tables mention the two waste effluent strainers, the detergent drain strainers, or the neutralizing agent measuring tank found in Figure 11.2-1, Sheets 1 and 2 of the DCD. Explain why the two waste effluent strainers, the detergent drain strainers, and the neutralizing agent measuring tank are not discussed in Section 11.2.2 of the DCD or included in any of the tables.

D) Section 11.2.2 of the DCD for the detergent drain processing subsystem mentions a detergent drainage tank and a filter. These names do not match the names on Figure 11.2-1, Sheet 2 of 3. Explain why the names are not consistent in Section 11.2.2 and Figure 11.2-1, Sheet 2 of 3.

Address the items identified above, and include a markup in the DCD.

11.02-10

Standard Review Plan Section 11.2, provides guidance on how to meet the requirements of GDC 61, as it relates to the ability of the LWMS design to ensure adequate safety under normal and postulated accident conditions. Standard Review Plan Section 11.2, Acceptance Criteria 5 states, "The LWMS should be designed to meet the anticipated processing requirements of the plant…Systems that have adequate capacity to process the anticipated wastes and that are capable of operating within the design objectives during normal operation, including anticipated operational occurrences, are acceptable." The staff has reviewed Figure 11.2-1, Sheet 3 of 3 and has identified the following inconsistencies:

A) The inputs to the reactor coolant drainage subsystem from the reactor coolant pump (RCP) Number 3 seal leakage, RCS pressurizer relief tank drain, reactor cavity drain, and accumulator drains go to the suction of the containment vessel reactor coolant drain tank (CVDT) pumps in Figure 11.2-1, Sheet 3 of 3. In Figure 11.2-1, Sheet 3 of 3, these inputs are downstream of the CVDT. Section 11.2.2.1.2.1 states that small quantities of reactor-grade water from these locations drain to the CVDT. Given that inputs from the RCP Number 3 seal leakage, RCS pressurizer relief tank drain, reactor cavity drain, and accumulator drains go to the suction of the CVDT pumps and are downstream of the CVDT in Figure 11.2-1, Sheet 3 of 3, justify the discrepancy between Section 11.2.2.1.2.1 and Figure 11.2-1, Sheet 3 of 3.

B) In Figure 11.2-1, Sheet 3 of 3, inputs from the reactor cavity drain and permanent cavity seal drain go to the suction of the CVDT pumps. Section 11.2.2.1.2.3 states that "During refueling, the containment vessel reactor coolant drain tank pumps are used to drain water from the reactor cavity and the fuel transfer canal to the refueling water storage auxiliary tank (RWAST)." Verify that these are the same inputs and pumps.

C) Section 11.2.2 of the DCD states, "The reactor coolant drainage system consists of the CVDT and two containment vessel reactor coolant drain pumps." On Figure 11.2-1 (Sheet 3 of 3), the equipment is called the C/V Reactor Coolant Drain Tank and the CVDT pumps and the system is called the Reactor Coolant Drain System. Explain why the names are not consistent in Section 11.2.2 and Figure 11.2-1, Sheet 3 of 3.

Address the items identified above, and include a markup in the DCD.

11.02-11

Standard Review Plan Section 11.2, Acceptance Criteria 2 states, “The LWMS should be designed to meet the anticipated processing requirements of the plant. Adequate capacity should be provided to process liquid wastes during periods when major processing equipment may be down for maintenance (single failures) and during periods of excessive waste generation.” Standard Review Plan Section 11.2, Review Procedure 2 states, “It will be assumed that the primary means for processing liquid waste is unavailable for 2 consecutive days per week for maintenance. If 2 days of holdup capacity or a primary water processing source is not available for the process stream, it will be assumed that the waste stream is processed by an alternate method or discharged to the environment.”

Tables 11.2-2 and 11.2-19 provide expected inputs to the LWMS, processing times, and holdup capacity. The staff has identified that there is insufficient information regarding the reactor coolant drain subsystem expected inputs, processing time, and holdup capacity. Provide additional details in the DCD and justify how the reactor coolant drain subsystem meets the SRP criteria that processing equipment should be assumed to be unavailable for 2 consecutive days per week.

11.02-12

Standard Review Plan Section 11.2, Acceptance Criteria 2 states, “The LWMS should be designed to meet the anticipated processing requirements of the plant. Adequate capacity should be provided to process liquid wastes during periods when major processing equipment may be down for maintenance (single failures) and during periods of excessive waste generation.” Standard Review Plan Section 11.2, Review Procedure 2 states, “It will be assumed that the primary means for processing liquid waste is unavailable for 2 consecutive days per week for maintenance. If 2 days of holdup capacity or a primary water processing source is not available for the process stream, it will be assumed that the waste stream is processed by an alternate method or discharged to the environment.”

DCD Tables 11.2-2 and 11.2-19 provide expected maximum inputs, tank capacities, and storage times for the equipment and floor drainage, chemical drain, and detergent subsystems. Specifically, the equipment and floor drainage, detergent, and chemical drain subsystems can only store the expected maximum influent for 1.07 days, 1.05 days, and 0.8 days, respectively. In the case of 2 consecutive days of expected maximum influent, the subsystems do not appear to meet the SRP guidance. Clarify in the DCD how the equipment and floor drainage, chemical drain, and detergent subsystems meet the storage requirements given that processing equipment should be assumed to be unavailable for 2 consecutive days per week.

