

## US-APWRRRAIsPEm Resource

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**Sent:** Tuesday, August 14, 2012 6:25 AM  
**To:** us-apwr-rai@mhi.co.jp; US-APWRRRAIsPEm Resource  
**Cc:** Nold, David; McKirgan, John; Reyes, Ruth; Snyder, Amy  
**Subject:** US-APWR Design Certification Application RAI 955-6585 (9.2.7, 9.4.3)  
**Attachments:** US-APWR DC RAI 955 SPCV 6585.pdf

MHI,

The attachment contains the subject Request for Additional Information (RAI). This RAI was sent to you in draft form. Your licensing review schedule assumes technically correct and complete responses within 30 days of receipt of RAIs.

Please submit your RAI response to the NRC Document Control Desk.

Thank you,

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# REQUEST FOR ADDITIONAL INFORMATION 955-6585

Issue Date: 8/14/2012

Application Title: US-APWR Design Certification - Docket Number 52-021

Operating Company: Mitsubishi Heavy Industries

Docket No. 52-021

Review Section: 06.04 - Control Room Habitability System

Application Section: 9.2.7, 9.4.3

## QUESTIONS

### 06.04-17

The following is a follow-up RAI question to RAI 917-6272, Question No. 06.04-15 and is the fifth in a series of RAI exchanges. The staff found acceptable the applicant's response to Part (4) of Question No. 06.04-15. As identified below, the staff requests resolution of several concerns associated with the applicant's response to Question No. 06.04-15 Parts (1), (2) & (3).

#### For Part (1)

The staff notes that "chiller mechanical equipment rooms" are not clearly defined (i.e. labeled) on the plant drawings (e.g. Figure 9A-16) as being separate and isolatable (i.e. tight fitting and self closing doors) from the rest of Fire Zone FA4-101-18 "HVAC Equipment Room".

Consistent with the ANSI/ASHRAE Standard 15, the rest of Fire Zone FA4-101-18 (i.e. outside the "chiller mechanical equipment rooms") is an occupied space that needs to protection from a refrigerant release inside the "chiller mechanical equipment rooms". The staff requests that the applicant revise Figure 9A-16 or some other plant arrangement drawing to clearly indicate the area designated as "Chiller Mechanical Equipment Rooms" and that this area is separate and isolatable (i.e. tight fitting and self closing doors) from the rest of Fire Zone FA4-101-18 "HVAC Equipment Room". If the applicant does not believe that this level of detail (i.e. tight fitting and self closing doors) is warranted in Figures 9A-1 1, 9A-16, 1.2-35, and 1.2-26 or a new DCD figure then the staff requests that the applicant clearly describe what is required and the why of what is required in the text of subsection 9.2.7.

The applicant indicated that DCD Subsections 9.2.7.2.1 and 9.2.7.2.2 would be revised to clarify that the doors are self-closing and that the refrigerant leak detectors alarms annunciate inside and outside of the chiller rooms. The staff notes that Attachment 1 to RAI 917-6272 in its entirety does not mention nor require self-closing doors. The staff requests the applicant correct this omission. In addition the staff notes that Attachment 1 to RAI 917-6272 page 9.2-65 reads "...being equipped with refrigerant leak detectors that can actuate an alarm inside and outside the equipment room and in the MCR". "Equipment room" is open to interpretation ... Does it mean the "HVAC Equipment Room" (i.e. all of Fire Zone FA4-101-18)? ...

OR...Does this mean the "Chiller Mechanical Equipment Rooms". The staff requests that the applicant amend this passage to "...being equipped with refrigerant leak detectors that can actuate an alarm inside and outside the Chiller Mechanical Equipment Rooms and in the MCR".

The staff requests that DCD Section 9.2.7.2.1 "Essential Chilled Water System" be revised to reflect self-closing tight fitting doors and being equipped with refrigerant leak detectors that can actuate an alarm inside and outside the chiller mechanical equipment room and in the MCR.

