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TOKYO, JAPAN

December 09, 2010

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-10330

Subject: MHI's Amended Response to US-APWR DCD RAI No. 579-4481 Revision 2 (SRP 03.04.01)

Reference: 1) "Request for Additional Information No. 579-4481 Revision 2, SRP Section: 03.04.01 – Internal Flood Protection for Onsite Equipment Failures," dated April 28, 2010.
2) "MHI's Responses to US-APWR DCD RAI No. 579-4481 Revision 2" dated May 27, 2010.

With this letter, Mitsubishi Heavy Industries, Ltd. ("MHI") transmits to the U.S. Nuclear Regulatory Commission ("NRC") a document entitled "Responses to Request for Additional Information No. 579-4481, Revision 2."

Enclosed is the amended response to the one (1) RAI contained within Reference 1. The original response to Question 03.04.01-22 is contained within Reference 2. This transmittal completes the response to this RAI.

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.

D081
NRO

Enclosure:

1. Response to Request for Additional Information No. 579-4481, Revision 2

CC: J. A. Ciocco
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Docket No. 52-021
MHI Ref: UAP-HF-10330

Enclosure 1

UAP-HF-10330
Docket No. 52-021

Response to Request for Additional Information No. 579-4481,
Revision 2

December, 2010

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

12/09/2010

US-APWR Design Certification

Mitsubishi Heavy Industries, Ltd.

Docket No. 52-021

RAI NO.: **0579-4481 REVISION 2**

SRP SECTION: **03.04.01 – Internal Flood Protection for Onsite Equipment Failures**

APPLICATION SECTION: **03.04.01**

DATE OF RAI ISSUE: **04/28/2010**

Question No. 03.04.01-22

In the amended May 21,2009 response to request for information (RAI) Question No.3.4.1-06, Mitsubishi stated that the Design Control Document (DCD) Tier 2 will be revised to include a complete list of systems, structures, and components (SSCs) inside the PS/B that require flood protection. A copy of this list has been included as part of Mitsubishi's response. This list contains numerous equipment items, including the Class 1 E turbine generators and Class 1 E batteries. However, neither this list nor the DCD Tier 2 identifies the need to protect electrical interconnections among components (e.g., cables) within the PS/B.

General Design Criteria (GDC) 2 requires in part that "structures, systems, and components important to safety shall be designed to withstand the effects of natural phenomena such as ... floods ... without loss of capability to perform their safety functions." Per Standard Review Plan (SRP) 3.4.1, Item 1.1, the set of SSCs that must be protected from flooding should be reviewed, and therefore, should be identified in the DCD.

Identify the electrical interconnections among components located within the PS/B that require protection from internal flooding (e.g., cables). Include this information in the DCD, identify which revision will include the change, and provide a markup in your response.

Reference: Amended MHI's Responses to US-APWR DCD RAI No. 220-2058; MHI Ref: UAP-HF-09251; Dated May 21, 2009; ML091480377.

Amended Answer:

The complete list of SSCs inside the PS/B that require flood protection is available in DCD Tier 2, Revision 2, Table 3K-4. The electrical interconnections (e.g., cables) servicing the components in the PS/B are not considered as SSCs requiring protection against internal flooding, since the cables on level B1F (elevation -26'-4") are located above the applicable flooding level, and protection is provided for level 1F (elevation 3'-7") by separation and redundancy of other trains/components.

The cables, including the power cable, the control cable and the instrument cable, are routed in cable trays that are elevated above the floor in compartments and corridors of the PS/B, except for some vertical riser segments of cable trays that penetrate the floor of the main level 1F from the lower level B1F.

Electrical interconnections (e.g., cables) servicing components located on lower level B1F of the PS/B are not considered as SSCs requiring protection against internal flooding, since the cables are located above the maximum flood level of 0.6 feet for B1F floor elevation -26'-4".

In addition, the cables to equipment, such as pumps and electrical boards, are routed directly from elevated cable trays or in conduits. Therefore, cables are not affected by floods internal to their compartment.

Cables applicable for safety-related use are factory tested by the voltage test in water (e.g., ICTA T-27-581/NEMA WC 53). In this voltage test, cables are immersed in water for several hours and tested while immersed. These tests confirm it is possible to maintain the functionality of the cable in case of submergence, if unintentional exposure to internal flooding were to occur.

