

REQUEST FOR ADDITIONAL INFORMATION 532-4019 REVISION 1

2/22/2010

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

SRP Section: 12.02 - Radiation Sources

Application Section: 12.2

QUESTIONS for Health Physics Branch (CHPB)

12.02-23

RAI 427-2909, Question 12.02-17 (a supplemental question derived from RAI 141-1735 12.02-6), requested additional information about the In Core Instrument System (ICIS) source term. In their response, the applicant noted that source term from the ICIS fission chamber detector was insignificant compared to the source term from the detector cable. However, the applicant noted that there is no impact on the DCD, so this information is not presented in the DCD.

The applicant should revise and update FSAR Tier 2 Chapter 12.2, to provide some discussion about the source term for the ICIS fission chamber in the USAPWR DCD Tier 2 Chapter 12.2.

12.02-24

RAI 427-2909, Question 12.02-18 (a supplemental question derived from RAI 142-1733, Questions 12.02-8 and 12.02-9), requested additional information about dose rates and airborne activity concentrations that would be associated with maintenance of the Boric Acid Evaporator (BAE) units. In the response to Item 1 of this question, the applicant noted that shielding provided maintains dose rates outside the BAE enclosure vault ALARA, and that airborne activity concentrations during operation will be low because of the leak tight construction of the units. The NRC staff agrees with the applicant's statements regarding dose rates outside of the BAE vault during operation, however as indicated on USAPWR DCD Tier 2 Figure 12.3-1 (Sheet 17 of 34) pumps are located inside of the BAE vault. Also, process monitoring and control equipment will be installed inside the vault area. From the information provided in Table 12.4-1, the NRC staff is unable to ascertain the estimated exposure associated with maintenance and non-routine operation and surveillance of the BAE package. The experience of the NRC staff, corroborated by EPRI TR-1011728 "Radioactive Liquid Processing Guidelines", is that residual activity following pre-maintenance flushing may result in elevated dose rates adjacent to the BAE package. The applicant has provided insufficient information regarding the estimated exposure and the associated basis, for routine maintenance and surveillance of the BAE packages.

The applicant should provide the requested information, and revise and update the USAPWR DCD Tier 2 Sections 12.2 and 12.4 to include the estimated maintenance and surveillance exposure data, or provide the specific alternative approaches used and the associated justification for not providing the requested information.

REQUEST FOR ADDITIONAL INFORMATION 532-4019 REVISION 1

12.02-25

RAI 427-2909, Question 12.02-19 (a supplemental question derived from RAI 143-1737 Questions 12.02-10), requested additional information about assumptions used for calculating expected airborne activity concentrations. In Item 2.b.III, the staff asked the applicant to clarify the assumption used for the duration of the Low Volume Purge system. In their response, the applicant noted the USAPWR DCD Tier 2 Chapter 16 Technical Specifications Surveillance Requirement 3.6.3.2 allows an exception for the normally closed valve position, for the purpose of air quality considerations, so the use of Low Volume Purge on a continuous basis for reducing airborne activity concentrations in the PCCV was acceptable. The position of the NRC staff responsible for containment isolation is that this answer is not acceptable. This position is supported by Branch Technical Position 6-4 Revision 3 "Containment Purging During Normal Plant Operations" section B.3 which states "The need for purging of the containment should be minimized by containment atmosphere clean up systems within the containment.". The amount of time that these valves are credited with being open for the purpose of maintaining airborne activity concentrations should be consistent with the Probabilistic Risk Assessment (PRA) used for containment openings.

The applicant should revise and update the USAPWR DCD Tier 2 Chapter 12.2 containment airborne activity concentrations and assumptions to reflect use of the Low Volume Purge system that is consistent with the PRA for containment openings, or provide the specific alternative approaches used and the associated justification.

12.02-26

RAI 427-2909, Question 12.02-19 (a supplemental question derived from RAI 143-1737 Questions 12.02-10), requested additional information about assumptions used for calculating expected airborne activity concentrations as depicted in FSAR Tier 2 Table 12.2-61. While the confirmatory calculations performed by the staff are in close agreement with the data provided, the NRC staff noted that the fraction DAC (fDAC) airborne concentration exceeded 1 DAC in ventilation zones V-VI and the Containment Building (PCCV). These estimated airborne activity concentrations are not consistent with the SRP Section 12.3-12.4 Acceptance Criteria 3, which notes that the ventilation system is to have adequate capability to reduce concentrations of airborne radioactivity to 1 DAC, in areas not normally occupied where maintenance or in service inspection must be performed.

The applicant should revise and update the USAPWR DCD Tier 2 Chapter 12.2 and Chapter 12.3, to describe how the ventilation system design is consistent with the acceptance criteria noted in SRP Section 12.3-12.4, or provide the specific alternative approaches used and the associated justification.

