

# REQUEST FOR ADDITIONAL INFORMATION NO. 171-1858 REVISION 1

2/3/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

SRP Section: 12.03-12.04 - Radiation Protection Design Features

Application Section: 12.03.1

## QUESTIONS for Health Physics Branch (CHPB)

### 12.03-12.04-7

10 CFR 20.1101(b) requires licensees to control external occupational exposure, and to ensure that engineering controls are used to keep occupational doses ALARA. 10 CFR 50 GDC 61 requires licensees to ensure that there is adequate shielding for routine activities in the area of the equipment. The guidance contained in Regulatory Guide 1.206 section C.I.12.3.1 notes that the applicant is to provide the information regarding how to keep dose ALARA. Regulatory Guide 8.8 Position C2.b, provides methods and techniques that may be used to reduce radiation exposure associated with operation and maintenance of plant equipment. The APWR FSAR Figures in section 12.3-1 "Radiation Zones for Normal Operation/Shutdown" shows a number of areas, such as equipment associated with the Boric Acid Recycle system and Piping Area, as Zone VII, VIII or IX dose rate areas.

The APWR FSAR Figure 12.3-1 "Radiation Zones for Normal Operation/Shutdown (Sheet 15 of 34) Auxiliary Building at Elevation -26'-4'" identifies the Boric Acid Storage Tanks (BAST) as a Zone VIII (Maximum Dose Rate 100 R/h) area and the Boric Acid Transfer Pumps (BATP) as a Zone VII (Maximum Dose Rate 10 R/h) area. FSAR section 12.3.1.1.2 "Common Facility and Layout Designs for As Low As Reasonably Achievable" subsection E. "Equipment Layout", notes that for major radiation sources, such as the Boric Acid Recycle System, equipment separation is used as a dose reduction technique. FSAR Figure 12.3-1 does not show any indication of separation between the two BATP. In addition, FSAR Sections 12.3.1.1.1.2 "Balance of Plant Equipment" part D, does not discuss a number of shielding and geometry control dose reduction design features, noted in RG 8.8 Position C2.b, that are recommended to reduce maintenance and operation related exposure from high dose rate equipment, like the Boric Acid Transfer Pumps. The possible dose reduction design features include items such as, installed shielding between the components, easily removable shielding around system piping, provisions for easing the installation of temporary shielding and design features to facilitate equipment removal (i.e. quick disconnects)

In accordance 10 CFR 12.1101(b), 10 CFR 50 GDC 61, Regulatory Guides 8.8 and 1.206, please update chapter 12.3.1.1.1.2.D. to describe the design features provided to keep operating and maintenance doses for the Boric Acid Transfer Pumps, ALARA or revise chapter 12.3.1.1.1.2.D to provide your justification for not specifying known and proven exposure reduction methods and facilities. This information should reflect the source term expected to be contained in these components following operation of the Boric Acid Evaporator for an operating cycle with design basis cladding defects.

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12.03-12.04-8

10 CFR 20.1101(b) requires licensees to control external occupational exposure, and to ensure that engineering controls are used to keep occupational doses ALARA. 10 CFR 50 GDC 61 requires licensees to ensure that there is adequate shielding for routine activities in the area of the equipment. The guidance contained in Regulatory Guide 1.206 section C.I.12.3.1 notes that the applicant is to provide the information regarding how to keep dose ALARA. Regulatory Guide 8.8 Position C2.b, provides methods and techniques that may be used to reduce radiation exposure associated with operation and maintenance of plant equipment. The APWR FSAR Figures in section 12.3-1 "Radiation Zones for Normal Operation/Shutdown" shows a number of areas, such as equipment associated with the Boric Acid Recycle system and Piping Area, as Zone VII, VIII or IX dose rate areas.

