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TOKYO, JAPAN

July 27, 2012

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-12218

Subject: **MHI's Amended Response to US-APWR DCD RAI No. 921-6415 Revision 0 (SRP 06.02.02)**

References: [1] "Request for Additional Information No. 921-6415 Revision 0, SRP Section: 06.02.02 – Containment Heat Removal System –Application Section: 6.2." dated April 16 2012 (ML12114A293).
[2] MHI Letter UAP-HF-12128, "MHI's Response to US-APWR DCD RAI No. 921-6415 Revision 0 (SRP 06.02.02)" dated May 30, 2012 (ML12153A079).

With this letter, Mitsubishi Heavy Industries, Ltd. ("MHI") transmits to the U.S. Nuclear Regulatory Commission ("NRC") a document entitled "Amended Response to Request for Additional Information No. 921-6415 Revision 0 (SRP 06.02.02)".

This response supersedes the previous response to Question 06.02.02-89 that was transmitted in Reference 2. The amended response corrects typographical errors and makes no significant technical changes.

Please contact Mr. Joseph Tapia, General Manager of Licensing Department, Mitsubishi Nuclear Energy Systems, Inc. if the NRC has questions concerning any aspect of this submittal. His contact information is provided below.

Sincerely,

Yoshiki Ogata,
Director - APWR Promoting Department
Mitsubishi Heavy Industries, LTD.

D081
NRO

Enclosure:

1. Amended Response to Request for Additional Information No. 921-6415 Revision 0 (SRP 06.02.02)

CC: J. A. Ciocco
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Docket No. 52-021
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Enclosure 1

UAP-HF-12218
Docket No. 52-021

Amended Response to Request for Additional Information
No. 921-6415 Revision 0 (SRP 06.02.02)

July 2012

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

7/27/2012

US-APWR Design Certification

Mitsubishi Heavy Industries, Ltd.

Docket No. 52-021

RAI NO.:	**NO. 921-6415 REVISION 0**
SRP SECTION:	**06.02.02 – Containment Heat Removal System**
APPLICATION SECTION:	**6.2**
DATE OF RAI ISSUE:	**4/16 /2012**

QUESTION NO. : 06.02.02-89

Follow-up to Question 06.02.02-64:

In response to question 06.02.02-64, the selection of the flow coefficient C was based, in part, on Reference 8, "Discharge characteristics of weirs of finite crest width." Reference 8 shows that the flow coefficient C is a function of H/B at least for values of H/P up to unity. Given that the US-APWR H/P exceeds unity, what is the justification for why Reference 8 is still applicable for selection of flow coefficient C?

ANSWER:

As the NRC indicated, the H/P value exceeds unity (i.e., unity is 0 < H/P < 1, but H/P = 2 for the US-APWR). It means the weir height is relatively short, and the state of the weir can be assumed to be close to an abrupt drop. Therefore, the state of the US-APWR is in the transition range between overflow of the weir and abrupt drop.

Water depth of an abrupt drop can be calculated using following equation.

$$h = \sqrt[3]{Q^2 / gB^2}$$

Where,
- h: water depth
- Q: flow rate
- g: gravitational acceleration
- B: width of the flow path

Using same conditions for Q and B, water depth "h" becomes

$$h = \sqrt[3]{1.01^2 / (9.81 \times 21.12^2)}$$
$$= 0.062(m)$$
$$= 2.4(in)$$

Calculated overflow height in response to Question No. 06.02.02-64 (see Reference 1) was 4 in. Therefore, it is considered that the actual overflow height will be in the range between 4 in. and 2.4 in.

Although MHI decided to continue to use the formula defined in "Discharge characteristics of weirs of finite crest width" (see Reference 2), the uncertainty of using the formula is discussed in the response to Question No. 06.02.02-73 (Reference 3).

References

1) MHI Letter No. UAP-HF-12126, "MHI's 3rd Amended Response to US-APWR DCD RAI No. 740-5719 Revision 2 (SRP 06.02.02)", dated May 30, 2012 (ML121520507).
2) Rao N.S. Govinda, Muralidhar D. "Discharge characteristics of weirs of finite crest width". J La Houille Blanche 1963;18(5):537–45.
3) MHI Letter No. UAP-HF-12217, "MHI's 2nd Amended Response to US-APWR DCD RAI No. 839-6103 Revision 3 (SRP 06.02.02)", dated July 2012.

Impact on DCD

There is no impact on the DCD.

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 Report

There is no impact on the Technical/Topical Report.