MITSUBISHI HEAVY INDUSTRIES, LTD.
16-5, KONAN 2-CHOME, MINATO-KU
TOKYO, JAPAN

March 10, 2009

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-09089

Subject: MHI's Response to US-APWR DCD RAI No. 186-2009 REVISION 1

Reference: 1) "Request for Additional Information No.186-2009 Revision 1, SRP Section: 11.02 – Liquid Waste Management System, Application Section: 11.2" dates February 9, 2009.

With this letter, Mitsubishi Heavy Industries, Ltd. ("MHI") transmits to the U.S. Nuclear Regulatory Commission ("NRC") a document entitled "Response to Request for Additional Information No. 186-2009 Revision 1."

Enclosed is the response to the RAI 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. Response to Request for Additional Information No. 186-2009 Revision 1

CC: J. A. Ciocco
C. K. Paulson

Contact Information
C. Keith Paulson, Senior Technical Manager
Mitsubishi Nuclear Energy Systems, Inc.
300 Oxford Drive, Suite 301
Monroeville, PA 15146
E-mail: ck_paulson@mnes-us.com
Telephone: (412) 373-6466

D081
NRO

Enclosure 1

UAP-HF-09089
Docket Number 52-021

Response to Request for Additional Information No. 186-2009 Revision 1

March 2009

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

3/10/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 186-2009 REVISION 1**
SRP SECTION:	**11.02 – Liquid Waste Management System**
APPLICATION SECTION:	**11.2 – LIQUID WASTE MANAGEMENT SYSTEM**
DATE OF RAI ISSUE:	**2/9/2009**

QUESTION NO. : 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.

ANSWER:

For item A through G, the Table on Figure 11.2-1, all three sheets, indicates design conditions and not operating conditions. The Table will be replaced to show only normal operating conditions in order to address the inconsistencies listed above. Also the statement in Section 11.2 will be revised to say "activated carbon filter" instead of "activated charcoal filter" to address the naming differences given in item H. The name for the Ion Exchangers (Demineralizers) will not be changed, as the two names are equivalent, as identified in Section 11.2.2.2.6.

To address item I, a connection will be added from the Activated Charcoal Filter to remove the spent filter media as slurry.

Impact on DCD

The Table on Figure 11.2-1, all three sheets will be revised to shown normal operating conditions, and not the design conditions. This information is not determined at this time and will be added later in DCD revision.

The statement in the 5th paragraph in Section 11.2.1.4, Section 11.2.1.6 and 2nd paragraph in Section 11.2.2 will be revised to say "activated carbon filter" instead of "activated charcoal filter".

Figure 11.2-1, Sheet 1 of 3 will be revised to add a connection from the activated carbon filter to remove the spent filter media as slurry.

Impact on COLA

There is no impact on the COLA

Impact on PRA

There is no impact on the PRA

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

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

3/10/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 186-2009 REVISION 1**
SRP SECTION:	**11.02 – Liquid Waste Management System**
APPLICATION SECTION:	**11.2 – LIQUID WASTE MANAGEMENT SYSTEM**
DATE OF RAI ISSUE:	**2/9/2009**

QUESTION NO. : 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.

ANSWER:

A) The flow rate for the detergent drain filter is 20 gpm. Table 11.2-5 will be changed to reflect the correct flow rate.

B) The neutralizing agent measuring tank is part of a vendor purchased package to neutralize the chemical drain tank as required. Therefore this information is not available at this time.

C) The strainers are a piping item installed in-line. Per normal industry practice these are stainless steel strainers of a basket-type with 25 micron to 550 micron mesh. These components are not discussed individually in the DCD, but do meet the LWMS requirements. For neutralizing agent measuring tank refer to answer B of this Question.

D) In 11th paragraph in Section 11.2.2 the statement "The detergent drainage and monitor tanks" will be revised to say "The detergent drain and monitor tanks". Section 11.2.2.2.8 describes the Detergent Drain Subsystem. In this section, the equipment is called "detergent drain tank" and "detergent drain filter." These names are consistent with the names of the equipment on Figure 11.2-1, Sheet 2 of 3. Therefore no change to the figure is required.

Impact on DCD

In Table 11.2-5, the detergent drain filter design flow rate will be changed to 20 gpm.

The statement in the 11th paragraph in Section 11.2.2 will be revised to read;
"The detergent drain~~age~~ and monitor tanks and their associated pumps are located at an elevation of -26'-4" in the A/B."

