

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

September 14, 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-09446

**Subject:** MHI's Response to US-APWR DCD RAI No. 426-3167 REVISION 1

**Reference:** 1) "Request for Additional Information 426-3167 Revision 1, SRP Section: 09.03.03 - Equipment and Floor Drainage System, Application Section: 9.3.3," dated July 30, 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. 426-3167 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. 426-3167 Revision 1

CC: J. A. Ciocco  
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*D081  
HRO*

Contact Information

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Docket No. 52-021  
MHI Ref: UAP-HF-09446

Enclosure 1

UAP-HF-09446  
Docket Number 52-021

Response to Request for Additional Information  
No. 426-3167 Revision 1

September 2009

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**RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION**

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9/14/2009

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

**RAI NO.:** NO. 426-3167 REVISION 1  
**SRP SECTION:** 09.03.03—Equipment and Floor Drainage System  
**APPLICATION SECTION:** 9.3.3  
**DATE OF RAI ISSUE:** 7/30/2009

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**QUESTION NO. : RAI 09.03.03-15**

**Question Open Item 01**

Upon further review of DCD Section 9.3.3, the staff found that the safety-related ESF equipment room isolation valves do not have any distinctive representation of being safety-related components and are only referred to as "isolation valves" (Section 9.3.3.1.1). In Section 9.3.3.2.2, the component description of the manually-operated valve also did not designate it as a safety-related isolation valve.

GDC 2 is applicable to all safety-related portions being capable of withstanding the effects of natural phenomena. The staff followed SRP 9.3.3, Section III to review the applicant's revision 2 to Figure 9.3.3-1 (submitted on May 14, 2009, in response to Request for Additional Information 299-2036) and notes that the safety-related valves and portions (for example: piping, isolation valves) are not explicitly labeled. Therefore, the staff is unable to determine compliance with GDC 2. Furthermore, the staff requests clarification on the safety designation of the valve on the transfer line between the C/V and R/B.

The staff requests that all references to safety-related isolation valves and piping should be clearly distinguished from non-safety related valves in the DCD Section 9.3.3 and Figure 9.3.3-1. Revise Figure 9.3.3-1 to clearly define component classification and quality class to distinguish between safety and non-safety portions of the EFDS.

**ANSWER**

DCD Subsection 9.3.3.1.1 states that "The equipment and floor drainage systems are not safety-related and serve no safety-related function except the isolation valves installed in the drainage piping from engineered safety feature (ESF) equipment rooms." Accordingly, the valves DS-VLV-001A/B/C/D are safety classification. Figure 9.3.3-1 will be revised to define component classification and quality class to distinguish between safety and non-safety portions of the EFDS. In addition, Figure 9.3.3-1 will incorporate the following changes:

- Add another R/B sump and delete the valve numbered DS-VLV-002 with forming the basemat of R/B rectangularly.
- Add another R/B non-radioactive sump and delete the valves numbered DS-VLV-100 through 102 in the same manner as above.

Safety-related valves of the Liquid Waste Management System for the transfer line between the C/V and R/B are the part of containment isolation valves which classifications were already described in the DCD Tier-2 Section 6.2.4. Therefore, classification for these safety valves will not be discussed in the DCD Teir-2 Section 9.3.3.

#### **Impact on DCD**

- Figure 9.3.3-1 will be replaced with the attachment 1.
- The proposed change on the statement in Item 25 of Table 3.2-2 per the response to RAI 299-2036 Question 09.03.03-2 will be revised to read:

"Drain piping valves related to ESF rooms drain isolation ~~DS-VLV-001A through DS-VLV-002,~~ and ~~DS-VLV-100 through 102~~ DS-VLV-001A through DS-LVL-001D"

#### **Impact on COLA**

There is no impact on the COLA.

#### **Impact on PRA**

There is no impact on the PRA.

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**RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION**

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9/14/2009

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

**RAI NO.:** NO. 426-3167 REVISION 1  
**SRP SECTION:** 09.03.03--Equipment and Floor Drainage System  
**APPLICATION SECTION:** 9.3.3  
**DATE OF RAI ISSUE:** 7/30/2009

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**QUESTION NO. : RAI 09.03.03-16**

**Question Open Item 02**

In order to demonstrate compliance with GDC 60, the applicant must show suitable control to avoid inadvertent transfer of radioactive waste to non-radioactive waste portions of the system. Review of Figure 9.3.3-1, revision 2, indicated that applicant has added two normally-closed valves to the T/B sump discharge. With the figure depicting flow through both non-radioactive and radioactive discharge paths closed off, it is not clear which valve configuration is appropriate for normal operation.

Provide an explanation of the two normally closed valves added to the T/B sump discharge. It is not clear from the schematic whether normal operation will discharge to the A/B sump (FD) or outside the building. The staff requests further clarification on the method used to open the valves for proper configuration in order to avoid cross-contamination.