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### For Part (2)

The staff notes that the design exhaust flow rate from the Auxiliary Building HVAC System is 216,000 cfm. As stated in RAI 917-6272, Question 06.04-15 and based on approximate refrigerant amounts contained in one non essential chiller and four essential chillers, the required combined design exhaust flow rates to the four essential chiller mechanical equipment rooms and the non-essential chiller mechanical equipment room (i.e. to meet ANSI/ASHRAE Standard 15 requirements) could be as high as 25,000 cfm. This represents a significant ventilation load ( $\geq 10\%$ ) of the system total exhaust flow. From the on-going series of RAIs pertaining to this issue, it appears that the applicant may not have considered this substantial system flow requirement in the original design of the system. Please provide the basis for concluding that the original design supply and exhaust flow rate of the system adequately satisfies the system design flow rate required for 10CFR20 (ALARA), GDC 4 and ANSI/ASHRAE Standard 15 compliance. In addition the staff notes that ANSI/ASHRAE Standard 15 Section 8.11.4 reads "... To obtain a reduced airflow for normal ventilation, multiple fans or multispeed fans shall be used..." to the chiller mechanical equipment rooms. How does applicant intend to satisfy the intent of this requirement with the current configuration of the Auxiliary Building HVAC System?

The staff further notes that the revision to DCD Subsection 9.2.7.2.1 provided by the applicant reads *"The supply and exhaust air to and from the chiller mechanical equipment rooms are ducted to prevent airflow from the mechanical equipment rooms to occupied spaces"*. This language (i.e. "are ducted") neither conveys the concise meaning of the applicant's response (i.e. is vague/ambiguous) nor does it explain what system design attributes of the ducting or in the ducting (e.g. back flow dampers) prevent a massive refrigerant dump in the room from communicating with the other areas served by Auxiliary Building HVAC System. Here again the applicant uses another name (i.e. "mechanical equipment rooms") for the area that is to be labeled "Chiller Mechanical Equipment Rooms". The applicant is requested to amend their proposed revision to the DCD to provide this needed clarity.

The applicant replied to Question 06.04-15 that the third acceptance criteria of 14.2.12.1.99 "Auxiliary Building HVAC System Preoperational Test", the ventilation flow balancing of the auxiliary building HVAC system is performed to meet the commitment described in DCD Subsection 9.4.3. With that question, the staff provided examples of three nuclear plant operating experience events as the basis for elevating the need for designing the chiller equipment rooms' ventilation system consistent with the ANSI/ASHRAE Standard 15 requirements. Based on these operating experience events at existing US nuclear power plants, the staff requests that the applicant either: (1) Add another bullet to the Power Generation Design Bases of DCD Section 9.4.3.1.2 "Auxiliary Building HVAC System" to capture this important design attribute for the system; OR (2) Amend the acceptance of 14.2.12.1.99 "Auxiliary Building HVAC System Preoperational Test" to specifically verify this design attribute; OR (3) Both.

The applicant also responded to Question 06.04-15 that DCD Figure 9.4.3-1 is a simplified flow diagram of the ABVS for which this level of detail is not appropriate. The staff notes that a significant portion (i.e.  $\geq 10\%$ ) of the system ventilation flow capacity is required and that separate supply and exhaust ducting is required for the chiller mechanical equipment rooms. Accordingly the staff requests that this system attribute be captured on Figure 9.4.3-1 in the "A/B Uncontrolled Area" with a unique set of supply and exhaust lines.

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### For Part (3)

The staff disagrees with the applicant's statement "*The amount, or quantity, limits provided in ANSI/ASHRAE Standard 15 are not applicable.*" Per ANSI/ASHRAE Standard 15 Section 8.11.5, the mass amounts of refrigerant in each chiller is used to determine the amount of the supply and exhaust ventilation flows required to purge the chiller equipment rooms of a massive refrigerant/oil vapor dump into the respective chiller equipment room. Therefore the staff requests that the applicant bound within the DCD the maximum mass amount of safety group A1 refrigerant per chiller to ensure that the design of the Auxiliary Building HVAC System can satisfy the requirements of ANSI/ASHRAE Standard 15.