12.02-27

RAI 427-2909, Question 12.02-19 Item 3, (a supplemental question derived from RAI 143-1737 Questions 12.02-10), requested additional information about assumptions used for calculating expected liquid activity concentrations as depicted in FSAR Tier 2

REQUEST FOR ADDITIONAL INFORMATION 532-4019 REVISION 1

Table 12.2-72, which were provided in response to Question 12.02-10. While the confirmatory calculations performed by the staff are in close agreement with the data provided, the NRC staff noted that some of the assumptions used were not consistent with plant design parameters. For instance, RAI 427-2909 Table 2 "Parameters Used to Calculate Coolant Activity After Shutdown" list CVCS letdown flow rate that exceeds the system design flow rate. The stated flow rate exceeds the total flow listed in FSAR Tier 2 Table 9.3.4-3 for the Mixed Bed letdown demineralizer beds, the Regenerative Heat Exchanger, the Seal Water Heat Exchanger and the Reactor Coolant Filters in the letdown flow path. The purification system flow path presented in Figure A-1, "Diagram of CVCS and RCS", shows coolant flow through these components. Because the maximum design flow rate of the components is less than the assumed flow rate, insufficient information is available to allow the NRC staff to confirm the activity concentrations presented by the applicant.

The applicant should revise and update the USAPWR DCD Tier 2 Chapter 12.2 to describe how the coolant purification system design is consistent with the stated assumptions used in the response to Question RAI 427-2909 12.02-19, or provide the specific alternative approaches used and the associated justification.

12.02-28

RAI 427-2909, Question 12.02-22 (a supplemental question derived from RAI 168-1739 12.02-14), requested additional information about the density values used in the component shielding calculations. In their response, the applicant provided information that adequately described the basis for the density values presented in FSAR Tier 2 Table 12.2-1. However, while the applicant noted that the table would be changed to reflect the updated values, the DCD change did not include a discussion of the methodology that was presented in the answer to Question 12.02-22. The methodology and figure presented in the response dialogue and text is useful for evaluating shielding impacts associated with future component replacements.

The applicant should revise and update FSAR Tier 2 Chapter 12.2 to include the description of the basis for the assumed density values presented in Table 12.2-1.

12.02-29

RAI 427-2909, Question 12.02-21 (a supplemental question derived from RAI 144-1738 12.02-12), requested additional information about the controls associated with the Refueling Water Storage Auxiliary Tank and the Primary Makeup Water Tank following removal of the concrete shielding, noted in the response to Question 12.02-12. In the response, the applicant noted that the design will be changed to enclose the tanks in a "tank house". Contrary to the response provided, Figure 12.3-1 (Sheet 1 of 34) provided as part of the response to Question 12.02-12 does not show the "tank house" structure.

REQUEST FOR ADDITIONAL INFORMATION 532-4019 REVISION 1

The applicant stated that the enclosure would be established as a Zone II, however, Figure 12.3-1 (Sheet 1 of 34) does not depict a Zone II area in the vicinity of the tanks. In addition, based on the activity concentration assumed in Table 12.2-50, the NRC staff calculated dose rates inside the tank enclosure indicate that the area would meet the specifications for a Zone IV area. The response indicates controls limiting the activity in the tanks would be part of some program, such as the Radiation Protection Program and that dose rate at 2 meters tank surface will be limited to less than 0.25 mrem/h. However, the "Impact on the DCD" section of the response did not provide a COL Action Item stating the requirement to provide a program to limit tank activity. Additionally, because the applicant, provided insufficient information regarding the design of the tank area enclosure, the NRC staff is unable to evaluate the adequacy of design features of the facility, such as the entry and egress points for the area, and the ventilation controls and effluent monitoring for the area,

The applicant should revise and update the USAPWR DCD Tier 2 Chapter 12.2 to fully and accurately describe the tank enclosure facility and the associated required COL Action Items, or provide the specific alternative approaches used and the associated justification.

12.02-30

10CFR20.1101(b), 1201, 1202, GDC 61, SRP 12.02, RG 1.206, RG 8.8

RAI 427-2909, Question 12.02-18 (a supplemental question derived from RAI 168-1739 Question 12.02-14, and RAI 142-1733, Questions 12.02-8 and 12.02-9), requested additional information about dose rates and airborne activity concentrations that would be associated with maintenance of the Boric Acid Evaporator (BAE) units. In the response to Item 3 of this question, the applicant noted that the BAE will concentrate the liquid input feed stream until the boric acid concentration is 7000 ppm. The applicant assumes that the concentration is raised from 200 ppm boron to 7000 ppm, or a factor of 35. However, near the end of core life, the volume of water needed to reduce the concentration of boric acid in the reactor coolant system from 200 ppm down to 50 ppm exceeds the capacity of a CVCS Hold Up Tank, so the concentration of the feed to the BAE will be less than 200 ppm. Based on this information, the applicant's assumptions about the resultant activity concentration, may be non-conservative.

The applicant should revise and update the USAPWR DCD Tier 2 Sections 12.2 and 12.4 to provide the estimated maintenance and surveillance exposure data, or provide the specific alternative approaches used and the associated justification.