The applicant is also to discuss whether the connection is inconsistent with the Tier 1 Section 2.7.6.8.1 statement, "The drain systems are designed with no cross-connection between the radioactive and non-radioactive drainage system to prevent contamination due to possible backflow."

**ANSWER**

As stated in DCD, Subsection 9.3.3.2.3, the Turbine Building (T/B) sump collects drains from equipment and floor drainage in the T/B, and non-radioactive sumps in the R/B and the main steam/feed water piping room. During normal operation, these drains are non-radioactive and are sent to outside building waste water treatment system for processing. The T/B sump pump is equipped with a level switch, which automatically starts or stops the pump at preset levels. The switch also opens the discharge valve to the outside building. When a pre-determined contamination level is reached, the radiation monitor initiates a signal to automatically shut off the valve to the outside building, opens the discharge valve to automatically divert the flow to the LWMS via the A/B floor drain sump, and alarms in the MCR. Both valves are designed to be failed close.

The current design is not inconsistent with the Tier 1 statement as the T/B sump (at reference elevation 3' 7") is above the A/B sump (at reference elevation -26' 4"), thus prevents backflow of the radioactive liquid to the non-radioactive drainage system.

#### **Impact on DCD**

- Attachment 1 shows the mark-up of the Figure 9.3.3-1 to add automatic valve operators as indicated in DCD Section 9.3.3.2.3.
- DCD subsection 9.3.3.2.3.D on "Turbine building sump" will be revised as follows to reflect Figure 9.3.3-1 (sheet 2 of 2) information.

"The T/B drain sump collects drain from all equipment and floor drainage in the T/B and non-radioactive drain sump. This sump normally discharges to the WWS for treatment. However, if it should become contaminated, the discharge is automatically diverted to LWMS via the A/B Sump. Radiation monitor located in the Turbine building sump, which alarms in the MCR when a pre-determined contamination level is reached. Upon receipt of a radiation signal the discharge valve is automatically shutoff and the waste water of the sump is pumped to the LWMS via the A/B Sump for treatment, as described described in Chapter 11 Section 11.2."

#### **Impact on COLA**

There is no impact on the COLA.

#### **Impact on PRA**

There is no impact on the PRA.

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**RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION**

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9/14/2009

**US-APWR Design Certification**

**Mitsubishi Heavy Industries**

**Docket No. 52-021**

**RAI NO.:** NO. 426-3167 REVISION 1  
**SRP SECTION:** 09.03.03—Equipment and Floor Drainage System  
**APPLICATION SECTION:** 9.3.3  
**DATE OF RAI ISSUE:** 7/30/2009

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**QUESTION NO. : RAI 09.03.03-17**

**Question Open Item 03**

In order to demonstrate compliance with GDC 60, the applicant must show suitable control to avoid inadvertent transfer or [of] radioactive waste to non-radioactive waste portions of the system. Upon staff review of Figure 9.3.3-1, revision 2, it appears that liquid effluent has a route for draining into either radioactive or non-radioactive sump in the same area of the A/B and R/B.

- Figure 9.3.3-1 (Sheet 1 of 2) shows an equipment and floor drain located in the R/B that drains directly into "R/B Sump" (radioactive). However, Figure 9.3.3-1 (sheet 2 of 2) also shows an equipment and floor drain located in the R/B that drains directly into the "R/B Non-Radioactive Sump" (non-radioactive).
- Figure 9.3.3-1 (Sheet 1 of 2) shows an equipment and floor drain located in the A/B that drains directly into "A/B Sump" (radioactive). However, Figure 9.3.3-1 (sheet 2 of 2) also shows an equipment and floor drain located in the A/B that drains directly into the "R/B Non-Radioactive Sump" (non-radioactive).

The applicant is requested to provide justification for providing floor drains discharging into both radioactive and non-radioactive sumps in the same building and how radioactive waste is precluded from draining into non-radioactive sump.

**ANSWER**

Figure 9.3.3-1 (Sheet 1 of 2) shows the equipment and floor drains located in the radiological controlled area (RCA), and Figure 9.3.3-1 (Sheet 2 of 2) shows the equipment and floor drains located in the non-radiological controlled area (NRCA). The radiological and non-radiological sumps are physically separated by floors and walls, and are located in different areas within the R/B. The R/B sumps in the RCA are located in the plant north, and the R/B sumps in the NRCA are located in the plant south side of the reactor building.