Each compartment on PS/B level 1F is protected from in-flow of flooding from sources outside the compartment by separation walls and water-tight doors. In consideration of postulated flooding inside compartments, components within these compartments are not required to be protected against flooding due to separation and redundancy of other trains/components. In those compartments on level 1F where cable tray risers or stairwells penetrate the floor, any flood waters will drain from level 1F to level B1F, which is designed to protect SSCs from internal flooding.

MHI will revise the DCD to state the reason for the cables being excluded from Table 3K-4.

Impact on DCD

See Attachment 3 for mark-up of DCD Tier 2, Appendix 3K changes to be incorporated.

- Add the following Note 2 to the end of DCD Table 3K-4 Notes:

  "2. The electrical interconnections (e.g., cables) servicing components are excluded as SSCs requiring protection against internal flooding, because the cables in PS/B are located above the internal flooding level and maintain their function in case of any internal flooding."

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.

ATTACHMENT 1
to RAI 579-4481

Table 3K-4 PS/B Components Protected From Internal Flooding
(Sheet 1 of 7)

Item No.	Equipment Tag	Description	Location					Flood Elevation above Floor [ft]	Notes
			Building	Side	Floor Elevation	Fire Zone No.	Location Elevation above Floor		
1	VRS-RFN-251A	A-Class 1E Battery Room Exhaust Fan	PS/B	E	3'-7"	FA3-104-04	N/A	-	1
2	VRS-RFN-251B	B-Class 1E Battery Room Exhaust Fan	PS/B	E	3'-7"	FA3-103-03	N/A	-	1
3	VRS-RFN-251C	C-Class 1E Battery Room Exhaust Fan	PS/B	W	3'-7"	FA3-109-03	N/A	-	1
4	VRS-RFN-251D	D-Class 1E Battery Room Exhaust Fan	PS/B	W	3'-7"	FA3-111-04	N/A	-	1
5	VRS-EHD-251A	Motor Operated Damper	PS/B	E	3'-7"	FA3-104-04	N/A	-	1
6	VRS-EHD-251B	Motor Operated Damper	PS/B	E	3'-7"	FA3-103-03	N/A	-	1
7	VRS-EHD-251C	Motor Operated Damper	PS/B	W	3'-7"	FA3-109-03	N/A	-	1
8	VRS-EHD-251D	Motor Operated Damper	PS/B	W	3'-7"	FA3-111-04	N/A	-	1
9	VRS-EHD-252A	Motor Operated Damper	PS/B	E	3'-7"	FA3-104-04	N/A	-	1
10	VRS-EHD-252B	Motor Operated Damper	PS/B	E	3'-7"	FA3-103-03	N/A	-	1
11	VRS-EHD-252C	Motor Operated Damper	PS/B	W	3'-7"	FA3-109-03	N/A	-	1
12	VRS-EHD-252D	Motor Operated Damper	PS/B	W	3'-7"	FA3-111-04	N/A	-	1
13	VRS-MAH-511A	A-Essential Chiller Unit Area Air Handling Unit	PS/B	E	-26'-4"	FA3-101-01	above flood elevation	0.45	2
14	VRS-MAH-511B	B-Essential Chiller Unit Area Air Handling Unit	PS/B	E	-26'-4"	FA3-102-01	above flood elevation	0.45	2

ATTACHMENT 1
to RAI 579-4481

Table 3K-4 PS/B Components Protected From Internal Flooding
(Sheet 2 of 7)

