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

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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-11432

Subject: **MHI's Response to US-APWR DCD RAI No. 863-6148 Revision 3 (SRP 09.02.06)**

Reference: 1) "Request for Additional Information 863-6148 Revision 3, SRP Section: 09.02.06 – Condensate Storage Facilities, Application Section: 9.2.6, dated November 7, 2011.

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. 863-6148 Revision 3."

Enclosed is the response to 1 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. 863-6148 Revision 3

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NRO

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

Enclosure 1

UAP-HF-11432
Docket No. 52-021

Response to Request for Additional Information No. 863-6148
Revision 3

December, 2011

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

12/15/2011

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 863-6148 REVISION 3**
SRP SECTION:	**09.02.06 CONDENSATE STORAGE SYSTEM**
APPLICATION SECTION:	**9.2.6**
DATE OF RAI ISSUE:	**11/7/2011**

QUESTION NO.: 09.02.06-3

RAI 9.2.6-3

SRP 9.2.6 "Condensate Storage Facilities," Section III, Item 3E makes the following statement concerning outdoor storage tanks, "The outdoor storage tank is designed in compliance with GDC 60 and the guidance of Regulatory Guide 1.143 and has a dike or retention basin capable of preventing runoff if a tank overflows or fails; for a non-safety related storage facility, the need for a seismic Category 1 dike or retention basins is reviewed."
In Part C of the applicants June 09, 2009, response to RAI 9.2.6-2, it is indicated that the dike installed around the US-APWR Condensate Storage Tank (CST) is designed to prevent runoff, is in compliance with Regulatory Guide 1.143, but is not designed to seismic Category 1.
While equipment, components, and structures used to collect, process, and store radioactive waste need not be designed to seismic criteria, a failure of the CST, as a result of a seismic event, may result in flooding that impacts safety-related SSCs, if the dike or retention basin also fail as a result of the seismic event. Therefore, the CST must also adhere to the requirements of GDC 2, in that flooding resulting from the failure of the CST should not have an adverse effect on safety-related SSCs.

Also, the staff noticed that in DCD Table 1.9.2-9 "US-APWR Conformance with Standard Review Plan Chapter 9 Auxiliary Systems," the applicant indicated that SRP section 9.2.6 did not apply to the US-APWR design. Since a CST failure may result in potential for safety-related SSCs to be effected through flooding, and for the release of radioactive materials to the environment, it appears that even though the CST has no safety related function that GDC 2, and GDC 60 are still applicable.

1. Provide justification for the use of the nonseismic dike for the CST. Specifically discuss how GDCs 2 and 60 are met with neither the CST nor the CST dike designed as a seismic Category 1 structure, and update the DCD to include this discussion.
2. Update DCD Table Table 1.9.2-9, to address the relevant regulation that apply to the CST.

ANSWER:

1. The CST receives condensate overflow water from condenser hotwell from its level system and is the normal source of water for makeup to the main condenser and other secondary condensate users. The condensate is treated by the Condensate Polishing System and the Steam Generator Blowdown System for the removal of suspended solids and radionuclides

(except for tritium) to maintain secondary water chemistry. The CST is designed to meet the requirements of RG 4.21 as the condensate includes the primary to secondary leakage in the steam generator. As a result, a dike around the CST, coated with epoxy and equipped with a sump, is provided. The sump has liquid level detection instrument for detection of system overflow, leakage, or tank failure.

The CST is classified as non-safety-related as the system does not perform any safety-related function. Hence, GDC 2 is not applicable. The CST, its dike and the pump house are strategically located away from other structures, systems, and components (SSCs), particularly the safety-related SSCs. The flat site grading in the nuclear island area, and yard drainage from this area, minimizes any adverse impacts on any safety-related SSCs due to the failure of the tank and/or the dike. Hence, the CST and the CST dike are designed as non-seismic.

