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October 8, 2008

Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Attention: Mr. Jeffrey A. Ciocco,

Docket No. 52-021
MHI Ref: UAP-HF-08229

Subject: MHI's Responses to US-APWR DCD RAI No.68

References: 1) "Request for Additional Information No.68 Revision 0, SRP Section: 09.04.03 – Auxiliary and Radwaste Area Ventilation System, Application Section: Tier 2 FSAR Section 9.4.3," dated September 8, 2008.

With this letter, Mitsubishi Heavy Industries, Ltd. ("MHI") transmits to the U.S. Nuclear Regulatory Commission ("NRC") a document entitled "Responses to Request for Additional Information No. 68 Revision 0".

Enclosed are the responses to 19 RAIs contained within Reference 1.

Please contact Dr. C. Keith Paulson, Senior Technical Manager, Mitsubishi Nuclear Energy Systems, Inc. if the NRC has questions concerning any aspect of the submittals. His contact information is below.

Sincerely,

Y. Ogata

Yoshiki Ogata,
General Manager- APWR Promoting Department
Mitsubishi Heavy Industries, LTD.

Enclosure:

1. Responses to Request for Additional Information No. 68 Revision 0

CC: J. A. Ciocco
C. K. Paulson

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Docket No. 52-021
MHI Ref: UAP-HF-08229

Enclosure 1

UAP-HF-08229
Docket Number 52-021

Responses to Request for Additional Information No. 68 Revision 0

October 2008

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

10/08/2008

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO.68-841 REVISION 0**
SRP SECTION:	**09.04.03 – Auxiliary and Radwaste Area Ventilation System**
APPLICATION SECTION:	**Tier 2 FSAR Section 9.4.3**
DATE OF RAI ISSUE:	**9/08/2008**

QUESTION NO. : 09.04.03-1, RAI 9.4.3-1

The US APWR in section 9.4.3 states that the auxiliary building ventilation system provides proper environmental conditions during normal plant operations throughout all areas of the A/B, R/B and PS/B. Section 9.4.3 goes on to list the systems included in the auxiliary building ventilation system including:

- Auxiliary building HVAC system
- Non-Class 1E electrical room HVAC system
- Main steam/feed water piping area HVAC system, and
- Technical support center (TSC) HVAC system.

The diagram shown in Figure 9.4.3-1, "Auxiliary Building HVAC System Flow Diagram," includes the Fuel Handling Area, the AC/B Controlled Area, and the AC/B Uncontrolled Area. These areas were not included in the list in section 9.4.3. The system description of section 9.4.3.2.1 includes a reference to Figure 9.4.3-1 and Table 9.4.3-1. Table 9.4.3-1 does not include the equipment for the Fuel Handling Area, the AC/B Controlled Area or the AC/B Uncontrolled Area. In addition, Table 9.4-1 provides a list of areas supplied by the Auxiliary Building HVAC system. The list in Table 9.4-1 is not consistent with the systems listed on the diagram in Figure 9.4.3-1. For example, Table 9.4-1 lists the Gas Turbine Area, the Sampling/Laboratory Room, and the Access Control Area that do not appear to be included on the diagram in Figure 9.4.3-1.

DCD Figure 9.4.3-3 "Main Steam/Feed water Piping Area HVAC System Flow Diagram" displays the wrong system. It displays the same system as shown on Figure 9.4.3-2 "Non-Class 1E Electrical Room HVAC System Flow Diagram". Figure 9.4.3-3 must be corrected to display the correct system flow diagram for the Main Steam/Feed water Piping Area HVAC System.

Figure 9.4.3-1 "Auxiliary Building HVAC System Flow Diagram" displays a system interface with the "Containment Ventilation System" (i.e. Containment Low Volume Purge Exhaust Filtration Units). Figure 9.4.6-1 "Containment Ventilation System Flow Diagram (2 of 2)" displays this same system interface. Neither DCD Section 9.4.3 "Auxiliary Building Ventilation System" nor DCD Section 9.4.6 "Containment Ventilation System" provides discussion of the system interface. The staff requests that the DC applicant amend both DCD Section 9.4.3 and Section 9.4.6 with

discussion as to the function/purpose of this system interface.

GDC 60 requirements control the quantities of radioactive materials in gaseous effluents released to the environment from normal ventilation systems. Consistent with SRP 9.4.3, the system description and P&IDs should show all of the auxiliary building ventilation systems to confirm that essential safety-related portions of the auxiliary building ventilation system are correctly identified and are isolable from nonessential portions of the system. Clarify the lists in section 9.4.3, the diagram in Figure 9.4.3-1, Table 9.4.3-1 and Table 9.4-1 to provide a consistent list of systems supplied by the auxiliary building ventilation system and the interfaces. Provide additional information for the inconsistencies to allow for verification that two automatically operated isolation dampers in series separate nonessential portions and components from essential portions.

ANSWER:

Consistency

MHI has revised the figure 9.4.3-1 and the 1st sentence of DCD Subsection 9.4.3 in DCD revision 1 as follows: "The auxiliary building ventilation system is designed to provide proper environmental conditions during normal plant operation throughout all areas of the A/B, R/B, **PS/B and AC/B** ~~and PS/B~~, except for the **CRE** ~~MCR envelop~~, and Class 1E electrical rooms." The fuel handling area is an area inside and a part of Reactor Building. There are no dedicated HVAC system for the Fuel Handling Area, the AC/B controlled area, AC/B uncontrolled area, PS/B area and the controlled and uncontrolled areas of the A/B. These areas are all served by the Auxiliary Building HVAC system. Therefore, the Figure 9.4.3-1 is consistent with the list in DCD Subsection 9.4.3. However, MHI will revise the description and/or the table to provide the consistency to clarify the system description.

Main Steam/Feedwater Piping Area HVAC System Flow Diagram

DCD Figure 9.4.3-3 is revised in DCD revision 1.

System interface

MHI will add the additional description of the interface between the Auxiliary Building HVAC System and the Containment Low Volume Purge System when the filtration unit is utilized.

Automatically operated isolation dampers

The Automatically operated isolation dampers of the Auxiliary building HVAC System (i.e. VAS-AOD-501A thru 508A, VAS-AOD-511,512), are shown in Figure 9.4.5-1, 9.4.5-3 and 9.4.6-1(2 of 2). The areas where these dampers are installed, are an essential part of the Auxiliary Building HVAC System. MHI will revise the flow diagram to include design classification changes.