The contents of the RCA sump are directly routed to the Waste Holdup Tanks for processing in the LWMS. The drainage from the NRCA also does not have a route to discharge directly into radioactive sumps. The content from the NRCA R/B non-radioactive sump is pumped to the T/B sump which is equipped with a radiation monitor. From the T/B sump, the fluid can be directed for treatment in the LWMS if the fluid is detected to be radioactively contaminated to a predetermined level. Otherwise, the fluid is pumped to non-radioactive waste water treatment for processing (please also refer to answer to open item 02 of this RAI). A portion of equipment drains of RCA is also designed to be drained directly into non-radioactive sumps. During normal operation, these drains are non-radioactive. These drains are from the non-radioactive liquid side of the component such as the Component Cooling Water System. However there is a possibility that radioactive liquid flows into non-radioactive system in case of CCW component failure. Such contamination can be detected by the radiation monitor in the T/B sump and the fluid is routed to the A/B sump for processing in the LWMS, as discussed above.

Per the above discussion, the design separates radioactive versus non-radioactive drains during normal operation. The design also provides detection and recycle capability to treat contaminated fluid in the event of equipment failure. Also, the RCA sump is directly piped to the LWMS and there is no inadvertent transfer of radioactive waste to non-radioactive waste portions of the system.

**Impact on DCD**

Figure 9.3.3-1 (Sheet 1 of 2) and (Sheet 2 of 2) titles will be revised to differential between the radioactive and non-radioactive sumps. Refer to Attachment 1 for the title revision.

**Impact on COLA**

There is no impact on the COLA.

**Impact on PRA**

There is no impact on the PRA.

ATTACHMENT 1  
to RAI 426-3167

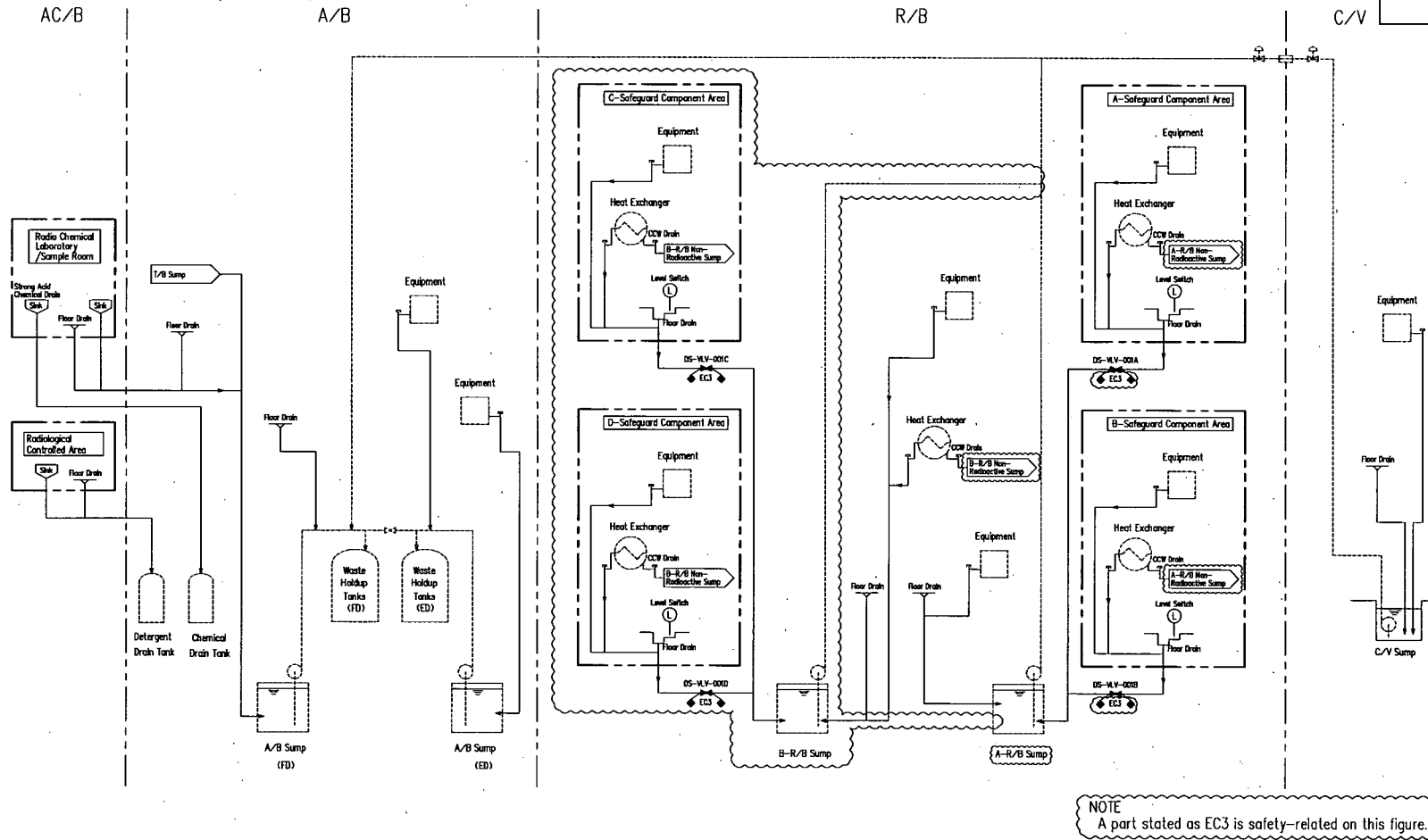


Figure 9.3.3-1 Equipment and Floor Drain System Flow Schematic Radiological Controlled Area (Sheet 1 of 2)