Item No.	Equipment Tag	Description	Location					Flood Elevation above Floor [ft]	Notes
			Building	Side	Floor Elevation	Fire Zone No.	Location Elevation above Floor		
15	VRS-MAH-511C	C-Essential Chiller Unit Area Air Handling Unit	PS/B	W	-26'-4"	FA3-108-01	above flood elevation	0.60	2
16	VRS-MAH-511D	D-Essential Chiller Unit Area Air Handling Unit	PS/B	W	-26'-4"	FA3-110-01	above flood elevation	0.60	2
17	VRS-MFN-511A	A-Essential Chiller Unit Area Air Handling Unit Fan	PS/B	E	-26'-4"	FA3-101-01	above flood elevation	0.45	2
18	VRS-MFN-511B	B-Essential Chiller Unit Area Air Handling Unit Fan	PS/B	E	-26'-4"	FA3-102-01	above flood elevation	0.45	2
19	VRS-MFN-511C	C-Essential Chiller Unit Area Air Handling Unit Fan	PS/B	W	-26'-4"	FA3-108-01	above flood elevation	0.60	2
20	VRS-MFN-511D	D-Essential Chiller Unit Area Air Handling Unit Fan	PS/B	W	-26'-4"	FA3-110-01	above flood elevation	0.60	2
21	VRS-MCL-511A	A-Essential Chiller Unit Area Air Handling Unit Cooling Coil	PS/B	E	-26'-4"	FA3-101-01	above flood elevation	0.45	2
22	VRS-MCL-511B	B-Essential Chiller Unit Area Air Handling Unit Cooling Coil	PS/B	E	-26'-4"	FA3-102-01	above flood elevation	0.45	2
23	VRS-MCL-511C	C-Essential Chiller Unit Area Air Handling Unit Cooling Coil	PS/B	W	-26'-4"	FA3-108-01	above flood elevation	0.60	2
24	VRS-MCL-511D	D-Essential Chiller Unit Area Air Handling Unit Cooling Coil	PS/B	W	-26'-4"	FA3-110-01	above flood elevation	0.60	2
25	VRS-MEH-511A	A-Essential Chiller Unit Area Air Handling Unit Electric Heating Coil	PS/B	E	-26'-4"	FA3-101-01	above flood elevation	0.45	2
26	VRS-MEH-511B	B-Essential Chiller Unit Area Air Handling Unit Electric Heating Coil	PS/B	E	-26'-4"	FA3-102-01	above flood elevation	0.45	2
27	VRS-MEH-511C	C-Essential Chiller Unit Area Air Handling Unit Electric Heating Coil	PS/B	W	-26'-4"	FA3-108-01	above flood elevation	0.60	2

ATTACHMENT 1
to RAI 579-4481

Table 3K-4 PS/B Components Protected From Internal Flooding
(Sheet 3 of 7)

Item No.	Equipment Tag	Description	Location					Flood Elevation above Floor [ft]	Notes
			Building	Side	Floor Elevation	Fire Zone No.	Location Elevation above Floor		
28	VRS-MEH-511D	D-Essential Chiller Unit Area Air Handling Unit Electric Heating Coil	PS/B	W	-26'-4"	FA3-110-01	above flood elevation	0.60	2
29	VWS-MEQ-001A	A-Essential Chiller Unit	PS/B	E	-26'-4"	FA3-101-01	above flood elevation	0.45	2
30	VWS-MEQ-001B	B-Essential Chiller Unit	PS/B	E	-26'-4"	FA3-102-01	above flood elevation	0.45	2
31	VWS-MEQ-001C	C-Essential Chiller Unit	PS/B	W	-26'-4"	FA3-108-01	above flood elevation	0.60	2
32	VWS-MEQ-001D	D-Essential Chiller Unit	PS/B	W	-26'-4"	FA3-110-01	above flood elevation	0.60	2
33	VWS-MPP-001A	A-Essential Chilled Water Pump	PS/B	E	-26'-4"	FA3-101-01	above flood elevation	0.45	2
34	VWS-MPP-001B	B-Essential Chilled Water Pump	PS/B	E	-26'-4"	FA3-102-01	above flood elevation	0.45	2
35	VWS-MPP-001C	C-Essential Chilled Water Pump	PS/B	W	-26'-4"	FA3-108-01	above flood elevation	0.60	2
36	VWS-MPP-001D	D-Essential Chilled Water Pump	PS/B	W	-26'-4"	FA3-110-01	above flood elevation	0.60	2
37	VWS-MTK-001A	A-Essential Chilled Water Compression Tank	PS/B	E	-26'-4"	FA3-101-01	above flood elevation	0.45	2
38	VWS-MTK-001B	B-Essential Chilled Water Compression Tank	PS/B	E	-26'-4"	FA3-102-01	above flood elevation	0.45	2
39	VWS-MTK-001C	C-Essential Chilled Water Compression Tank	PS/B	W	-26'-4"	FA3-108-01	above flood elevation	0.60	2
40	VWS-MTK-001D	D-Essential Chilled Water Compression Tank	PS/B	W	-26'-4"	FA3-110-01	above flood elevation	0.60	2
41	VWS-TMV-542	Chilled Water Control Valve	PS/B	E	-26'-4"	FA3-101-01	above flood elevation	0.45	2
42	VWS-TMV-552	Chilled Water Control Valve	PS/B	E	-26'-4"	FA3-102-01	above flood elevation	0.45	2

