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April 24, 2009

Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Attention: Mr. Jeffery A. Ciocco

Docket No. 52-021
MHI Ref: UAP-HF-09195

Subject: MHI's Response to US-APWR DCD RAI No. 276-2043

References: 1) "Request for Additional Information No. 276-2043 Revision 1, SRP Section: 03.02.02 – System Quality Group Classification, Application Section: 3.2.2" dated 3/11/2009.

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. 276-2043 Revision 1."

Enclosed are the responses to questions 3.2.2-1, 2, 4, and 9 of the RAI (Reference 1). Responses to the remaining five questions of this RAI have 60-day response times as agreed to between the NRC and MHI. The responses for these questions will be issued at a later date by a separate transmittal.

Please contact Dr. C. Keith Paulson, Senior Technical Manager, 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,
General Manager- APWR Promoting Department
Mitsubishi Heavy Industries, LTD.

Enclosures:

1. Response to Request for Additional Information No. 276-2043, Revision 1

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

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Docket No. 52-021
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Enclosure 1

UAP-HF-09195
Docket No. 52-021

Response to Request for Additional Information No. 276-2043,
Revision 1

April, 2009

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

4/24/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	NO. 276-2043 REVISION 1
SRP SECTION:	03.02.02 - System Quality Group Classification
APPLICATION SECTION:	03.02.02
DATE OF RAI ISSUE:	03/11/09

QUESTION NO. RAI 03.02.02-1:

DCD Subsection 3.2.2.2 states an exclusion "pursuant to paragraph I(2)..." , whereas RG 1.26, part 1, Quality Group B, which 3.2.2.2 commits to, states "pursuant to paragraph c(2)." Clarify if this is a typographical error and the correct reference is c(2).

ANSWER:

The reference to 10 CFR 50.55a paragraph I(2) is a typographical error, paragraph I(2) should be paragraph c(2). DCD Subsection 3.2.2.2 will be revised accordingly.

Impact on DCD

See Attachment 1 for the mark-up of DCD Section 3.2, Revision 2, changes to be incorporated.

- Change the last sentence of the first paragraph of DCD Subsection 3.2.2.2 to: "Equipment Class 2 applies to water- and steam-containing pressure vessels, heat exchangers (other than turbines and condensers), storage tanks, piping, pumps, and valves that are either (1) part of the RCPB defined in 10 CFR 50.2 (Reference 3.2-1) but excluded from the requirements of 10 CFR 50.55a (Reference 3.2-12) pursuant to paragraph c(2) of that section, or (2) not part of the RCPB but are part of the following:"

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

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Docket No. 52-021

RAI NO.:	NO. 276-2043 REVISION 1
SRP SECTION:	03.02.02 - System Quality Group Classification
APPLICATION SECTION:	03.02.02
DATE OF RAI ISSUE:	03/11/09

QUESTION NO. RAI 03.02.02-2:

DCD Subsection 3.2.2.3 states that Equipment Class 3 is equivalent to RG 1.26, NRC Quality Group C. However, if equivalent, then RG 1.26, section 2, Quality Group C, paragraph (d) is only partially addressed. Discuss where the requirements regarding single component failures for systems located in Seismic Category I structures are addressed or why these requirements are not applicable.

ANSWER:

DCD Subsection 3.2.2.3 identifies systems or portions of systems designated as Equipment Class 3. The systems of Subsection 3.2.2.3, other than Radioactive Waste Management System not covered above, contains or may contain radioactive material and whose postulated failure would result in conservatively calculated potential offsite doses that exceed 0.5 rem to the whole body or its equivalent to any part of the body. Consistent with Regulatory Guide (RG) 1.26, Revision 4, Section C.2.d, Subsection 3.2.2.3 will be expanded to indicate that for those systems located in seismic category I structures, only single component failures need be assumed. No credit is taken for automatic isolation from other components in the system or treatment of released materials unless isolation or treatment capability is designed to appropriate seismic and quality group standards and can withstand loss of offsite power and a single failure of an active component.

Impact on DCD

See Attachment 1 for the mark-up of DCD Section 3.2, Revision 2, changes to be incorporated.