Impact on COLA

There is no impact on the COLA

Impact on PRA

There is no impact on the PRA

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

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

3/10/2009

US-APWR Design Certification
Mitsubishi Heavy Industries
Docket No. 52-021

RAI NO.:	**NO. 186-2009 REVISION 1**
SRP SECTION:	**11.02 – Liquid Waste Management System**
APPLICATION SECTION:	**11.2 – LIQUID WASTE MANAGEMENT SYSTEM**
DATE OF RAI ISSUE:	**2/9/2009**

QUESTION NO. : 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.

ANSWER:

A) RCP Number 3 seal leakage, RCL drainage ACC drainage, Pressurizer relief tank drainage, Reactor cavity drain, Permanent cavity seal drain are sent to downstream piping of CVDT. RCP Number 3 seal leakage is sent to CVDT via outlet of the tank. Other drains are sent to suction of containment vessel reactor coolant drain tank pumps directly. DCD Section 11.2.2.1.2.1 will be revised to state some drains are sent to the suction of the containment vessel reactor coolant drain pump.

B) The CVDT pumps shown on Figure 11.2-1, Sheet 3 of 3, are the same as the "containment vessel reactor coolant drain pumps," discussed in Section 11.2.2.1.2.3. The Reactor Cavity Drain input and the Permanent Cavity Seal Drain input are the same inputs described in the text in Section 11.2.2.1.2.3.

C) As stated in the list of abbreviations in Chapter 1, CVDT stands for C/V Reactor Coolant Drain Tank, therefore the equipment naming is consistent. In Section 11.2.2.1.2, the subsystem is called the "reactor coolant drainage subsystem," which matches the title on Figure 11.2-1. The name of CVDT pumps in Figure 11.2-1 (Sheet 3 of 3) will be changed to "C/V reactor coolant drain pump". Table 11.2-4 also to be revised to change "C/V Reactor Coolant Drain Tank Pumps" to "C/V Reactor Coolant Drain Pumps".

Impact on DCD

The statement in the 2nd paragraph in Section 11.2.2.1.2.1 will be revised to read;
"These liquids drain to the CVDT <u>or to the suction of the containment vessel reactor coolant drain pump</u> which is located inside the containment."

Figure 11.2-1, Sheet 3 of 3 will be revised to change "CVDT pump" to "C/V reactor coolant drain tank pump".

Table 11.2-4 will be revised to change "C/V Reactor Coolant Drain Tank Pumps" to "C/V Reactor Coolant Drain Pumps".

Impact on COLA

There is no impact on the COLA

Impact on PRA

There is no impact on the PRA

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

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

3/10/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 186-2009 REVISION 1**
SRP SECTION:	**11.02 – Liquid Waste Management System**
APPLICATION SECTION:	**11.2 – LIQUID WASTE MANAGEMENT SYSTEM**
DATE OF RAI ISSUE:	**2/9/2009**

QUESTION NO. : 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.

ANSWER:

The Reactor Coolant Drain Subsystem collects waste from the reactor coolant pump (RCP) seal leakages, excess letdown water, inside containment valve leakages, and accumulator (ACC) drainage. The collected liquid waste is stored in the Containment Vessel Reactor Coolant Drain Tank (CVDT) and is subsequently sent under normal operating conditions to the holdup tanks in the CVCS. The collected liquid waste is processed within the CVCS system and is therefore not included in the calculated inventory for the LWMS. Thus the Reactor Coolant Drain Tank acts as a staging tank and there is no processing within the Reactor Coolant Drain Subsystem. If the Reactor Coolant Drain Tank subsystem is not available, the tank content can be drained to the Containment Vessel Sump to be forwarded to LWMS for processing. There is no direct release from the CVCS system.

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.

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

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

3/10/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 186-2009 REVISION 1**
SRP SECTION:	**11.02 – Liquid Waste Management System**
APPLICATION SECTION:	**11.2 – LIQUID WASTE MANAGEMENT SYSTEM**
DATE OF RAI ISSUE:	**2/9/2009**

QUESTION NO. : 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.

ANSWER:

The design basis for the Waste Holdup Tank was based on the requirements in ANSI 55.6 Table 7 for PWR, as stipulated in RG 1.143. The maximum input to the floor drain and equipment drains subsystem is 90,000 gallon per event. From the design standpoint, MHI interpreted that the event referred to is minimally a result of refueling operation during which the reactor cavity or other equipment would be drained and decontaminated. The most conservative approach for tank sizing is under the assumption that this volume of liquid input will flow into the tank in a single occurrence on a continuous basis. Furthermore, Table 7 of ANSI 55.6 states that the frequency of the maximum volume per event occurring is once per year, indicating that this maximum volume would not occur two days in a row. Hence the combined tank capacity is calculated to be 96,000 gallons, each at 24,000 gallon batch capacity. Using the same reference table from ANSI 55.6, the maximum generation rate for shutdown condition is 3000 gallons per day, with the normal generation rate being 40 gallons per day. Each tank can provide up to 8 days (24000 gallons/3000 gallons/day) of the maximum expected input (24,000 gallons) during the shutdown condition, while there are at least two other tanks available on standby or undergoing maintenance. This exceeds the SRP Section 11.2 Acceptance Criterion 2 requirement.