Impact on DCD

The DCD will be revised to incorporate the followings:

- Revision 2 of DCD section 9.4.3.1.2.1 and 9.4.3.2.1 will include the additional description of the interface between the Auxiliary building HVAC system and the containment low volume purge system and when the filtration unit is utilized.

- Add the information to indicate the design classification change in flow diagram, DCD Figure 9.4.3-1.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

10/08/2008

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO.68-841 REVISION 0**
SRP SECTION:	**09.04.03 – Auxiliary and Radwaste Area Ventilation System**
APPLICATION SECTION:	**Tier 2 FSAR Section 9.4.3**
DATE OF RAI ISSUE:	**9/08/2008**

QUESTION NO. : 09.04.03-1, RAI 9.4.3-2

Provide additional details for the following section 9.4.3 auxiliary building ventilation system calculation procedures and methods, including assumptions and margins. Identify any deviations from the recommended calculational procedures in SRP Section 9.4.3, Revision 3, March 2007:

- Auxiliary building HVAC system calculations supporting the normal and abnormal condition min max temperatures and min max relative humidity shown in Table 9.4-1 sheet 2 of 3.
- Auxiliary building spent fuel pool HVAC system calculations supporting the normal and abnormal condition min max temperatures and min max relative humidity shown in Table 9.4-1 sheet 2 of 3.
- Non-Class 1E Electrical Room HVAC system calculations supporting the normal and abnormal condition min max temperatures shown in Table 9.4-1 sheet 3 of 3 and maintaining the hydrogen concentration below 2% by volume for the battery room.
- Main steam/feed water piping area HVAC system calculations supporting the normal condition min max temperatures shown in Table 9.4-1 sheet 3 of 3.
- Technical support center HVAC system calculations supporting the normal and abnormal condition min max temperatures and min max relative humidity shown in Table 9.4-1 sheet 3 of 3.

ANSWER:

DCD Subsection 9.4.3, Table 9.4-1 shows the design parameter on the temperature and relative humidity of each room, therefore these values are not decided from calculation. These design values of the above system is based on the Utility Requirements Document (URD), requirement for the I&C system, and the experience of Japanese PWR plants. The design values for the TSC are the same as for the MCR (See RAI No.63. 09.04.01-9).

Impact on DCD

There is no impact on the DCD.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

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QUESTION NO. : 09.04.03-1, RAI 9.4.3-3

The US APWR section 9.4.3.3 indicates that the penetration and safeguard component area envelope and auxiliary building HVAC system exhaust line duct isolation damper assemblies are the only components that are seismic Category I safety-related. GDC 2 requires that SSCs important to safety be designed to withstand the effects of a design basis earthquake. SRP 9.4.3 section III.2.A indicates that the P&IDs should clearly indicate the physical divisions between essential and nonessential portions and indicate design classification changes. The flow diagrams shown in figures 9.4.3-1, 9.4.5-1, 9.4.5-3, and 9.4.6-1 do not appear to show the boundaries between seismic Category I safety-related components and nonessential components. Provide additional information and clarify if the seismic classification boundaries for the auxiliary building ventilation system safety related isolation dampers should be shown in the figures. Both the Auxiliary Building HVAC System and the Main Steam /Feed water Area HVAC System either contain Seismic Category I components or have components (e.g. AO valves, ducting etc) in areas where safety-related Seismic Category I components are located. This system attribute is important to plant safety. Neither of the preoperational tests for these two systems require verification as a Prerequisite that seismic II/I construction is complete and that design certification walk down is complete before executing the preoperational test. The staff requests the DC applicant add this requirement as a test "Prerequisite." In addition, given the importance to plant safety, the staff requests that a line item be added to ITACC Table 2.7.5.4-2 Auxiliary Building Ventilation System Inspections, Tests, Analyses, and Acceptance Criteria that seismic II/I construction is complete and that design certification II/I walk down is complete.

ANSWER:

Classification Changes

The classification changes between seismic category I safety related components and nonessential components will be shown on the figures in DCD Section 9.4, revision 2.

Seismic II/I Preoperational Test Prerequisites

Verification that system configuration complies with design is performed during the system turnover and initial checkout during Construction testing as described in revision 1 of the DCD, Subsection 14.2.1.2.1, second paragraph:

> "The objective of the construction and preliminary tests and inspections test phase is to verify and document that construction and installation of equipment in the facility have been accomplished in accordance with design, and that the equipment and components are functional and ready for preoperational testing."

Implementation of this commitment is performed programmatically through the test program and is therefore not included as a prerequisite in the preoperational test abstracts.

Seismic qualification of a (ventilation) system does not affect preoperational testing to verify the system-level operational performance. Therefore, the performance of a preoperational test for a (ventilation) system does not require that the seismic supports for the system be completed. Further, temporary modifications to systems and scaffolding/ladders are frequently required to perform preoperational testing, which may affect the seismic qualification of a system at the time of test performance. Should deficiencies related to the seismic qualification of a system, or portions of a system, be identified following construction completion and turnover, administrative programs ensure that subsequent rework is reviewed for impact on the validity of completed, and remaining, testing as described in Subsection 14.2.4.3.

The requirement for seismic qualification of SSCs as a prerequisite to preoperational testing is not identified in RG 1.68 or RG 1.206.

Based on the above the request for seismic supports to be completed and the completion of design certification II/I walk downs is not to be included as a prerequisite in any of the preoperational testing abstracts for ventilation systems.

Seismic qualification of systems is a prerequisite for fuel loading and subsequent criticality, low power testing and power ascension testing. Therefore, a requirement for ITAAC related to seismic qualification of SSCs being completed prior to fuel loading would be appropriate.

Impact on DCD

The relevant Flow diagrams will be revised to include the classifications of the system.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

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QUESTION NO. : 09.04.03-1, RAI 9.4.3-4

The US APWR figure 9.4.3-1 shows continuation symbols to the Charging Pump Areas and the Annulus Emergency Exhaust Filtration Unit Areas within the dotted line boundary designated the R/B Controlled Area. The Charging Pump Areas and the Annulus Emergency Exhaust Filtration Unit Areas are shown on figure 9.4.5-5, "Safety Related Component Area HVAC System Flow Diagram." GDC 60 requirements control the quantities of radioactive materials in gaseous effluents released to the environment from normal ventilation systems. The Charging Pump Areas and the Annulus Emergency Exhaust Filtration Unit Areas are both safety related component areas inside of the Reactor Building Controlled Area. These two areas do not have double isolation from the rest of the normal Auxiliary Building HVAC System. From DCD Section 9.4.3.1.1.1, "During a design basis accident the Penetration and the Safeguard component areas are isolated in order that operation of the Annulus Emergency Exhaust system maintains a negative pressure and mitigates the release of airborne fission products to the atmosphere". The Annulus Emergency Exhaust Filtration Unit Areas contain the Annulus Emergency Exhaust Filtration Units which will be running during a design basis accident. The charging pumps are safety related and in the reactor building controlled area. Provide additional information and clarify why the Annulus Emergency Exhaust Filtration Unit Areas and the Charging Pump Areas do not switch over to be exhausted through the Annulus Emergency Exhaust Filtration Units and do not have double isolation between these two controlled areas and the rest of the uncontrolled auxiliary building.