- Add the following text to the end of the forth bullet of Subsection 3.2.2.3: "For those systems located in seismic category I structures, only single component failures need be assumed. No credit is taken for automatic isolation from other components in the system or treatment of released materials unless isolation or treatment capability is designed to appropriate seismic and quality group standards and can withstand loss of offsite power and a single failure of an active component."

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

4/24/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	NO. 276-2043 REVISION 1
SRP SECTION:	03.02.02 - System Quality Group Classification
APPLICATION SECTION:	03.02.02
DATE OF RAI ISSUE:	03/11/09

QUESTION NO. RAI 03.02.02-4:

DCD Subsection 3.2.2.5, Equipment Class 6, states that codes and standards defined in RG 1.143, Table 1 are applied to Class 6 component, implying only codes and standards in Table 1 are being used. This same language also appears in Chapter 11. There is additional design guidance provided in RG 1.143 other than those provided in Table 1. However, there are other parts of the DCD that imply commitment to RG 1.143 as a whole. Clarify if Equipment Class 6 components will be subject to all appropriate design guidance of 1.143 or only those specified in Table 1 of 1.143.

ANSWER:

Components for the radioactive waste management systems are classified Equipment Class 6. The components are designed to conform to all applicable guidelines presented in RG 1.143 as a whole, with particular commitment to follow the quality control provisions presented in Table 1 of RG 1.143 with respect to equipment design and construction, materials, welding, and inspection and testing. As an example, the design and construction of the waste holdup tanks are in accordance with API 650, the material specifications are in accordance with ASME II, welding is in accordance with ASME IX, and inspection and testing are in accordance with API 650. In addition, the design of the waste holdup tanks also follows other guidelines in RG 1.143, such as liquid level monitoring, drains and overflow provision, curbed cubicles, and leak detection (guidelines presented in Section 1.2 of RG 1.143).

Applicable sections in the DCD will be modified to clarify that Equipment Class 6 components will comply with the additional design guidance provided in RG 1.143 along with the Table 1 of RG 1.1.43.

Impact on DCD

See Attachment 1 for the mark-up of DCD Section 3.2, Revision 2, changes to be incorporated.

- Replace the third paragraph of the "Equipment Class 6" section of DCD subsection 3.2.2.5 with:

"The Equipment Class 6 components are designed in compliance with applicable codes and standards and guidance provided in RG 1.143 (Reference 3.2-10)."

- Change Note 3 (6) of DCD Table 3.2-2 to the following: "Codes and standards, and guidelines provided in RG 1.143 (Reference 3.2-10), for design of SSCs for Radwaste Facility"

See Attachment 2 for the mark-up of DCD Chapter 11, Revision 2, changes to be incorporated.

- Add the following as last sentence in the fifth bullet in Subsection 11.2.1.2: "The Equipment Class 6 components are designed in compliance with applicable codes and standards, and guidelines provided in RG 1.143 (Ref. 11.2-3)."

- Add the following as last sentence in Subsection 11.3.2.1: "The Equipment Class 6 components are designed in compliance with applicable codes and standards, and guidelines provided in RG 1.143 (Ref. 11.3-2)."

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

4/24/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

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SRP SECTION:	03.02.02 - System Quality Group Classification
APPLICATION SECTION:	03.02.02
DATE OF RAI ISSUE:	03/11/09

QUESTION NO. RAI 03.02.02-9:

DCD Table 3.2-2 page 3.2-44 identifies Equipment Class 5 for two systems and RG 1.26 is referenced for applicable codes and standards. RG 1.26 does not identify codes and standards for Equipment Class 5 systems that are not one of the four quality groups. Identify the applicable codes and standards for Equipment Class 5. Correct Table 3.2-2 as necessary.

ANSWER:

MHI will revise DCD Table 3.2-2, page 3.2-44 (Sheet 29 of 53) to correct the error. Regulatory Guide (RG) 1.26 does not define the codes and standards to be applied to Equipment Class 5 structures, systems, and components (SSCs). Equipment Class 5 SSC codes and standards are as defined in the design basis for those SSCs. The applicable codes and standards identification number will be changed from "4" to "5" in Table 3.2-2 for the following:

- "Nitrogen gas supply line piping and valves from and including the valves NCS-VLV-041A,B up to and excluding the valves NCS-PCV-1202,1212 and NCS-VLV-045A,B"
- "Chemical addition line piping and valves up to and excluding the valves NCS-VLV-047A,B".