ATTACHMENT 1
to RAI 579-4481

Table 3K-4 PS/B Components Protected From Internal Flooding
(Sheet 4 of 7)

Item No.	Equipment Tag	Description	Location					Flood Elevation above Floor [ft]	Notes
			Building	Side	Floor Elevation	Fire Zone No.	Location Elevation above Floor		
43	VWS-TMV-562	Chilled Water Control Valve	PS/B	W	-26'-4"	FA3-108-01	above flood elevation	0.60	2
44	VWS-TMV-572	Chilled Water Control Valve	PS/B	W	-26'-4"	FA3-110-01	above flood elevation	0.60	2
45	VWS-VLV-253A	Safety Valve	PS/B	E	-26'-4"	FA3-101-01	above flood elevation	0.45	2
46	VWS-VLV-253B	Safety Valve	PS/B	E	-26'-4"	FA3-102-01	above flood elevation	0.45	2
47	VWS-VLV-253C	Safety Valve	PS/B	W	-26'-4"	FA3-108-01	above flood elevation	0.60	2
48	VWS-VLV-253D	Safety Valve	PS/B	W	-26'-4"	FA3-110-01	above flood elevation	0.60	2
49	A-EGTG	A-Class 1E Gas Turbine Generator	PS/B	E	3'-7"	FA3-104-04	N/A	-	1
50	B-EGTG	B-Class 1E Gas Turbine Generator	PS/B	E	3'-7"	FA3-103-03	N/A	-	1
51	C-EGTG	C-Class 1E Gas Turbine Generator	PS/B	W	3'-7"	FA3-109-03	N/A	-	1
52	D-EGTG	D-Class 1E Gas Turbine Generator	PS/B	W	3'-7"	FA3-111-04	N/A	-	1
53	BCP-A	A-Class 1E Battery Charger	PS/B	E	-14'-2"	FA3-117-01	N/A	-	1
54	DCC-A	A-Class 1E DC Switchboard	PS/B	E	-14'-2"	FA3-117-01	N/A	-	1
55	DCC-A1	A1-Class 1E DC Switchboard	PS/B	E	-14'-2"	FA3-117-01	N/A	-	1
56	BCP-B	B-Class 1E Battery Charger	PS/B	E	-14'-2"	FA3-118-01	N/A	-	1
57	DCC-B	B-Class 1E DC Switchboard	PS/B	E	-14'-2"	FA3-118-01	N/A	-	1
58	BCP-C	C-Class 1E Battery Charger	PS/B	W	-14'-2"	FA3-122-01	N/A	-	1
59	DCC-C	C-Class 1E DC Switchboard	PS/B	W	-14'-2"	FA3-122-01	N/A	-	1

ATTACHMENT 1
to RAI 579-4481

Table 3K-4 PS/B Components Protected From Internal Flooding
(Sheet 5 of 7)