11.02-13

Standard Review Plan Section 11.2, Acceptance Criteria 5 states, “System designs should describe features that will minimize, to the extent practicable, contamination of the facility and environment.”

A) Section 11.2.2.1 of the DCD states, “A radiation detector and dual isolation valves are installed on the sole discharge line to monitor and control effluents to the environment." Table 11.2-18, "Equipment Malfunction Analysis (Sheets 2 of 2)," states that if there is a radiation detector failure on the discharge line that "radiation monitor indication will be lost. The discharge valve will close and prevent further discharge." Section 11.2 of the DCD lacks a clear discussion of the interlocks between the discharge radiation monitor and the dual discharge isolation valves. Provide a description in the DCD of any automatic actuations based on detection of radioactivity levels in the discharge stream or failure of the radiation detector.

B) DCD Section 11.2.2.2.8, "Detergent Drain Subsystem," states: "After processing, the waste is held in the monitor tank(s) where a sample is taken, and if discharge standards are met, the waste is discharged off site." Confirm in DCD Section 11.2.2.2.8 that the discharge of the detergent drain subsystem is upstream of the radiation detector in the discharge header.

11.02-14

The general design criteria specified in section 6.1.4 of Regulatory Guide 1.143 states, "The acceptability evaluation should be based on the requirements of the codes and standards given in Table 1, using the capacity criteria in Table 4."

The "Inspection and Testing" codes from Table 11.2-1 of the DCD for tanks (0-15 psig) and atmospheric tanks are API 620 and API 650, respectively. The "Inspection and Testing" codes from Table 1 of Regulatory Guide 1.143 for tanks (0-15psig) and atmospheric tanks are API 650 and API 620, respectively. Provide justification in the DCD why the "Inspection and Testing" codes for the Tanks (0-15 psig) and atmospheric tanks components from Table 11.2-1 of the DCD, differ from the Table 1 "Inspection and Testing" codes given in Regulatory Guide 1.143.

11.02-15

Regulatory Guide 1.143 provides guidance on how to meet the requirements of 10 CFR 50.34(a), and 10 CFR 50, Appendix A, Criterion 60 and 61 with respect to design, construction, installation, and testing the structures, systems, and components of radioactive waste management facilities. Regulatory Position 5, "Classification of Radwaste Systems for Design Purposes," discusses the three safety classes, or classifications, for radwaste management facilities. These classes are RW-IIa (High Hazard), RW-IIb (Hazardous), and RW-IIc (non-Safety).

There is no discussion of these safety classes in Tier 1 Section 2.7.4 or Tier 2 Section 11.2. Provide additional information in the DCD to justify how the guidance in Regulatory Position 5, are met.

11.02-16

Section B of Regulatory Guide 1.143 states, "For the purposes of this guide, the radwaste systems are considered to begin at the interface valves in each line from other systems provided for collecting wastes that may contain radioactive materials and to include related instrumentation and control systems. The radwaste system terminates at the point of controlled discharge to the environment, at the point of recycle to the primary or secondary water system storage tanks, or at the point of storage of packaged solid wastes." Address in the DCD the following issues related to this guidance.

A) Section 11.2.2 of the DCD states, "The boundary of the liquid waste processing system starts at the building sumps and ends at the isolation valve of the discharge lines to a tank or the discharge header." This boundary statement does not include all tank inputs that are not sumps or the piping and equipment downstream of the chemical drain tank.

B) The third paragraph of Section 11.2.2.1.2.3 of the DCD states, "The liquid is transferred via one of two reactor coolant drainage system pumps to the HT. Clarify if the HT refers to the CVCS HT?

C) There is no discussion in Section 11.2 of the DCD about the design provisions to preclude placing the components and structures of the system under adverse vacuum conditions. Provide a discussion about these design provisions.

11.02-17

Standard Review Plan Section 11.2, provides guidance on how to meet the requirements of Appendix A to 10 CFR Part 50 and GDC 60, as it relates to the ability of the LWMS design to control releases of radioactive materials to the environment. Standard Review Plan Section 11.2, Acceptance Criteria 4 states, "The applicant should describe the design features incorporated to prevent, control, and collect the release of radioactive materials due to overflows from all liquid tanks outside containment that could potentially contain radioactive materials. Discuss the effectiveness of both the physical and the monitoring precautions taken." Address in the DCD the following issues related to this guidance.

A) Section 11.2.1.2 of the DCD states, "The waste collection and monitor tanks are provided with an overflow connection at least as large as the inlet." Section 11.2.2.2.2 of the DCD similarly states, "The tanks are equipped with overflows (at least as large as the largest inlet) into the appropriate sumps." Are the waste collection tanks the same tanks shown as the waste holdup tanks in Figure 11.2-1 (Sheet 1 of 3)?

B) Section 11.2.1.4 of the DCD states that "Component connections are butt welded to minimize leakage." Does this apply for the connections for all components in the LWMS and for all piping joints?