Impact on DCD

See Attachment 1 for the mark-up of DCD Section 3.2, Revision 2. Changes to be incorporated:

- Change Table 3.2-2 Codes and Standards for rows three and four of sheet 29 of 53 from "4" to "5" for rows:
  - "Nitrogen gas supply line piping and valves from and including the valves NCS-VLV-041A,B up to and excluding the valves NCS-PCV-1202,1212 and NCS-VLV-045A,B" and
  - "Chemical addition line piping and valves up to and excluding the valves NCS-VLV-047A,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 responses to the NRC's questions.

- Emergency core cooling
- Post-accident containment heat removal
- Post-accident containment atmosphere cleanup
- Residual heat removal from the reactor and from the spent fuel storage pit (including primary and secondary cooling systems), although Quality Group B includes portions of those systems that are required for their safety functions and that (i) do not operate during any mode of normal reactor operation and (ii) cannot be tested adequately

- Cooling water and seal water systems or portions of those safety-related systems that are designed for the functioning of safety-related components and systems, such as RCPs and the MCR.
- Systems or portions of systems that are connected to the RCPB and are capable of being isolated from that boundary during all modes of normal reactor operation by two valves, each of which is either normally closed or capable of automatic closure.
- Systems, other than RWMS, not covered above, that contains or may contain radioactive material and whose postulated failure would result in conservatively calculated potential offsite doses that exceed 0.5 rem to the whole body or its equivalent to any part of the body. For those systems located in seismic category I structures, only single component failures need be assumed. No credit is taken for automatic isolation from other components in the system or treatment of released materials unless isolation or treatment capability is designed to appropriate seismic and quality group standards and can withstand loss of offsite power and a single failure of an active component.

In addition to the above, the following systems and components designated NRC Quality Group are classified in SRP 3.2.2 (Reference 3.2-16), as Equipment Class 3:

- Emergency power sources (gas turbines)
- Equipment and floor drainage system described in Subsection 9.3.3, SRP Section 9.3.3 (Reference 3.2-18)
- Plant ventilation systems for areas such as the MCR and engineered safety feature rooms
- Safety-related instrument sensing lines described in RG 1.151 (Reference 3.2-9) for classifying instrument sensing lines in terms of the ASME Code, Section III (Reference 3.2-14), Class 3
- Ultimate heat sink (UHS) and supporting systems described in Subsection 9.2.5.

Equipment Class 3 SSCs are classified as seismic category I, and the codes and standards for NRC, Quality Group C are applied. Equipment Class 3 components are designed to meet ASME Code, Section III (Reference 3.2-14), Class 3 requirements and the QA criteria of 10 CFR 50, Appendix B (Reference 3.2-8). Supports are designed and

• Pressure Vessels	ASME Code, Section VIII, Division 1 (Reference 3.2-19)
• Piping	ASME B31.1 (Reference 3.2-20)
• Pumps	Manufacturers' standards
• Valves	ASME B31.1 (Reference 3.2-20)
• Atmospheric Storage Tanks	API-650 (Reference 3.2-21), AWWA D-100 (Reference 3.2-22), or ASME B96.1 (Reference 3.2-23)
• 0-15 psig Storage Tanks	API-620 (Reference 3.2-24)
• Supports	Manufacturers' standards

3.2.2.5 Other Equipment Classes

Equipment Class 5

Equipment Class 5 is assigned to non safety-related components that are not part of the RWMS and not within the purview of RG 1.26 (Reference 3.2-13).

This equipment class is also assigned to non safety-related structures and structural components, instrumentation, controls, and electrical components.

Equipment Class 5 SSCs are classified NS or seismic category II, and 10 CFR 50, Appendix B (Reference 3.2-8) is not applied. Specific quality assurance program controls are applied to non safety-related SSCs, to a degree consistent with their importance to safety (graded approach), as described in Chapter 17. Codes and standards, as defined in the design bases, are applied to equipment Class 5 components.

Equipment Class 6

Equipment Class 6 is assigned to the components of the RWMS.

