# MITSUBISHI HEAVY INDUSTRIES, LTD.

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TOKYO, JAPAN

March 3, 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-09075

#### Subject: MHI's Response to US-APWR DCD RAI No. 179-1741 Rev. 1

**References:** 1) "Request for Additional Information No. 179-1741 Revision 1, SRP Section: 12.02 – Radiation Sources, Application Section: 12.2," dated February 3, 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.179-1741 Revision 1".

Enclosed is the response to one 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 submittal. His contact information is below.

Sincerely,

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

Enclosure:

1. Response to Request for Additional Information No.179-1741 Revision 1

CC: J. A. Ciocco

C. K. Paulson

Contact Information

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Enclosure 1

UAP-HF-09075 Docket No. 52-021

# Response to Request for Additional Information No. 179-1741 Revision 1

March, 2009

## **RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION**

3/3/2009

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

RAI NO.: NO. 179-1741 REVISION 1

SRP SECTION: 12.02 – Radiation Sources

APPLICATION SECTION: 12.2

DATE OF RAI ISSUE: 2/3/2009

### **QUESTION NO.: 12.02-16**

10 CFR 20.1101(b) requires licensees to ensure that engineering controls are used to keep occupational doses ALARA. The guidance contained in Regulatory Guide 1.206 sections C.I.12.1 "Radiation Protection" and C.I.12.2 note that the applicant is to provide the models, parameters and bases for all values used to calculate source magnitudes, for normal, AOO and accident conditions. 10 CFR 50 Appendix A, notes that Anticipated Operational Occurrences (AOO), mean those conditions of normal operation which are expected to occur one or more times during the life of the nuclear.

#### Question 1:

The APWR DCD Section 12.2.1 "Contained Sources" notes that the basis of the shielding design source terms are the three plant conditions: (1) normal full-power operation; (2) shutdown; and (3) design-basis accident (DBA) events.

In accordance with 10 CFR 20.1101(b) and RG 1.206, please provide in chapter 12, information that describes the bases, methods and assumptions for the source term, and dose rates, associated with Abnormal Operational Occurrences. If this information is not presented, then please provide justification for omitting this data.

#### ANSWER:

The three plant conditions currently discussed in Chapter 12 for (1) normal full-power operation; (2) shutdown; and (3) DBA events, envelope those for the Anticipated Operational Occurrence (AOO). The source term assumed for normal full-power operation includes fuel defects in the fuel rods producing a very conservative 1% of the core thermal power. The source term assumed for the accident assessment assumes Regulatory Guide 1.183 core inventory release fractions, for both fuel gap release and early in-vessel core damage. These source terms therefore bound any AOO event. The normal condition 1% fuel defect source term is well above any value found in MHI's fuel operating experience, and is therefore above that found for any actual AOO.

In addition, actual shield wall thicknesses to maintain dose rates within the limits of given radiation zones presented in Section 12.3 have allowance, which offers additional conservativism. This will ensure that dose rates during AOOs are within these limits.

Finally, in the event of an AOO, the area radiation monitors and/or airborne radiation monitors will indicate higher radiation level than in normal full-power operation, and it ensures radiation worker's safe evacuation from the affected area. It will result that radiation doses will be ALARA.

In summary, the design of the US-APWR shielding and overall radiation protection design is sufficiently conservative to ensure that radiation exposures will be ALARA, even in the event of an AOO. No change to the DCD is required.

#### Impact on DCD

There is no impact on the DCD.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.