FSAR Figure 12.3-1 "Radiation Zones for Normal Operation/Shutdown (Sheet 17 of 34) Auxiliary Building at Elevation 3'-7" ", identifies the Boric Acid Evaporator as a Zone VIII (Maximum Dose Rate 100 R/h) area. Based on the information depicted in this figure, two pumps are located next to the evaporator. FSAR section 12.3.1.1.2 "Common Facility and Layout Designs for As Low As Reasonably Achievable" subsection E. "Equipment Layout", notes that for major radiation sources, such as the Boric Acid Recycle System, equipment separation is used as a dose reduction technique. FSAR Figure 12.3-1 does not show any indication of separation between the Boric Acid Evaporator and the pumps located in the area. In addition, FSAR Sections 12.2.1.1.1.2 "Balance of Plant Equipment" parts C and D, do not discuss a number of dose reduction design features, noted in RG 8.8 Position C2.b, available to reduce maintenance and operation related exposure from high dose rate equipment, like the Boric Acid Evaporator and the adjacent pumps located in the evaporator room. The possible dose reduction design features include items such as, installed shielding between the components, easily removable shielding around system piping, provisions for easing the installation of temporary shielding, design features to facilitate equipment removal (i.e. quick disconnects). In addition, work on internal portions of these components will involve high levels of contamination. The discussion of this equipment area contains insufficient information to determine if the provisions of 10 CFR 20.1406, regarding minimization of facility contamination, are adequately addressed.

In accordance 10 CFR 20.1101(b), 10 CFR 20.1406, 10 CFR 50 GDC 61, and Regulatory Guides 8.8 and 1.206, please update chapter 12 to provide those design features provided to keep the Boric Acid Evaporator and the Boric Acid Evaporator Pumps operating and maintenance doses, ALARA, or revise chapter 12.3.1.1.1.2 to provide your justification for not specifying known and proven exposure reduction methods and facilities.

12.03-12.04-9

10 CFR 20.1101(b) requires licensees to control external occupational exposure, and to ensure that engineering controls are used to keep occupational doses ALARA. 10 CFR 50 GDC 61 requires licensees to ensure that there is adequate shielding for routine

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activities in the area of the equipment. The guidance contained in Regulatory Guide 1.206 section C.I.12.3.1 notes that the applicant is to provide the information regarding how to keep dose ALARA. Regulatory Guide 8.8 Position C2.b, provides methods and techniques that may be used to reduce radiation exposure associated with operation and maintenance of plant equipment. The APWR FSAR Figures in section 12.3-1 "Radiation Zones for Normal Operation/Shutdown" shows a number of areas, such as equipment associated with the Boric Acid Recycle system and Piping Area, as Zone VII, VIII or IX dose rate areas.

The APWR FSAR Figure 12.3-1 "Radiation Zones for Normal Operation/Shutdown (Sheet 16 of 34) Auxiliary Building at Elevation -8'-7" ", identifies several piping areas as Zone IX (Maximum Dose Rate < 500 Rad/h) areas. Section 12 of the FSAR does not provide any information regarding equipment or components located in these areas that may require access for operation, maintenance or period surveillances, such as MOVs, AOVs, process sensors and limit switches. As several of the depicted piping areas are large, and the dose rates are high, equipment located in these areas that may require operation or maintenance should be identified and evaluated for dose reduction provisions. Section 12.1.1.2 does not discuss any applicable dose reduction design features, noted in RG 8.8 Position C2.b that could be, provided to reduce maintenance and operation related exposure from the equipment or components located in these areas. The possible dose reduction design features include items such as, installed shielding between the components, easily removable shielding around system piping, provisions for easing the installation of temporary shielding, design features to facilitate equipment removal (i.e. quick disconnects).

In accordance 10 CFR 12.1101(b), and Regulatory Guides 8.8 and 1.206, please update chapter 12 to identify any components/equipment in these areas that may require periodic access and those design features provided to keep the operating and maintenance doses, ALARA, or revise chapter 12.3.1.1.2. to provide your justification for not specifying known and proven exposure reduction methods and facilities The information provided should reflect the expected source term contained in these components resulting from the operation of the Boric Acid Evaporator for an operating cycle with design basis cladding defects.