REQUEST FOR ADDITIONAL INFORMATION 690-4908 REVISION 2

02/03/2011

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

SRP Section: 09.04.05 - Engineered Safety Feature Ventilation System
Application Section: DCD Sections 9.4.5 and 9.3.3

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

09.04.05-19

Technical Rational 1 and 2 of SRP 9.3.3 forms the bases for this follow-up RAI.

In follow-up RAI No. 583-4554, Question No. 09.04.05-11, the staff noted for cooling coils of the ESF ventilation system AHUs, Table 9.4.5-2 does not address two failure modes of concern. (1) What design features will prevent the failure of a essential chilled water cooling coil leak inside the AHUs from adversely impacting the safety related components contained in these same rooms? (2) DCD subsection 9.2.7.2.1.1 reads "*The valve failure position at the loss of a control signal and electrical power is "as is*"." for the "Chilled Water Control Valves". What is the implication of this mode of failure with respect to the ventilation system?

The staff finds the applicant's response to part (2) of the question as acceptable with no further questions. However, the staff finds the applicant's response to part (1) of the question as insufficient. The applicant responded to part (1) for the Class 1E electrical room HVAC system, that:

> **"The AHU housing is designed to facilitate removal of water leaked from cooling coil inside the housing as described in Subsection 3.4.1.5.2.2. In the event leakage from cooling coils occurs, the water will drain to the non-radioactive drain sump via the drain system. Thus, water leakage from a cooling coil failure will not adversely impact the Class 1E electrical room."**

The applicant issued a similar rebuttal to the first question for each of three other subsystems of the ESF ventilation system: (a) safeguard component area HVAC system; (b) emergency feedwater pump area HVAC system; and (c) safety related component HVAC system.

The staff notes that a relevant excerpt from DCD 9.3.3.4.1 "Testing During Construction" reads:

> **"Equipment and floor drain piping in the A/B, access building, R/B, C/V, PS/B and T/B are hydrostatically tested with the static leak test method by filling the lines with water under atmospheric pressure. Pump suction and discharge piping are also tested hydrostatically. Where these tests are not practical, the exposed welds are tested by nondestructive examination. Section 14.2, discusses testing to verify component installation and initial operation, as well as integrated system testing. After performing the testing during construction, the formal testing of the equipment and floor drainage**

system is unnecessary since the operability and integrity of this system is checked during normal periodic inspections."

The staff also notes that the first sentence of 9.3.3.4.2 "Operational Testing Capability" reads:
"The operability of equipment and floor drainage systems dependent on gravity flow can be checked by normal usage."

The staff observes that the construction test is a leak test of the drain piping rather that full flow test and fails to demonstrate that the drain line can accommodate the drainage from a failed cooling cool. In addition, the staff observes that the operational testing is no real test at all. An equipment drain pipe could very well accommodate the AHU condensate drainage from normal plant operations for many years into plant life before the drains lines are perceived as plugged. Normally, such condensate drainage would be of low velocity. This most likely would contribute the buildup of sediments and dirt from the cooling coils and quite possibly to drain line corrosion that could significantly reduce the drain pipes inner diameter. Sufficient AHU condensate drainage could continue for many years into plant life before ultimately failing in this function. However, the loss of the equipment drain pipe's functional ability to drain away the cooling water flow from a failed cooling coil could occur (i.e. in time) well before the safety-related system cooling coil failure occurs.

Based on this, the staff requests that applicant enhance preoperational test 14.2.12.1.116 "Equipment and Floor Drainage System Test" to demonstrate the capability of the equipment and floor drain systems to route worst case flood waters and equipment cooing coil failures away from safety-related equipment throughout the US-APWR plant. In addition, the staff requests additional information about what plant maintenance programs will ensure that the equipment and floor drain lines are capable of their design function throughout the plant life cycle.

Reference: MHI's Response to US-APWR DCD RAI No. 583-4554; MHI Ref: UAP-HF-10177; dated June 22, 2010; ML101760191.