The seismic category defined in RG 1.143 (Reference 3.2-10) is applied and 10 CFR 50, Appendix B (Reference 3.2-8) is not applied.

~~The codes and standards defined in RG 1.143 (Reference 3.2-10), Table 1, are applied to equipment Class 6 components.~~ The Equipment Class 6 components are designed in compliance with applicable codes and standards, and guidance provided in RG 1.143 (Reference 3.2-10).

Table 3.2-2 Classification of Mechanical and Fluid Systems, Components, and Equipment (Sheet 29 of 53)

System and Components	Equipment Class	Location	Quality Group	10 CFR 50 Appendix B (Reference 3.2-8)	Codes and Standards(3)	Seismic Category	Notes
akeup line piping and valves from and including the valves NCS-VLV-061A,B up to and excluding the valves NCS-VLV-062A,B	4	R/B	D	N/A	4	II	
Makeup line piping and valves from and including the valves NCS-VLV-065A,B up to and including the valves NCS-LCV-1200,1210 and NCS-VLV-062A,B	3	R/B	C	YES	3	I	
Nitrogen gas supply line piping and valves from and including the valves NCS-VLV-041A,B up to and excluding the valves NCS-PCV-1202,1212 and NCS-VLV-045A,B	5	R/B	N/A	N/A	5~~4~~	NS	
Chemical addition line piping and valves up to and excluding the valves NCS-VLV-047A,B	5	R/B	N/A	N/A	5~~4~~	NS	
12. Spent Fuel Pit Cooling and Purification System (SPFCS)							
Spent fuel pit pumps	3	R/B	C	YES	3	I	
Spent fuel pit heat exchangers	3	R/B	C	YES	3	I	
Spent fuel pit filters	4	A/B	D	N/A	4	NS	
Spent fuel pit strainers	4	A/B	D	N/A	4	NS	
Spent fuel pit demineralizers	4	A/B	D	N/A	4	NS	

Table 3.2-2 Classification of Mechanical and Fluid Systems, Components, and Equipment (Sheet 53 of 53)

System and Components	Equipment Class	Location	Quality Group	10 CFR 50 Appendix B (Reference 3.2-8)	Codes and Standards[3]	Seismic Category	Notes
60. Condensate Polishing System (CPS)							
Condensate polisher	4	T/B	D	N/A	4	NS	
Other system components							
Containing secondary coolant	4	T/B	D	N/A	4	NS	
Not containing secondary coolant	5	T/B	N/A	N/A	5	NS	
61. Condensate and Feedwater System (CFS)							
The system components up to the first piping restraint at the interface between the reactor building and the turbine building	4	T/B	D	N/A	4	NS	
62. Secondary side Chemical Injection System (SCIS)							
Secondary chemical injection system components	5	T/B	N/A	N/A	5	NS	

Notes:

1. Seismic category meeting RG 1.143 (Reference 3.2-10) is applied.
2. Seismic category meeting RG 1.189 (Reference 3.2-11) is applied.
3. Identification number for "Code and Standards"

   (1) ASME Code, Section III, Class 1 (Reference 3.2-14)

   (2) ASME Code, Section III, Class 2 (Reference 3.2-14)

   (3) ASME Code, Section III, Class 3 (Reference 3.2-14)

   (4) RG 1.26 (Reference 3.2-13), Table 1, Quality Standards

   (5) Codes and standards as defined in design bases

   (6) ~~RG 1.143 (Reference 3.2-10), Table 1, Code and Standards for Design of SCC for Radwaste Facility~~ Codes and standards, and guidelines provided in RG 1.143 (Reference 3.2-10), for design of SSCs for Radwaste Facility.

- product leakage levels (i.e., leakage from fuel producing 1% of the reactor thermal power level). The processing capabilities are such that the operation of the plant will not be impaired under these conditions.

- The LWMS is designed so that no potentially radioactive liquids can be discharged to the environment unless they have first been monitored and confirmed to be within acceptable limits. Offsite radiation doses measured on an annual basis will be within the limits of 10 CFR 20 (Ref. 11.2-1) and 10 CFR 50, Appendix I (Ref. 11.2-2).

- The LWMS has cross-connections, adequate storage capabilities and the ability to connect to and return from mobile systems to accommodate anticipated waste surge volumes.