A similar approach was used to determine the tank size for the detergent drain tank. For the detergent drain tank, the normal input is 200 gallons/day, maximum generation rate is expected to be 1,900 gallons/event for shutdown operations. This value is taken from Table 7 of ANSI 55.6 and combines the maximum generation rates for the hot shower hand wash sources. The detergent drain tank is designed to collect personnel showers only, as laundry facility is contracted for offsite services. If the detergent drain tank is not available, the drains can be temporarily directed to the Auxiliary Building floor drain sump to be forwarded to the waste holdup tank for processing. The waste holdup tanks contain large holdup capacity. This flexibility increases the holdup time for detergent drains and satisfies the SRP 11.2 Acceptance Criteria.

The chemical drains tank, sized at 1000 gallons, is used to collect laboratory samples and equipment cleaning using approved chemicals. Generation rate is expected to be very small and slow. In the event that the tank is not available, chemical drains can be collected in drums until the tank is available. The small generation rate and the flexibility of using drums for staging, meets the acceptance criterion as stated.

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

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

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

3/10/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 186-2009 REVISION 1**
SRP SECTION:	**11.02 – Liquid Waste Management System**
APPLICATION SECTION:	**11.2 – LIQUID WASTE MANAGEMENT SYSTEM**
DATE OF RAI ISSUE:	**2/9/2009**

QUESTION NO. : 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.

ANSWER:

A) The Liquid Radwaste Discharge Radiation Monitor, described in DCD Section 11.5.2.5.1, measures the total gamma content in the discharge stream of the LWMS at a location downstream of all the sample tanks and pumps. This radiation monitor is an inline monitor used to measure the total radioactive content in the liquid waste discharge stream before it reaches the discharge header in order to prevent the release of waste with concentrations of radioactive material above the regulatory limits. The discharge isolation valve is under supervisory control and approval is required for the valve to be opened to discharge. In the case that radioactivity in the liquid discharge stream is detected to be above the predetermined setpoint, the monitor pump is automatically shut off and the discharge valve is automatically closed and the corresponding alarm in the Main Control Room is automatically activated.

B) While the processed liquid wastes are held in the Detergent Drain Monitor Tank, a local sample is taken and evaluated for radioactive content. If the sample shows that the radioactive content is below the acceptable limits for release, the processed liquid wastes are discharged. The route of the discharge stream is shown in Figure 11.2-1 Liquid Waste Processing System Process Flow Diagram (Sheet 2 of 3), in which the discharge stream from the Detergent Drain Monitor Tank is transferred via the Detergent Drain Monitor Tank Pump and then routed to upstream of the discharge radiation monitor. Hence the effluent, including the treated and sampled detergent drains, is monitored by the same radiation monitor for discharge. A reference to Figure 11.2-1 (Sheet 2 of 3) will be added to show the proper discharge stream connections.

Impact on DCD

At the end of this Section 11.2.2.2.8 a sentence will be added stating, "The detergent drain subsystem is shown in Figure 11.2-1 (Sheet 2 of 3)."

Impact on COLA

There is no impact on the COLA

Impact on PRA

There is no impact on the PRA

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

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

3/10/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 186-2009 REVISION 1**
SRP SECTION:	**11.02 – Liquid Waste Management System**
APPLICATION SECTION:	**11.2 – LIQUID WASTE MANAGEMENT SYSTEM**
DATE OF RAI ISSUE:	**2/9/2009**

QUESTION NO. : 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.

ANSWER:

The information provided in Table 11.2-1 concerning the codes applied to the "Inspection and Testing" of both 0-15 psig tanks and atmospheric tanks is correct. DCD Table 11.2-1 refers to API 650 for atmospheric tanks and API 620 for tanks rated for pressures 0-15 psig, consistent with the scope and limitations of the current standards. API-650 is intended for atmospheric tanks. Although API 650 has special provisions to allow slightly higher internal pressures using Appendix F of API 650, they are only applicable up to a pressure of 2.5 psig. Reference to API 650 for "Inspection and Testing" of the 0-15 psig tanks is inconsistent with the limitations of the standard.