ANSWER:

As shown in Figure 9.4.3-1 "Auxiliary Building HVAC system Flow Diagram", one supply and one exhaust line damper are normally open to provide and to maintain slightly negative pressure in the two Annulus Emergency Exhaust Filtration Unit areas and two charging pump Areas during normal operation. During normal operation, a high radiation signal from a local exhaust duct radiation detector will alarm in the main control room. That area's normal exhaust by the Auxiliary Building HVAC system is manually isolated, and the exhaust air is manually diverted to Containment Low Volume Purge System. However, during a design base accident or LOOP both the Auxiliary Building HVAC System and the Containment Volume Low Purge System are

isolated and not in service. During a design basis accident or LOOP, the areas are cooled by individual air handling units upon receipt of high temperature signal as shown in Figure 9.4.5-1, 9.4.5-3, 9.4.5-4 and 9.4.5-5.

Annulus Emergency Exhaust filtration Unit Areas contain the Annulus Emergency Exhaust filtration Units, which will be running during a design basis accident. The upstream side of the filter unit is under negative pressure, while the filter unit is in operation. Therefore, there is less of a chance for a release of contamination and not having isolation dampers is justifiable.

The Charging Pumps are safety related and in the reactor building controlled area. The charging pumps transfer purified water from CVCS purification loop or makeup water from other system, and does not transfer highly radioactive water from RCS under a design basis accident. Therefore, there is less of the radiological effect of a leakage from the charging pumps and not having isolation dampers is justifiable.

The rest of the uncontrolled area of the Auxiliary Building is normally ventilated by the A/B HVAC AHU supply fans and the unfiltered air is exhausted by the A/B HVAC exhaust fans. Under normal operation, the unfiltered exhaust air is continuously monitored for airborne radiation and is exhausted by the exhaust fans via the plant vent stack.

When the radiation monitors senses higher than allowed limits, alarms are activated and the spent fuel pool area is manually isolated from the A/B HVAC system and the exhaust is manually directed from the A/B HVAC system to the containment low volume purge exhaust system, where the exhaust air passes through a filtration unit that includes HEPA filter and charcoal adsorber.

The current design of the A/B HVAC system satisfies the dose evaluation during normal operation and anticipated operational occurrences as described in DCD revision 1, Subsection 11.3.3 and Subsection 12.4.

Impact on DCD

There is no impact on the DCD.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

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QUESTION NO. : 09.04.03-1, RAI 9.4.3-5

The US APWR Section 9.4.3.1 indicates that only specified isolation damper assemblies are safety related seismic Category I and that required ductwork will be supported to prevent adverse interaction with other safety-related systems during a seismic event. Section 9.4.3.1.1.3 indicates that the Main Steam/Feed water Piping Area HVAC System is neither safety-related nor seismic Category 1 qualified but does have required ductwork that will be supported to prevent adverse interaction with other safety-related systems during a seismic event. GDC 2 acceptance is based on guidance of Regulatory Guide 1.29 Position C.1 and C.2. These Regulatory Positions address seismic Category I and non-seismic over seismic Category I requirements respectively. There is no specific reference to Regulatory Guide 1.29 Positions C.1 and C.2 in section 9.4.3. Figure 9.4.3-1 appears to show Auxiliary Building Ventilation System Ducting that continues into safety-related areas such as the Safety Related Component area shown on Figure 9.4.5-5. Provide additional information to clarify compliance with Regulatory Guide 1.29 and if there are additional locations where duct work will have to be supported to prevent adverse interactions with safety related equipment. Provide references to appropriate sections of the DCD that address seismic design. Also, provide additional information on nonessential portions of the Auxiliary Building Ventilation System or if there are other systems or structures not designed to seismic Category I standards and located close to the safety-related seismic Category I isolation dampers that could preclude their operation.

Specifically regarding the spent fuel storage area; from DCD Section 9.1.2.2.2 spent fuel storage "The spent fuel storage pit is located within the seismic Category I reactor building fuel handling area. The walls of the spent fuel storage pit are an integral part of the seismic Category I reactor building structure. The facility is protected from the effects of natural phenomena such as earthquakes (Section 3.7), wind and tornados (Section 3.3), floods (Section 3.4), and external missiles (Section 3.5). The facility is designed to maintain its structural integrity following a safe shutdown earthquake and to perform its intended function following a postulated event such as a fire. Refer to Subsection 1.2.4.1 for further discussions of the reactor building fuel handling area."

The following are excerpts from Regulatory Guide 1.29 are applicable

Regulatory Position C.1 "The following SSCs of a nuclear power plant, including their foundations and supports, are designated as Seismic Category I and must be designed to withstand the effects of the SSE and remain functional. The titles and functions of these Seismic Category I SSCs for LWR designs are based on existing technology... k. systems or portions thereof that are required for (1) monitoring and (2) actuating systems important to safety l. the spent fuel storage pool structure, including the fuel racks "

Regulatory Position C.2 "Those portions of SSCs of which continued function is not required but of which failure could reduce the functioning of any plant feature included in items 1.a through 1.q above to an unacceptable safety level or could result in incapacitating injury to occupants of the control room should be designed and constructed so that the SSE would not cause such failure."

Regulatory Position C.3 reads "3. At the interface between Seismic Category I and non-Seismic Category I SSCs, the Seismic Category I dynamic analysis requirements should be extended to either the first anchor point in the non-seismic system or a sufficient distance into the non-Seismic Category I system so that the Seismic Category I analysis remains valid."

DCD Table 3.3-2 "Classification of Mechanical and Fluid Systems, Components, and Equipment (Sheets 44 & 45 of 50)" indicates that the components of the Auxiliary Building HVAC System are all "NS" (i.e. non seismic). This conflicts with the information contained in the first bullet DCD Section 9.4.3.1.1.1 "Auxiliary Building HVAC system" which reads "The auxiliary building HVAC system has the capability to close the safety-related, seismic Category I isolation dampers during a design basis accident." In addition to resolving this conflict, the staff requests that the DC applicant provide additional information as to how the Auxiliary Building HVACs system components (e.g. ductwork) within the Fuel Handling Area satisfies the requirements of Regulatory Positions C.2 and C.3 of DCD Section 3.2.1.1.2 Seismic Category II.