Under normal operating conditions, including anticipated operational occurrences, the CST is designed to store condensate for plant reuse. There are no planned releases of liquid or gas from the CST. The CST dike is designed with sufficient holdup capacity to retain the liquid and prevent uncontrolled runoff in the event of an accident resulting in a tank failure and release of liquid to the sump. The sump is designed to provide early detection of an overflow or leakage for prompt response. As mentioned earlier, the sump is equipped with a liquid level detection instrument that alarms in the main control room for operator actions if a predetermined liquid level is reached. The liquid will be retrieved via a drain line that connects to the pump house sump to facilitate removal for treatment and/or release. The CST is also designed with a diaphragm that minimizes evaporation from the tank. As GDC 60 is for control of release of radioactive materials to the environment during normal reactor operation and anticipated operational occurrences, GDC 60 is not applicable to the CST.

DCD Subsection 9.2.6.2.4 and Table 12.3-8 are revised to include above discussion.

2. As discussed in response to Item # 1 above, GDC 2 and GDC 60 are not applicable to the CST, and DCD Table 1.9.2-9 need not be revised.

Impact on DCD

See attachment 1 mark-up for DCD Subsection 9.2.6.2.4 and Table 12.3-8.

Impact on R-COLA

There is no impact on the R-COLA.

Impact on S-COLA

There is no impact on the S-COLA.

Impact on PRA

There is no impact on the PRA.

Impact on Technical / Topical Reports

There is no impact on a Technical / Topical Report.

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

The primary makeup water system consists of two PMWTs, each of 140,000 gallon capacity, two 100% capacity primary makeup water pumps, and associated valves, piping, and instrumentation.

All system components meet design code requirements consistent with the component quality group and seismic design classification in provided in Section 3.2.

The DWST, CST, and the PMWTs are non-safety related and non-seismic (Section 3.2.). These tanks have no safety-related function and failure of their structural integrity would not impact the seismic category I SSCs or cause adverse system interaction. A dike is provided for the PMWTs and CST for mitigating the environmental effects of system leakage or storage tank failure.

The CSF system is shown schematically in Figures 9.2.6-1, 9.2.6-2 and 9.2.6-3.

9.2.6.2.1 Demineralized Water Storage Tank

The DWST is the normal source of demineralized water for supplying water CST, the secondary side chemical injection system, condensate polishing system and the emergency feedwater pits. It is also the normal source for supplying deaerated water to primary makeup water tanks and various primary system users, as shown in Figure 9.2.6-1. The DWST also supplies demineralized water to other users, as shown in Figure 9.2.6-2. Makeup to the CST is provided from the DWST.

Design parameters of the DWST are shown in Table 9.2.6-1.

9.2.6.2.2 Demineralized Water Transfer Pumps

Two 100% capacity demineralized water transfer pumps are provided. The demineralized water transfer pumps take suction from the DWST and discharge into a header that supplies demineralized water to various plant users, as shown in Figure 9.2.6-1. Design parameters of the demineralized water transfer pumps are shown in Table 9.2.6-1

9.2.6.2.3 Deaeration Package

The deaeration package reduces the oxygen concentration of the demineralized water.

9.2.6.2.4 Condensate Storage Tank

The CST is the normal source of water for make up to certain plant systems including the main condenser. The CST is a source of water for supply to various locations such as areas near equipment that need water for maintenance and drain tanks. The tank is provided with a diaphragm that is in continuous contact with the tank water to prevent absorption of oxygen from air. The top of the diaphragm is blanketed with deaerated, demineralized water. Makeup to the CST is provided from the DWST. The CST overflow goes to a dike which is provided to control the release of chemicals and radioactive materials. DCD_09.02.06-3

The CST is installed on a steel-reinforced concrete foundation with a concrete retaining wall (dike) surrounding the tank. The foundation and wall are coated with epoxy providing smooth surfaces to facilitate draining leakage or overflow to a sump. In addition, the RCOL2_12.03-12.04-11 S03

concrete foundation beneath the tank is sloped towards the sump within the dike. The sump has liquid detection instrumentation and alarms for operator action to initiate the collection of samples of the liquid. If the liquid is determined to be non-contaminated it will be discharged, and if it is determined to be contaminated, it will be transferred to the Liquid Waste Management System (LWMS) for treatment. In either case, the liquid is drained to a sump within the adjacent pump house to facilitate pump-out for disposal or treatment. The CST has a painted carbon steel cover that extends from the top of the tank to slightly beyond the outer diameter of the dike in order to minimize the collection of rain and snow inside the dike. Liquid inside the dike is sampled for contamination and removed for disposal or treatment. RCOL2_12.03-12.04-11 S02

