REQUEST FOR ADDITIONAL INFORMATION 559-4387 REVISION 2

3/23/2010

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

SRP Section: 06.04 - Control Room Habitability System
Application Section: DCD section 6.4

QUESTIONS for Containment and Ventilation Branch 1 (AP1000/EPR Projects) (SPCV)

06.04-11

OPEN ITEM – Follow-up RAI (NRC ID 4387, Q#16730)

The staff notes that RAI No. 501-4004 Revision 2, Question No. 06.04-10 was the third in a sequence of RAI submittals with respect to the issue of the potential for Control Room flooding. The first two RAIs in the series were RAI No. 49-895, Question Number 06.04-8 and RAI 338-2325 Question 06.04-8.

The staff finds applicant's response to RAI No. 501-4004 Revision 2, Question No. 06.04-10 incomplete. The applicant in its response did not provide the following information: (1) a general description of the design of the doors and (2) whether identical or similar doors have been used in similar applications elsewhere

Due to the importance of the control room and recognizing the recommendations in the SRP associated with flood protection. Additional information is needed. As follow-up to the previous RAI, are these doors identical or similar doors are already used elsewhere and can the staff review the operating experience and how will they be tested to show operability (this should be part of the DCD)?

The staff also notes that the applicant has amended the DCD subsection 3.4.1.5.2.2 in accordance with RAI No. 338.2325 Question No. 06.04-8 to allow flood waters to encroach within 0.13ft (≈1.5 inches) of the safety related MCR emergency filter trains. This is very little margin for water surges, waves, splashes, and/or prevent electric shock hazards to operators or water draining into the CRE through ineffective floor seals, etc.. Please explain why this small margin with respect to the integrity of a safety related filter train is acceptable when considering uncertainties.

The staff also notes that the MCR air handling units and filter train units are being located above the CRE. How will the HVAC ductwork be routed to and from these units through the flood waters? What measures will be employed to prevent a path of flood waters in the CRE below?

The Staff could find no evidence in the DCD that an FMEA has been performed on the structures and components (i.e. doors, fire barriers, penetration seals) that make up the CRE. The staff requests that the applicant perform a FMEA that considers each of these issues on the components that make up the CRE and its innermost doors.

Alternatively, other methods to prevent the possibility of 3 feet of fire fighting water accumulating outside the CRE doors can be proposed by the applicant. The applicant could design the plant to divert fire fighting runoff water by drains, canals, floor slopes, barriers, etc., to make it virtually impossible for flood water to even approach the control room and other safety related doors.

06.04-12

The staff found the applicant's overall response to RAI No. 49-895, Question Numbers 06.04-6 as acceptable but incomplete. The applicant responded to the RAI question with the following words:

"During the emergency isolation mode of operation, when there is no positive pressure in the CRE, the access doors will be administratively controlled to prevent there being opened during the event."

The applicant failed to amend Revision 2 of the DCD with the above requirement for the emergency mode of operation. The staff requests that the applicant amend the DCD to ensure that the CRE access doors are administratively controlled closed during the emergency mode of operation.

06.04-13

<u>OPEN ITEM – Follow-up RAI</u> (NRC ID 4387, Q#16732)

The staff finds the applicant's response to RAI 338-2325, Question No. 06.04-6 as insufficient.

The applicant responded by committing to the use of ANSI/ASHRAE Standard 15, "Safety Standard for Refrigeration Systems". This standard, specifically section 8.11, requires a dedicated Ventilation Purge system capable of exhausting air from the Equipment rooms.

The staff found portions of the applicant's response acceptable and the staff recognizes that the COL will likely specify the refrigerant type based on the chiller vendor product specification. However, the DCD applicant either needs to either, 1) select a specific refrigerant and do the RG 1.78 analysis, 2) commit to using a refrigerant that is not toxic at conditions achievable in a nuclear power plant or 3) formally make it the responsibility of the COL applicant in a COL action item. Since the DCD applicant did not provide the specifics of the new design in its response and the proposed solutions did not appear in Revision 2 of the DCD, the staff considers the

issue as an OPEN ITEM until the applicant provides the specifics of the design change.

In particular the staff has the following concerns with the applicant's response of RAI 338-2325, Question No. 06.04-6. There was no statement that the design shall prevent all potential paths for refrigerant gas or fumes reaching the MCR or MCR intake. The potential migration of refrigerant gas and fumes from both the Essential and Non-Essential Chillers to the MCR and other safety related rooms was not addressed. The dependence on doors as barriers has to be further evaluated. In RAI No. 49-895, Question No. 06.04-8 the applicant's response indicated that seals would be used at the MCR doors, not weather-stripping and door sweeps as the applicant stated above. While the applicant proposes the use of ANSI/ASHRAE Standard 15 is good it does not eliminate the potential hazard. The distance between the chiller refrigerant pressure relief exhaust pipe outlet outside the building and CRE fresh air inlets was not addressed. The distance between the ventilation purge system exhaust pipe outlet outside the building and CRE fresh air inlets was not addressed.

In addition, the staff believes that a similar solution or a specific analysis is warranted for the refrigerant in the essential plant chillers housed within the safety related seismic category I Power Source Building. In addition to an asphyxiation hazards when released in excessive amounts, many of the new generation refrigerants have the potential to become deadly toxins given the right ambient conditions (e.g. open flame, excessive heat, electrical arcing, chemical reaction) if released to the internal confines of the Power Source Building.