ANSWER:

The Main Steam/Feedwater Piping HVAC system is housed in the MS / FDW piping area. The ductwork will drop down into the piping area and be routed in the piping area as required. Main Steam/Feedwater piping is safety-related and seismic category I. Though the HVAC system is not required to function after a seismic event, it is imperative that the associated ductwork, in the piping area, be seismically supported such that it will not fail or fall onto the Main Steam/Feedwater piping and affect its operation. Therefore, this ductwork would require RG 1.29, item C2 compliance.

MHI will include statements, regarding suspended ductwork, which are more substantial with respect to describing its characteristics and potential impacts on other systems in the revision of DCD. For instance with regard to the above case, employing a statement such as "the Main Steam/Feedwater Piping HVAC system ductwork, located over safety-related seismic category I piping, is not required to function after a seismic event but will be supported in accordance with seismic category II requirements"

All safety isolation dampers of the Auxiliary Building HVAC system are located in the Reactor Building and these assemblies are anchored in the Reactor Building as seismic category I structure.

It is expected that the Auxiliary Building HVAC system ductwork in the Fuel Handling Area, in the Reactor Building and in the Power Source Building will be designed to seismic category II

requirements if the ductwork is routed in the area housing the safety-related structure, systems or components.

Impact on DCD

1) In all HVAC system sections of the DCD (including Section 9.4.3), where conditions are known to apply or expected, include a more descriptive statement regarding ductwork attached to safety-related seismic category I isolation dampers to clearly denote seismic requirements (per required RGs, Codes, etc) of the ductwork. Provide references to appropriate sections of the DCD that address seismic design.
2) Revise Table 3.2.2 (not 3.3.2), Sheet 44 of 50, to denote that ductwork (for the Main Steam/Feedwater Piping HVAC system) in the piping area, is designed to seismic category II requirements.
3) Revise Table 3.2.2, Sheet 45 of 50, to denote that ductwork (for the Auxiliary. Building HVAC system) over safety-related equipment is to be designed to seismic category II requirements.
4) Include a statement in the appropriate DCD section(s) denoting the Auxiliary Builidng HVAC system ductwork are designed to non-seismic and seismic category II. The ductwork is designed to seismic category II requirements in the Fuel Pool Handling area, in the Reactor Building and in the Power Source Building if the ductwork is routed in the area housing safety-related structure, systems or components.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

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10/08/2008

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Mitsubishi Heavy Industries

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QUESTION NO. : 09.04.03-1, RAI 9.4.3-6

SRP 9.4.3 section III.1 requires a review to verify that the system description and temperature limits for the areas serviced are properly shown. The US APWR DCD section 9.4.3.2.2 indicates the Non-Class 1E Electrical Room HVAC System has a smoke purge mode of operation. However, this smoke mode is not shown in Table 9.4-1, sheet 3 as an abnormal condition like LOOP or SBO. Clarify if Table 9.4-1 sheet 3 should include an additional smoke purge mode under abnormal conditions. Also provide additional information and clarify the operation of the HVAC system supplying the non-Class 1E battery spaces during an abnormal condition like LOOP or SBO event.

ANSWER:

Smoke Purge Mode

The smoke purge mode of operation is not considered an abnormal condition. The smoke purge mode of operation is normally used after a fire has been extinguished. Typically, when smoke is detected, the ventilation system is automatically shutdown to minimize the spread of the smoke. After a fire in an area has been extinguished, the ventilation system is manually placed into the smoke purge mode of operation for quick removal of smoke from the area. The smoke purge mode of operation serves no safety-related function.

According to the SRP, the reviewer determines whether the ventilation system or portions of the system have been designed or need to be designed as safety-related systems and reviews them with respect to functional performance requirements during adverse environmental conditions, normal operation, anticipated operational occurrences and after a postulated accident, including the LOOP. The smoke purge portion of the Non-Class 1E Electrical Room HVAC System does not serve any safety-related function and has no safety design bases.

Therefore, DCD Table 9.4-1 does not have to include smoke purge mode of operation under abnormal conditions.

Non-Class 1E Battery Spaces

During normal plant operation coincident with a LOOP the HVAC system serving the Non-Class 1E Battery Room is lost shortly until the Alternate AC power is made available and the minimum and maximum temperatures are maintained as shown in Table 9.4-1, sheet 3. It should be noted that during a LOOP and SBO event there would be no heat load and no hydrogen generation in the battery room. Any residual heat load would be considered negligible.

During a SBO, ventilation to the Non-Class 1E Battery Room HVAC is lost. Table 9.4-1 indicates the design parameters when the HVAC equipment is in operation. It is not intended to indicate room conditions following a loss of ventilation that would occur with a SBO event.

Impact on DCD

There is no impact on the DCD.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

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QUESTION NO. : 09.04.03-1, RAI 9.4.3-7

US APWR DCD section 9.4.3.4 invokes the use of several industry standards listed below for test purposes, but does not list the specific standards. 10CFR52.47 "Contents of Applications" is the basis for this request. Section 9.4.8 "References" does not list these standards. Provide the specific standards for this testing and include them in the Reference section 9.4.8.

- Air Movement and Control Association Standards in regard to factory-testing of air handling units.
- American Society of Heating, Refrigerating and Air-Conditioning Engineers Standards in regard to testing air filters.
- Air Conditioning and Refrigeration Institute Standards in regard to performance ratings for cooling coils.
- Sheet Metal Air-Conditioning Contractors' National Association in regard to leak testing air distribution ductwork.
- Add the section 9.4.8 reference for RG 1.140 cited in section 9.4.3.4.4 "Technical Support Center (TSC) HVAC System."

ANSWER:

Section 9.4.3.4 states that air-handling equipment is factory tested in accordance with Air Movement and Control Association (AMCA) standards. Currently the AMCA standards for air handing equipment are as follows:

AMCA 210-2007 "Laboratory Methods of Testing Fans for Rating"
AMCA 230-1999 "Laboratory Methods of Testing Air Circulator Fans for Rating"
AMCA 802-2002 "Industrial Process / Power Generation Fans: Establishing Performance Using Laboratory Models"

Air filters are tested in accordance with American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) standards. Currently the ASHRAE standards for testing air filters are as follows:

ASHRAE 52.1-1992 "Gravimetric and Dust Spot procedures for Testing Cleaning Devices Used in General Ventilation for Removing Particulate Matter"
ASHRAE 52.2-2007 "Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size".