Item No.	Equipment Tag	Description	Location					Flood Elevation above Floor [ft]	Notes
			Building	Side	Floor Elevation	Fire Zone No.	Location Elevation above Floor		
60	BCP-D	D-Class 1E Battery Charger	PS/B	W	-14'-2"	FA3-123-01	N/A	-	1
61	DCC-D	D-Class 1E DC Switchboard	PS/B	W	-14'-2"	FA3-123-01	N/A	-	1
62	DCC-D1	D1-Class 1E DC Switchboard	PS/B	W	-14'-2"	FA3-123-01	N/A	-	1
63	VCC-A	A-Ventilation Chiller Control Cabinet	PS/B	E	-26'-4"	FA3-101-01	above flood elevation	0.45	2
64	VCC-B	B-Ventilation Chiller Control Cabinet	PS/B	E	-26'-4"	FA3-102-01	above flood elevation	0.45	2
65	VCC-C	C-Ventilation Chiller Control Cabinet	PS/B	W	-26'-4"	FA3-108-01	above flood elevation	0.60	2
66	VCC-D	D-Ventilation Chiller Control Cabinet	PS/B	W	-26'-4"	FA3-110-01	above flood elevation	0.60	2
67	BAT-A	A-Class 1E Battery	PS/B	E	-26'-4"	FA3-115-01	above flood elevation	0.45	2
68	BAT-B	B-Class 1E Battery	PS/B	E	-26'-4"	FA3-116-01	above flood elevation	0.45	2
69	BAT-C	C-Class 1E Battery	PS/B	W	-26'-4"	FA3-120-01	above flood elevation	0.60	2
70	BAT-D	D-Class 1E Battery	PS/B	W	-26'-4"	FA3-121-01	above flood elevation	0.60	2
71	EPBA	A-Class 1E Gas Turbine Generator Control Board	PS/B	E	3'-7"	FA3-104-04	N/A	-	1
72	EPBB	B-Class 1E Gas Turbine Generator Control Board	PS/B	E	3'-7"	FA3-103-03	N/A	-	1
73	EPBC	C-Class 1E Gas Turbine Generator Control Board	PS/B	W	3'-7"	FA3-109-03	N/A	-	1

ATTACHMENT 1
to RAI 579-4481

Table 3K-4 PS/B Components Protected From Internal Flooding
(Sheet 6 of 7)

Item No.	Equipment Tag	Description	Location					Flood Elevation above Floor [ft]	Notes
			Building	Side	Floor Elevation	Fire Zone No.	Location Elevation above Floor		
74	EPBD	D-Class 1E Gas Turbine Generator Control Board	PS/B	W	3'-7"	FA3-111-04	N/A	-	1
75	VRS-TS-541	A - Essential Chiller Unit Area Temperature	PS/B	E	-26'-4"	FA3-101-01	above flood elevation	0.45	2
76	VRS-TS-544	A - Essential Chiller Unit Area Temperature	PS/B	E	-26'-4"	FA3-101-01	above flood elevation	0.45	2
77	VRS-TS-545	A - Essential Chiller Unit Area Temperature	PS/B	E	-26'-4"	FA3-101-01	above flood elevation	0.45	2
78	VRS-TS-551	B - Essential Chiller Unit Area Temperature	PS/B	E	-26'-4"	FA3-102-01	above flood elevation	0.45	2
79	VRS-TS-554	B - Essential Chiller Unit Area Temperature	PS/B	E	-26'-4"	FA3-102-01	above flood elevation	0.45	2
80	VRS-TS-555	B - Essential Chiller Unit Area Temperature	PS/B	E	-26'-4"	FA3-102-01	above flood elevation	0.45	2
81	VRS-TS-561	C - Essential Chiller Unit Area Temperature	PS/B	W	-26'-4"	FA3-108-01	above flood elevation	0.60	2
82	VRS-TS-564	C - Essential Chiller Unit Area Temperature	PS/B	W	-26'-4"	FA3-108-01	above flood elevation	0.60	2
83	VRS-TS-565	C - Essential Chiller Unit Area Temperature	PS/B	W	-26'-4"	FA3-108-01	above flood elevation	0.60	2
84	VRS-TS-571	D - Essential Chiller Unit Area Temperature	PS/B	W	-26'-4"	FA3-110-01	above flood elevation	0.60	2
85	VRS-TS-574	D - Essential Chiller Unit Area Temperature	PS/B	W	-26'-4"	FA3-110-01	above flood elevation	0.60	2
86	VRS-TS-575	D - Essential Chiller Unit Area Temperature	PS/B	W	-26'-4"	FA3-110-01	above flood elevation	0.60	2

ATTACHMENT 1
to RAI 579-4481

Table 3K-4 PS/B Components Protected From Internal Flooding
(Sheet 7 of 7)

Notes:

1. These components are protected by water-tight door against in-flow of flooding occurring outside of compartment. In addition, these components are not required to be protected against flooding occurring inside the compartment due to redundancy of other trains/components.
2. The electrical interconnections (e.g., cables) servicing components are excluded as SSCs requiring protection against internal flooding, because the cables in PS/B are located above the internal flooding level and maintain their function in case of any internal flooding.