The CST, the dike and the pump house are located away from other SSCs, particularly from the safety-related SSCs. The liquid will drain (in case of overflow, leakage, or CST failure) from the tank away from any safety-related SSCs due its distance from the SSCs, flat site grading in nuclear island area and yard drainage from this area. DCD_09.02.06-3

The transfer piping running between the CST and the hotwell is single-walled welded stainless steel piping in a coated trench with removable but sealed covers. This design is supplemented by periodic hydrostatic or pressure testing of pipe segments, instrument calibration, and when required, visual inspection and maintenance of piping, trench and instrument integrity, in compliance with the guidance of RG 4.21 and industry operating experience. Design and system features addressing RG 4.21 are captured in Section 12.3.1.3 of the DCD.

Design parameters of the CST are shown in Table 9.2.6-1.

The water chemistry in the CST is maintained in accordance with Table 9.2.6-2.

9.2.6.2.5 Condensate Transfer Pumps

Two 100% capacity condensate transfer pumps are provided. The condensate transfer pumps take suction from the CST and supply condensate to the condenser hotwell and various other users throughout the plant as shown in Figure 9.2.6-1. Design parameters of the condensate transfer pumps are shown in Table 9.2.6-1.

9.2.6.2.6 Primary Makeup Water Tanks

Two 140,000 gallon capacity PMWTs are provided. Each tank is provided with a diaphragm that is in continuous contact with the tank water to prevent absorption of oxygen from air. The top of the diaphragm is blanketed with deaerated, demineralized water. The tanks receive deaerated, demineralized water from the DWST. They also receive distilled water discharged from the boric acid evaporator (subsection 9.3.4). Normally, one tank supplies water to the users, while the other tank is standby. Each tank has sufficient capacity to serve all users. Each tank is provided with level and other instrumentation as shown in Figure 9.2.6-2. Design parameters of the PMWT are shown in Table 9.2.6-1.

The piping to and from the PMW Tank is single-walled stainless steel piping designed to run aboveground and penetrates the building wall directly into the tank. This piping is mostly inside the A/B in pipe chases. For piping between buildings, penetration sleeves

Table 12.3-8 Regulatory Guide 4.21 Design Objectives and Applicable DCD Subsection Information for Minimizing Contamination and Generation of Radioactive Waste (Sheet 16 of 62)

Water Systems **(Note: The "System Features" column consists of excerpts/summary from the DCD)**

Condensate Storage Facility

Objective		System Features	DCD Reference
1	Minimize leaks and spills and provide containment in areas where such events may occur.	The CST is installed on a steel-reinforced concrete foundation with a concrete retaining wall (dike) surrounding the tank. The foundation and wall are coated with epoxy providing smooth surfaces to facilitate draining leakage or overflow to a sump. In addition, the concrete foundation beneath the tank is sloped towards the sump within the dike. The sump has liquid detection instrumentation and alarms for operator action to initiate the collection of samples of the liquid. If the liquid is determined to be non-contaminated it will be discharged, and if it is determined to be contaminated, it will be transferred to the Liquid Waste Management System (LWMS) for treatment. In either case, the liquid is drained to a sump within the adjacent pump house to facilitate pump-out for disposal or treatment. The CST has a painted carbon steel cover that extends from the top of the tank to slightly beyond the outer diameter of the dike in order to minimize the collection of rain and snow inside the dike. Liquid inside the dike is sampled for contamination and removed for disposal or treatment. The CST, the dike and the pump house are located away from other SSCs, particularly from the safety-related SSCs. The liquid will drain (in case of overflow, leakage, or CST failure) from the tank away from any safety-related SSCs due its distance from the SSCs, flat site grading in nuclear island area and yard drainage from this area.	9.2.6.2.4

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Attachment 1 to RAI 863 response (3/3)