Cooling Coils are tested in accordance with Air Conditioning and Refrigeration Institute (ARI) standards. Currently the ARI standards for testing cooling coils are as follows:

ARI 410-2001 "Forced-Circulation Air-Cooling and Air-Heating Coils"
ARI 430-1999 "Central Station Air Handling Units"
ARI 440-2005 "Performance Rating of Room Fan-coils"

Air distribution ductwork is leak-tested in accordance with the Sheet Metal and Air-conditioning Contractor's National Association. Currently the SMACNA standards for the ductwork are as follows:

SMACNA 1143-1985 "HVAC Air Duct Leakage Test Manual – First Edition; Technical Research Update – 92"
SMACNA 1780 – 2002 "HVAC Systems Testing, Adjusting and Balancing – Third Edition"

Reference to RG 1.140 cited in Section 9.4.3.4.4 is already provided in DCD Section 9.4.8, Reference 15. No need to repeat the reference again.

Impact on DCD

Add the following references to Section 9.4.8:

- AMCA 210-2007 "Laboratory Methods of Testing Fans for Rating"
- AMCA 230-1999 "Laboratory Methods of Testing Air Circulator Fans for Rating"
- AMCA 802-2002 "Industrial Process / Power Generation Fans: Establishing Performance Using Laboratory Models"
- ASHRAE 52.1-1992 "Gravimetric and Dust Spot procedures for Testing Cleaning Devices Used in General Ventilation for Removing Particulate Matter"
- ASHRAE 52.2-2007 "Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size"
- ARI 410-2001 "Forced-Circulation Air-Cooling and Air-Heating Coils"
- ARI 430-1999 "Central Station Air Handling Units"
- ARI 440-2005 "Performance Rating of Room Fan-coils"
- SMACNA 1143-1985 "HVAC Air Duct Leakage Test Manual – First Edition; Technical Research Update – 92"
- SMACNA 1780 – 2002 "HVAC Systems Testing, Adjusting and Balancing – Third Edition"

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

10/08/2008

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO.68-841 REVISION 0**
SRP SECTION:	**09.04.03 – Auxiliary and Radwaste Area Ventilation System**
APPLICATION SECTION:	**Tier 2 FSAR Section 9.4.3**
DATE OF RAI ISSUE:	**9/08/2008**

QUESTION NO. : 09.04.03-1, RAI 9.4.3-8

The US APWR Table 9.4.3-1 Equipment Design Data does not list all of the components in the air handling units shown in DCD Figures 9.4.3-1, 2, 3, and 4. For example the Technical Support Center Emergency Filtration Unit in Table 9.4.3-1 lists the After-Filters but none of the filters shown on Air Handling Units for any of the other areas are listed. Also, Table 1.9.2-9, "US-APWR Conformance with Standard Review Plan Chapter 9 Auxiliary Systems" lists an exception for section 9.4.3 in regard to GDC 60 acceptance which is based on the guidance of Regulatory Guides 1.52 and 1.140. The exception states, "*With exception of TSC HVAC system, not provided air clean up function.*" Regulatory Guide 1.140 for normal atmosphere cleanup systems Position C.3.1 states that typical systems should have HEPA filters and carbon adsorbers and goes on to state that whenever a normal atmosphere cleanup system is designed to remove only particulate matter, a component for iodine adsorption need not be included. Regulatory Guide 1.52 for ESF atmosphere cleanup systems Position C.3.1 also states HEPA filters and carbon adsorbers should be used. DCD section 9.4.3.1.2.1 states the Auxiliary Building HVAC system maintains dose levels due to airborne radioactivity below the allowable values set by 10 CFR 20 by supplying and exhausting sufficient air flow (see also RAI 9.4.3-9). Provide additional information or references to the appropriate DCD sections regarding how the Auxiliary Building HVAC systems with no HEPA filters or carbon adsorbers during normal operation and only HEPA filters, no carbon adsorbers, in the Annulus Emergency Exhaust Filtration Unit during the ESF mode meets the limits specified in 10 CFR Part 20.

ANSWER:

List of the components:

- Low efficiency (10-35%) and medium efficiency (45%-75%) filters for the Auxiliary Building Air Handling Unit
- Low efficiency (10-35%) pre-filters and high efficiency (85%-95%) filters for the Non-Class 1E electrical Room Air Handling Unit
- Low efficiency (10-35%) filter to the Main Steam / Feedwater Piping Areas Air Handling Unit

- Low efficiency (10-35%) and high efficiency (85%-95%) filters for the Technical Support Center Air Handling Unit
- High efficiency (85% - 95%) pre-filter for the Technical Support Center Emergency Filtration Unit

Table 9.4.3-1 will be revised to include information for all of the components in the air handling units as shown in DCD Figures 9.4.3-1, 2, 3, and 4.

Comply with 10CFR20

The radiological controlled areas are ventilated by the Auxiliary Building HVAC System. The exhaust air from the radiological controlled areas is not filtered before release to the environment via the vent stack. During the normal plant operation, the release of radioactive materials entrained in gaseous effluents does not exceed the limits specified in 10 CFR 20 as described in DCD Subsection 11.3.3.1.

The Auxiliary Building HVAC System is not used in postulated accidents. During the postulated accidents, the annulus emergency exhaust system is used to maintain a negative pressure in the penetration and safeguard component areas relative to adjacent areas and the exhaust air from the penetration and safeguard component areas is filtered by only HEPA filters before release to the environment via the vent stack. Chapter 15, Subsection 15.6.5 analyzes the DBA LOCA. The EAB and LPZ doses are shown to meet the 10 CFR 50.34 dose guidelines. Chapter 15, Subsection 15.4.8 analyzes the DBA rod ejection accident. The resultant doses are well within the guideline limit of 25 rem identified in 10 CFR 50.34. Both analyses meet the criteria without carbon adsorbers.

SRP 9.4.3, Technical Rational, 5 states: "Meeting these requirements provides assurance that release of radioactive materials entrained in gaseous effluents will not exceed the limits specified in 10 CFR Part 20 for normal operation and anticipated operational occurrences." Therefore, MHI believes that the annulus emergency exhaust system is not required to meet the 10 CFR 20.

SRP Acceptance Criteria for GDC 60 is based on the guidance of RG 1.52 and RG 1.140 as related to design, inspection, testing, and maintenance criteria for post-accident and normal atmosphere clean up systems in light-water-cooled nuclear power plants.

