

  
**MITSUBISHI HEAVY INDUSTRIES, LTD.**  
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TOKYO, JAPAN

July 14, 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-10203

**Subject: MHI's Amended Response to US-APWR DCD RAI No.562-4427 Rev.2**

- References:** 1) "Request for Additional Information No. 562-4427 Revision 2, SRP Section: 02.03.04 - Short Term Atmospheric Dispersion Estimates for Accident Releases, Application Section: Tier 2, Sections 2.0 and 2.3," dated March 24, 2010.  
2) " MHI's Response to US-APWR DCD RAI No.562-4427 Rev.2, UAP-HF-10122, dated April 28, 2010"

With this letter, Mitsubishi Heavy Industries, Ltd. ("MHI") transmits to the U.S. Nuclear Regulatory Commission ("NRC") a document entitled "Request for Additional Information No. 562-4427 Revision 2." This amended response is provided to address MCR doses in chapter 15 based on 97-720 hr x/Q change in previous response to this RAI.

Enclosed is the amended response to 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 provided below.

Sincerely,



Yoshiaki Ogata,  
General Manager- APWR Promoting Department  
Mitsubishi Heavy Industries, LTD.

Enclosure:

1. MHI's Amended Responses to Request for Additional Information No. 562-4427 Revision 2

DOB  
NRC

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

Contact Information

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Docket No. 52-021  
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Enclosure 1

UAP-HF-10203  
Docket No. 52-021

MHI's Amended Response to Request for Additional Information  
No. 562-4427  
Revision 2

July, 2010

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**RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION**

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7/14/2010

**US-APWR Design Certification**

**Mitsubishi Heavy Industries**

**Docket No. 52-021**

**RAI NO.:** NO.562-4427 REVISION 2  
**SRP Section:** 02.03.04 - Short Term Atmospheric Dispersion Estimates for Accident Releases  
**APPLICATION SECTION:** TIER 2, SECTIONS 2.0 AND 2.3  
**DATE OF RAI ISSUE:** 3/24/2010

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**QUESTION NO. : 02.03.04-9**

The following set of comments primarily refers to DCD Tier 2, Tables 2.3.4-1 through 2.3.4-7.

- a. DCD Tier 2, Section 2.3.4 states that (1) the 0-8 hr MCR and TSC  $\chi/Q$  values were calculated based, in part, on the diffusion equations contained in the ARCON96 atmospheric dispersion model and (2) the 8-24 hr, 24-96 hr, and 96-720 hr MCR and TSC  $\chi/Q$  values were derived from the 0-8 hr  $\chi/Q$  values by adjusting for long-term meteorological averaging of wind speed and wind direction as described in Section C.4.4 of Regulatory Guide 1.194. The long-term meteorological averaging was generally accomplished by multiplying the 0-8 hr  $\chi/Q$  values by combined wind speed and wind direction correction factors of (1) 0.59 to obtain the 8-24 hr  $\chi/Q$  values, (2) 0.38 to obtain the 24-96 hr  $\chi/Q$  values, and (3) 0.17 to obtain the 96-720 hr  $\chi/Q$  values.

SRP 2.3.4 states that the site parameters postulated for a standard design certification should be representative of a reasonable number of sites that have been or may be considered for a COL application. In order to confirm that the US-APWR MCR and TSC  $\chi/Q$  values listed as key site parameters in DCD Tier 1, Table 2.1-1 and DCD Tier 2, Table 2.0-1 are representative of a reasonable number of sites that have been or may be considered for a COL application, the staff generated a set of site-specific MCR and TSC  $\chi/Q$  values using hourly meteorological data provided in support of the four docketed ESP applications (North Anna, Clinton, Grand Gulf, and Vogtle). The staff executed the ARCON96 computer code with a subset of the source/receptor information presented in DCD Tier 2, Tables 2.3.4-1 through 2.3.4-7 assuming the US-APWR plant north was aligned to true north at each site. The staff found that the US-APWR 0-8 hour, 8-24 hour, and 1-4 day  $\chi/Q$  values were bounding in all cases, but the US-APWR 4-30 day  $\chi/Q$  values were not bounding for three out of the four sites. This implies to the staff that the use of a 96-720 hr combined wind speed and wind direction long-term averaging correction factor of 0.17 with the ARCON96 diffusion equations does not produce appropriate results.

Consequently, please consider increasing the 96-720 hr MCR and TSC  $\chi/Q$  values listed as key site parameters in DCD Tier 1, Table 2.1-1 and DCD Tier 2, Table 2.0-1 to ensure they bound a reasonable number of sites that have been or may be considered for a COL application.

**ANSWER:**

- a. The original response to this RAI was provided in the MHI letter UAP-HF-10122, dated April 28, 2010. In addition to this response, the following answer is given.

Change in MCR dose in DCD Chapter 15 due to the change of 97-720 hr  $\chi/Q$  values is only to loss of coolant accident (LOCA). MCR dose for LOCA due to the change of 97-720 hr  $\chi/Q$  values in DCD Chapter 15 is 4.6 rem, and this meets the dose criteria.

**Impact on DCD**

The additional Impacts on DCD are changes to the DCD Tier 2, Table 15.0-17 and Table 15.6.5-16 brought about by the re-evaluation results based on 1.5 times  $\chi/Q$  of the 96-720 hr  $\chi/Q$  values of MCR in DCD revision 2.

**Table 15.0-17  
Summary of Calculated Doses for Events with a Radiological Release**

Accident or Case	EAB and LPZ Dose Criteria (rem TEDE)	Calculated EAB Dose (rem TEDE)	Calculated LPZ Dose (rem TEDE)	MCR Dose Criteria (rem TEDE)	Calculated MCR Dose <sup>2</sup> (rem TEDE)
LOCA <sup>2</sup>	25	13	13	5	4.5 4.6
Steam generator tube rupture					
Fuel damage or pre-incident spike	25	3.6	1.5	5	3.5
Coincident iodine spike	2.5	0.96	0.43	5	0.61
Steam system piping failure					
Fuel damage or pre-incident spike	25	0.19	0.11	5	3.4
Coincident iodine spike	2.5	0.32	0.28	5	4.3
RCP rotor seizure	2.5	0.49	0.70	5	1.1
Failure of small lines carrying primary coolant outside containment <sup>*1</sup>	2.5	1.5	0.60	5	0.21
Rod ejection accident	6.3	5.1	4.5	5	4.4
Fuel handling accident					
Occurred in fuel handling area	6.3	3.3	1.4	5	0.75
Occurred in containment	6.3	3.3	1.4	5	0.79

**Notes:**

\*1 The acceptance criterion except for the failure of small lines carrying primary coolant outside containment is based on RG 1.183. The acceptance criterion for the failure of small lines carrying primary coolant outside containment is based on SRP 15.6.2.

\*2 The direct radiation shine dose at the time of LOCA is added as a direct dose for each event.

**Table 15.6.5-16  
Radiological Consequences of the LOCA**

<b>Dose Location</b>	<b>TEDE Dose (rem)</b>
EAB (0.5 to 2.5 hours)	13
LPZ outer boundary	13
MCR dose	
Airborne activity entering the MCR	4.5 4.6
Direct radiation from the containment	$8.2 \times 10^{-3}$
Direct radiation from the radioactive plume	$2.1 \times 10^{-4}$
Direct radiation from the recirculation filters	$9.2 \times 10^{-3}$
Total	4.5 4.6
TSC dose	Less than MCR dose

**Impact on COLA**

There is no impact on the COLA.

**Impact on PRA**

There is no impact on the PRA.