- Interconnections between the LWMS and other plant systems are designed so that contamination of non-radioactive systems are precluded and the potential for uncontrolled and unmonitored releases of radiation to the environment from a single failure are minimized.

- Design features minimize maintenance, equipment downtime, and leakage of radioactive liquid into the building atmosphere. Table 11.2-1 details the equipment codes for design and construction as required in Table 1 of RG 1.143 (Ref. 11.2-3). The Equipment Class 6 components are designed in compliance with applicable codes and standards, and guidelines provided in RG 1.143 (Ref. 11.2-3).

- The waste collection and monitor tanks are provided with an overflow connection at least as large as the inlet. The location of the overflow is above the high-level alarm setpoint. Each cell housing these tanks is designed to contain the contents of the tank in the event that the tank ruptures.

- The LWMS tanks are provided with a vent piping connected to the heating, ventilation, and air conditioning (HVAC) system. (See Chapter 9, Section 9.4) with the exception of the containment vessel reactor coolant drain tank (CVDT), which is routed to the vent header in the gaseous waste management system (GWMS).

- The LWMS is designed in compliance with the as low as reasonable achievable (ALARA) principle for occupational doses. Sufficient shielding is provided for all equipment located in the radiological controlled area (RCA) that could cause unacceptable radiation doses.

- The LWMS is capable of controlling releases of radioactive material within the numerical design objectives of 10 CFR 50, Appendix I (Ref. 11.2-2).

- The LWMS is designed to meet the requirements of 10 CFR 50, Appendix A (Ref. 11.2-4) Criteria 60, 61, and 64 and the guidance of RG 1.143, (Ref. 11.2-3) so that waste can be successfully processed even during natural phenomena events and external man-induced hazard events.

11.3.2.1 Component Description

This section provides a general description of the key GWMS equipment. Specific component design parameters are summarized in Table 11.3-2. Design codes, standards, and materials for construction of these components are summarized in Table 11.3-11, and are consistent with RG 1.143 (Ref. 11.3-2). The Equipment Class 6 components are designed in compliance with applicable codes and standards, and guidelines provided in RG 1.143 (Ref. 11.3-2).

11.3.2.1.1 Waste Gas Compressors

There are two waste gas compressors. The waste gas compressors continuously draw gases from various systems in the plant and compress the gases into the gas surge tanks. One compressor is used for normal operation and is capable of handling the cover gas from a HT. A second compressor is standing by as backup. The waste gas compressors are water sealed centrifugal units and contain gas coolers and moisture separators. The moisture separator level is equipped with a level control valve. Primary makeup water (PMW) is used as seal water during normal operation. Each gas compressor is sized to handle 100% of the rated load during normal operation including AOOs.

11.3.2.1.2 Gas Surge Tanks

Four gas surge tanks are provided. One is normally set up to receive compressed gases from the waste gas compressor. A second gas surge tank is available for discharge. A third gas surge tank is primarily used for temporary storage of cover gas, and the fourth gas surge tank is a backup. The four gas surge tanks are interconnected and any of the four can be used for any of these functions. In addition, each gas surge tank is independent and functions as a redundant unit. In the unlikely event that one is not functional due to a gas explosion, the others remain unaffected.

Each gas surge tank is provided with pressure control valves to automatically isolate the tank when it reaches the predetermined setpoint. The high-pressure signal provides alarms both in the radwaste control room and the MCR.

Each gas surge tank is sized to retain waste gases discharged from the waste gas compressor during normal operation, including AOOs, and plant shutdown conditions. The gas surge tanks are vertical cylindrical tanks and are made of carbon steel.

11.3.2.1.3 Oxygen Analyzer

One oxygen analyzer unit containing dual analyzers and monitors is provided downstream of the waste gas dryer to continuously monitor the concentration of oxygen upstream of the charcoal beds. The oxygen content of the waste stream is controlled to preclude the formation of a flammable mixture.

11.3.2.1.4 Hydrogen/Oxygen Analyzers

Two hydrogen and oxygen gas analyzers monitor the concentrations of hydrogen and oxygen in GWMS components. During normal operation, one is in service to measure the oxygen and hydrogen concentration on a periodic basis and the second one is used