Although by virtue of monitoring airborne radiation in the exhaust duct, and providing an alarm to alert on high radiation, this function enables the system to comply with GDC 60 requirements, this system does not incorporate the clean up system that complies with RG 1.52 or RG 1.140. Therefore, MHI concluded the A/B HVAC system is not required to meet the GDC 60.

Impact on DCD

DCD Table 9.4.3-1 will be revised to include information for all of the components in the air handling units as shown in DCD Figures 9.4.3-1, 2, 3, and 4.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

10/08/2008

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO.68-841 REVISION 0**
SRP SECTION:	**09.04.03 – Auxiliary and Radwaste Area Ventilation System**
APPLICATION SECTION:	**Tier 2 FSAR Section 9.4.3**
DATE OF RAI ISSUE:	**9/08/2008**

QUESTION NO. : 09.04.03-1, RAI 9.4.3-9

DCD section 11.3.1.4 for the Gaseous Waste Management System (GWMS) states, "to dilute this gas further, it is mixed with the A/B ventilation flow before it is discharged to the environment." DCD section 11.3.1.4 goes on to state the GWMS is designed so that releases of radioactive gases are below the concentration limits of 10 CFR 20. The HVAC ventilation flow provides dilution for the GWMS release in the vent stack and discharge isolation valves close on low ventilation system exhaust flow rate. DCD section 11.3.4 also states that the ventilation system is designed in accordance with Regulatory Guide 1.140 and is described in Chapter 9, Section 9.4. No reference to or description of the GWMS and its interface points with the A/B ventilation system could be found in DCD section 9.4 or 9.4.3. This system interface should also be identified as an attribute in the Interface Requirements section of Tier 1 Section 2.7.5.4 Auxiliary Building Ventilation System (ABVS). Provide additional information and clarification in DCD section 9.4.3 and Tier 1 Section 2.7.5.4 on where and how the GWMS interfaces with the A/B ventilation system.

ANSWER:

MHI will add the system interface with the Gaseous waste Management System (GWMS) and revise the description in order to provide the consistency between the Auxiliary Building HVAC system and the GWMS.

"Interface requirements" described in Tier 1 is defined as the "design attributes and performance characteristics that ensure that the site-specific portion of the design is in conformance with the certified design." Therefore, MHI will not be identifying any attributes and performance characteristics in the Interface Requirements section of Tier 1 Subsection 2.7.5.4

Impact on DCD

The DCD will be revised to incorporate the following:

- Add the system interface with the GWMS and provide the consistency between the auxiliary building HVAC system and the GWMS.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

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QUESTION NO. : 09.04.03-1, RAI 9.4.3-10

SRP 9.4.3 sections III.1, III.3 and III.4 make reference to use of a failure modes and effects analysis, as appropriate, to confirm that the essential safety-related portions of the system are capable of functioning in spite of the failure of any active component, in the event of an earthquake, during loss of offsite power, or a concurrent single active failure. DCD section 9.4.3 does not contain any references to or COL items for a failure modes and effects analysis for the Auxiliary Building Ventilation System. Provide additional information and clarify if a failure modes and effects analysis is necessary for the Auxiliary Building Ventilation System.

ANSWER:

A failure modes and effects analysis will be performed for the essential safety-related portions of the Auxiliary Building Ventilation System and referenced in DCD Subsection 9.4.3 revision 2.

Impact on DCD

A failure modes and effects analysis will be performed for the essential safety-related portions of the Auxiliary Building Ventilation System and referenced in DCD Subsection 9.4.5 revision 2.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

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QUESTION NO. : 09.04.03-1, RAI 9.4.3-11

GDC 2 requires addressing the effects of earthquakes and SRP 9.4.3 section III.2.B review addresses proper seismic classification. DCD Table 3.2-2 "Classification of Mechanical and Fluid Systems, Components, and Equipment" (sheet 45 of 50) lists Equipment Class 3 and "NS" (i.e. Nonseismic) for the Isolation Dampers of the Auxiliary Building Heating Ventilation and Air Conditioning System. The fourth paragraph of DCD Section 9.4.3.2.1 "Auxiliary Building HVAC System" reads "The penetration of the penetration and safeguard component area and the discharge duct of the auxiliary building HVAC system are provided with safety-related isolation dampers that automatically close upon receipt of the ECCS actuation signal. The penetration and safeguard component area supply and exhaust line isolation damper assemblies are equipment class 2, seismic Category I and the auxiliary building HVAC system exhaust line isolation damper assemblies are equipment class 3, seismic I." The staff requests that the applicant amend Table 3.2-2 to reflect the existence of Class 2 and Class 3 Seismic I Isolation Dampers.

ANSWER:

The penetration and safeguard component areas supply and exhaust line isolation damper assemblies are equipment class 2, seismic category I and the auxiliary building HVAC system exhaust line isolation damper assemblies are **equipment class 2, seismic category I.** MHI has revised the description to incorporate above system description. MHI has also revised the table 3.2-2 to be consistent with DCD Subsection 9.4.3.2.1.

Impact on DCD

There is no impact on the DCD.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

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RAI NO.:	**NO.68-841 REVISION 0**
SRP SECTION:	**09.04.03 – Auxiliary and Radwaste Area Ventilation System**
APPLICATION SECTION:	**Tier 2 FSAR Section 9.4.3**
DATE OF RAI ISSUE:	**9/08/2008**

QUESTION NO. : 09.04.03-1, RAI 9.4.3-12

SRP 9.4.3 sections III.1 & III.2.A address reviews to ensure the P&IDs show the equipment used, divisions between essential and nonessential portions of the system and the temperature limits for the areas serviced. The second paragraph of DCD Section 9.4.3.2.1 Auxiliary Building HVAC System reads "The cooling coil of each air handling unit is supplied with chilled water from the non-essential chilled water system (Section 9.2.7)." The following deficiencies/discrepancies were noted by the staff during its review of DCD Section 9.2.7:

- There is no flow diagram (i.e. Figure) of the Non-Essential Chilled Water System contained in DCD Section 9.0. This missing Figure should display all the heat loads (i.e. number of cooling coils/per AHU) that the Non-Essential Chilled Water System supplies with chilled water (e.g. Auxiliary Building AHUs VAS-AAH-201A/B of Figure 9.4.3-1). The staff requests that this flow diagram be added to the DCD.
- The last paragraph of DCD Section 9.2.7 "Chilled Water System" for the "Non-Essential Chilled Water System" reads "The function of the non-essential chilled water system is to provide, during plant normal operation and LOOP, chilled water for the plant air cooling and ventilation systems serving the non safety-related areas." Table 8.3.1-5 "Electrical Load Distribution-AAC GTG Loading (LOOP Condition)" does not list any of the Auxiliary Building Ventilation Systems as a LOOP load. Do any of the MCCs listed on Table 8.3.1- 5 (i.e. P11, P12, P21 & P22) supply power during a LOOP to any other Auxiliary Building Ventilation System besides the Non-class 1E Electrical Room HVAC System and the TSC HVAC System? If so, the staff requests that the DC applicant revise Table 9.4-1 "Area Design Temperature and Relative Humidity (sheet 2 of 3)" to include Abnormal Conditions "Min" and "Max" LOOP temperatures for all Areas served by the Auxiliary Building HVAC System and powered during a LOOP event.