A transposition error appears to have occurred during preparation of Revision 2 to Regulatory Guide 1.143. Revision 1, Table 1 has consistent references to the API standards for "Design and Construction" and "Inspection and Testing." This revision applies API 650 to atmospheric tanks and API 620 to tanks with rated pressures of 0-15 psig for both applications.

DCD Table 11.2-1 will not be changed at this time.

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

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

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

3/10/2009

US-APWR Design Certification
Mitsubishi Heavy Industries
Docket No. 52-021

RAI NO.:	**NO. 186-2009 REVISION 1**
SRP SECTION:	**11.02 – Liquid Waste Management System**
APPLICATION SECTION:	**11.2 – LIQUID WASTE MANAGEMENT SYSTEM**
DATE OF RAI ISSUE:	**2/9/2009**

QUESTION NO. : 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 RWIIa (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.

ANSWER:

The Solid Waste Management System (SWMS) and the Liquid Waste Management System (LWMS) are housed in the Auxiliary Building. The Auxiliary Building is classified as RW-IIa and is discussed in DCD Revision 1 Section 3.7.2.8.4. Component classifications for the LWMS are presented in DCD Section 3.2, Table 3.2-2, item 15, which are consistent with Table 1 of Regulatory Guide 1.143.
Tier 1 Section 2.7.4.1.1 includes a description of the LWMS seismic and ASME Code Classifications. No additional information is required.

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

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

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

3/10/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 186-2009 REVISION 1**
SRP SECTION:	**11.02 – Liquid Waste Management System**
APPLICATION SECTION:	**11.2 – LIQUID WASTE MANAGEMENT SYSTEM**
DATE OF RAI ISSUE:	**2/9/2009**

QUESTION NO. : 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.

ANSWER:

A) In addition to the description, the boundary of the Liquid Waste Processing System, in accordance with RG 1.143, is also described in the process flow diagrams, which pick up the system boundary at the interface valves for each component from other systems. System interfaces and boundaries are usually presented in details by the associated P&IDs. Section 11.2.2 System Description will be changed in order to clearly define the system boundary.

B) In the third paragraph of DCD Section 11.2.2.1.2.3, the Holdup Tank (HT) referred to is a component of the Chemical and Volume Control System (CVCS). This is indicated on Figure 11.2-1 Reactor Coolant Drainage System Process Flow Diagram (Sheet 3 of 3). Section 11.2.2.1.2.3 will be revised to clarify the name of this tank.

C) The components of the Liquid Waste Management System are not under adverse vacuum conditions as stated in Section 11.2.2 System Description because the system operates at ambient temperature and there is no vacuum induced equipment, such as induced fans or heating devices. Further, the tanks have vents and overflow lines that are open to the cubicle environment. Hence there are no vacuum conditions existing due to component operations.

Impact on DCD

The 1st paragraph in Section 11.2.2 System Description will be changed to read:

"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.~~ interface valves for each of the input streams potentially containing radioactive material from other plant systems as indicated in Figure 11.2-1. For many of these streams, the boundary of the LWMS starts at the respective building sump tank discharge line. The boundary of the liquid waste processing system ends at the isolation valve of the discharge lines to a tank or the discharge header."

The 3rd paragraph in Section 11.2.2.1.2.3 will be revised to say,

"The liquid is transferred via one of two reactor coolant drainage system pumps to the CVCS HT"

Impact on COLA

There is no impact on the COLA

Impact on PRA

There is no impact on the PRA

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

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

3/10/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 186-2009 REVISION 1**
SRP SECTION:	**11.02 – Liquid Waste Management System**
APPLICATION SECTION:	**11.2 – LIQUID WASTE MANAGEMENT SYSTEM**
DATE OF RAI ISSUE:	**2/9/2009**

QUESTION NO. : 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?

ANSWER:

A) DCD Section 11.2.1.2 describes the overflow design of the "waste collection and monitor tanks." The statement encompasses all waste collection and monitor tanks in the LWMS including those collecting radioactive (from equipment and floor drainage), chemical, and detergent wastes. The waste holdup tanks are therefore included in this description as the collection tanks for radioactive wastes. This statement also includes the remainder of the tanks in the equipment and floor drainage, detergent drainage, chemical drainage, and reactor coolant drainage subsystems as listed in DCD Table 11.2-3 and shown in Figure 11.2-1.

B) Section 11.2.1.4 describes the method of treatment for the overall system, showing that butt welding is used for all the component and piping joints in the LWMS except where flanged connections are adopted such as pump suction for easy maintenance.

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

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