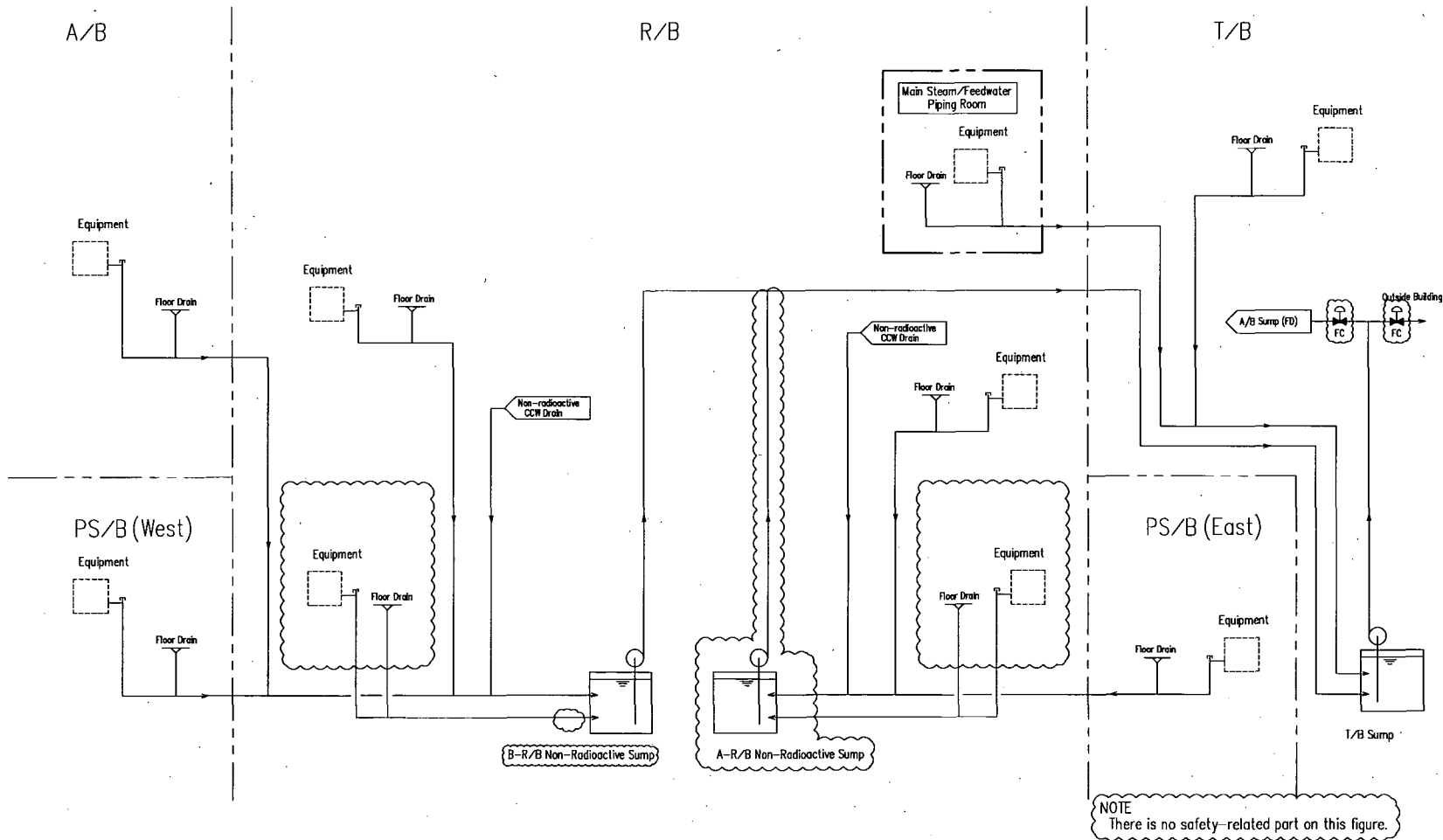


Figure 9.3.3-1 Equipment and Floor Drain System Flow Schematic Non-radiological Controlled Area (Sheet 2 of 2)