ANSWER:

Flow diagram and Equipment data

MHI will add the flow diagram and equipment design data of the Non-Essential Chilled Water System in DCD Subsection 9.2.7. The flow diagram also indicates design classifications.

Area design temperature and humidity
During a LOOP condition, the Non-Class 1E Electrical Room HVAC System and TSC HVAC are available to be powered by the MCCs. The Auxiliary Building HVAC System and Main Steam/Feedwater Piping Area HVAC System are not powered by the Alternate ac power source. Because the areas served by Auxiliary Building HVAC System and Main Steam/Feedwater Piping Area HVAC System are not required to maintain the design temperature and humidity design limits during a LOOP.

Impact on DCD

The DCD will be revised to incorporate the following:

- Add the flow diagram and equipment data of the Non-Essential Chilled Water System.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

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APPLICATION SECTION:	**Tier 2 FSAR Section 9.4.3**
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QUESTION NO. : 09.04.03-1, RAI 9.4.3-13

GDC 60 requires provisions to be included in the design to ensure suitable controls on the release of radioactive materials in gaseous effluents during normal reactor operation, including anticipated operational occurrences. DCD Section 9.4.3.1.2.1 contains the following three design bases:

- Keep dose levels due to the airborne radioactivity below the allowable values set by 10 CFR 20 by supplying and exhausting sufficient airflow.
- Control exhaust fan airflow continuously and automatically at a predetermined value to maintain a slightly negative pressure in the controlled areas relative to the outside atmosphere and minimize exfiltration from the radiological controlled areas during normal plant operation.
- Maintain airflow from areas of low radioactivity to areas of potentially higher radioactivity.

The difference of the Unit Air Flow Capacities for the Auxiliary Building Air Handling Unit(s) and the Auxiliary Building Exhaust Fan(s) listed in Table 9.4.3-1 ensures a 12,000 cfm differential. This differential thereby ensures a negative building pressure. What is the design value for this negative building pressure? Without a detailed flow diagram of the supply flows and exhaust flows to and from the controlled areas of Figure 9.4.3-1, there is nothing contained within Tier 1 or Tier 2 of the DCD that ensures the above three design bases. The staff requests the addition of a detailed flow diagram to the DCD that ensures the COL applicant satisfies the intent of the three above design basis.

DCD Section 9.4.3.4 "Inspection and Testing Requirements" reads "Preoperational testing of the auxiliary building ventilation system is performed as described in Chapter 14, Verification Programs, to verify that system is installed in accordance with plans and specifications. All HVAC system airflows are balanced in conformance with the design flow, path flow capacity, proper air mixing temperature throughout the A/B, R/B and PS/B."

There is nothing within DCD Section 14.2.12.1.99 "Auxiliary Building HVAC System Preoperational Test" that reflects the above passage about "Preoperational Testing" and that

ensures that the COL applicant will satisfy the three above design bases. The staff requests that the DC applicant amend Section 14.2.12.1.99 to address this deficiency.

ANSWER:

The DCD contains design flow rates in Table 9.4.3-1 for the Auxiliary Building AHU and exhaust fan for normal operation. During normal plant operation, total supply airflow from two 50% A/B AHU is 196,000 cfm and the total exhaust airfow is 208,000 cfm. Hence, the radiological controlled areas served by the A/B HVAC system, as identified in Figure 9.4.3-1, are maintained under a constant and slightly negative pressure. The exhaust airflow rate is determined by approximately 10% differential between supply and exhaust airflow to a slightly negative pressure to with respect to the outside environment to prevent the uncontrolled leakage of potentially containment air to the outside environment.

The third paragraph in DCD Section 9.4.3.4 is validated in DCD Section 14.2.12.1.99 Item C, point 3 as, "Verify Design Airflow". It implies that proper procedure and test method is employed to establish proper air distribution and path flow capacities for all the areas served by the auxiliary building HVAC system to satisfy its design heat load and that ductwork to each space will be sized accordingly and configured to ensure satisfactory mixing and temperature control. However, in the final design the entire system "will be balanced" to maintain the consistency of negative pressure.

With reference to the three design bases in Section 9.4.3.1.2.1, the following statements in Chapter 14 satisfies them.

DCD Section 14.3.4.8 "ITAAC for Radiation Protection" Second, fourth and fifth bullet identifies the ITAAC for those SSCs that provide containment of radioactivity, ventilation of airborne contamination and control/monitor radiation (or radioactivity concentration) for normal operations and during accident. The above stated bullets satisfies that all ventilation system have been designed to maintain the does level within the limits of 10 CFR 20, maintain a negative pressure and maintain an airflow from low to high radioactivity areas.

Also per DCD Section 14.2.1, "Summary of Test Program and Objectives" preoperational testing is performed on those SSCs, which are required to process, store, control and/or limit the release of radioactive materials.

Hence, based on the statement in Section 9.4.3.4 and in Section 14.2.1.12.1.99, Section 14.2.1 and Section 14.3.4.8 the three design bases are adequately reflected by the preoperational testing already described in the DCD without any further modification to DCD.

Impact on DCD

There is no impact on the DCD.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

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APPLICATION SECTION:	**Tier 2 FSAR Section 9.4.3**
DATE OF RAI ISSUE:	**9/08/2008**

QUESTION NO. : 09.04.03-1, RAI 9.4.3-14

SRP 9.4.3 sections III.1 & III.2.A address reviews to ensure the P&IDs show the equipment used and divisions between essential and nonessential portions of the system are shown. The 6th paragraph of DCD Section 9.4.3.2.1 "Auxiliary Building HVAC System" reads "In summer, the outside supply airflow is cooled by the air handling unit's chilled water cooling coil. Upon supply air temperature rise, as sensed by thermostats located in the supply air duct, the air handling unit's cooling coil flow control valves allow for an increase in the chilled water flow through the cooling coils." Figure 9.4.3-1 does not display these thermostatically controlled temperature control valves providing non-essential chilled water to the Auxiliary Building Air Handling Units. This system interface with the Non-essential Chilled Water System is fundamental to the performance design basis of the Auxiliary Building HVAC System. The staff requests that the DC applicant amend all figures for the Auxiliary Building Ventilation System (i.e. Figures 9.4.3-1 through 9.4.3-4) to display this system interface.

The 6th paragraph of DCD Section 9.4.3.2.1 "Auxiliary Building HVAC System" reads "In winter, the supply air is heated by the air handling unit heating coil to maintain the supply air temperature at the design set point. Supplemental heating with local unit heaters is provided in areas with higher heat loss, due to their proximity to exterior walls." Table 9.4.3-1 does not reflect the site specific existence of these area heaters. The sizing of these in-duct heaters defaults to the COL applicant in accordance with COL item 9.4(5). Eventually, these site-specific area heaters will be added to Table 9.4.3-1. A "place holder" for these in-duct heaters with a COL item 9.4(5) in Table 9.4.3-1 seems appropriate to help ensure that COL applicants address this need.

ANSWER:

<u>The System Interface</u>

MHI concurs with NRC recommendation. Figure 9.4.3-1 through 9.4.3-4 will be revised to display the Non-Essential Chilled Water System interface. And add flow diagrams of the Non-Essential Chilled water in DCD Subsection 9.2.7. (See, RAI 9.4.3-12)

The in-duct heater capacity

MHI believes that the design basis and the capacity of in-duct heaters are not required to be described in DCD because of the following reasons.

- In duct heaters are not major component.
- Regulatory Guide 1.206, C.I.9.4.3.2 "System Description" states: "The system description should include the system' major components, key parameters, essential controls, and operating mode."

Impact on DCD

The DCD will be revised to incorporate the followings:

- For all figures (i.e.9.4.3-1 thru 9.4.3.-4), revise all AHU cooling coil depictions to include inlet and outlet chilled water piping, and control valve showing link(s) to required thermostats and temperature elements, etc., and references to the non-essential chilled water system interface.
- Add the flow diagrams of the Non-Essential Chilled Water System in DCD Subsection 9.2.7. (See, RAI 9.4.3-12)

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

10/08/2008

US-APWR Design Certification

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Docket No. 52-021

RAI NO.:	**NO.68-841 REVISION 0**
SRP SECTION:	**09.04.03 – Auxiliary and Radwaste Area Ventilation System**
APPLICATION SECTION:	**Tier 2 FSAR Section 9.4.3**
DATE OF RAI ISSUE:	**9/08/2008**

QUESTION NO. : 09.04.03-1, RAI 9.4.3-15

Fire protection requirements in 10 CFR 50.48, "Fire Protection" and associated NRC regulatory guide 1.189 Revision 1 address preventing smoke from migrating from one fire area to another so that safe shutdown capability is not adversely affected. DCD Section 9.4.3.2.1 last paragraph reads, "Smoke detectors located in the supply and exhaust air ducts detect the presence of smoke and activate an alarm in the MCR. If the smoke is detected in the supply or exhaust ducts, the auxiliary building HVAC system is manually shutdown." DCD Section 9.5.1.2.7 reads "Ventilation system fire dampers close automatically against full airflow, if required, on high temperature to limit the spread of fire and combustion products. Fire dampers serving certain safety-related, smoke-sensitive areas are also closed in response to an initiation signal from the fire detection system. In selected areas, the fire alarm system will provide interface with the HVAC systems such as to shut down HVAC operation upon a fire alarm signal. Where continued HVAC system operation is deemed necessary for radiological control, the HVAC system incorporates design features to allow operation under fire conditions."

DCD Section 9.4.3 "Auxiliary Building Ventilation System" does not indicate the fire protection attributes (e.g. fire dampers) installed in the ductwork for the areas served (i.e. Figure 9.4.3-1) by the Auxiliary Building HVAC System. This system interface with the Fire Protection System is fundamental to plant operations response to instances of smoke or fire within the areas served by Auxiliary Building HVAC System.

This detailed information could neither be located in DCD Appendix 9A nor in DCD Section 9A.3.89. For example, Table 9A-3 "Fire Hazard Analysis Summary (Sheet 235 of 263)" provides the following information for Access Building Fire Zone FA5-101-01 with respect to "Fire Barrier Description": "A 3 hour rated fire wall exists between this building and the adjacent auxiliary building. All opening in this wall are protected to 3-hour fire rating. Other building walls are exterior and not assigned a fire rating."

The staff requests that the applicant add information to DCD Section 9.4.3 that reflects the existence of these fire protection system interfaces for the four systems that comprise the Auxiliary Building Ventilation System and the above passage from DCD Section 9.5.1.2.7.

ANSWER:

MHI will add the information about fire protection attribute and system interfaces between the Auxiliary Building HVAC System and the Fire Protection System in DCD Subsection 9.4.3.

Impact on DCD

The DCD will be revised to incorporate the following:

Reflect the existence of the Fire Protection System interfaces for the Auxiliary Building HVAC System to DCD Subsection 9.4.3.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

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QUESTION NO. : 09.04.03-1, RAI 9.4.3-16

Technical specifications are required by 10 CFR 50.36 for operating reactors. SRP 9.4.3 Section I addresses the review interface for the proposed technical specifications. The auxiliary building HVAC system: (1) has the capability to close the safety-related, seismic Category I isolation dampers of the penetration and safeguard component areas during a design basis accident; and (2) has the capability to close safetyrelated, seismic Category I isolation dampers to prevent the back flow from the annulus emergency exhaust system during a design basis accident. These two functions are essential to the performance of the Annulus Emergency Exhaust System.

DCD Chapter 16 "Technical Specifications" does not address the operability and surveillance testing requirements of these isolation valves. The staff requests that the DC applicant provide the basis for not including operability and surveillance testing requirements for these isolation valves within the technical specifications. If the DC applicant determines that operability and surveillance testing should be part of the plant's technical specifications, the staff requests that the DC applicant amend DCD Section 9.4.3.4 "Inspection and Testing Requirements" to reflect this.

ANSWER:

Operability testing of the Auxiliary Building HVAC supply and return dampers to the penetration and safeguard component areas is included in LCO 3.7.11, Annulus Emergency Exhaust System. The isolation feature for these dampers, initiated by an ECCS Actuation signal is discussed in LCO 3.7.11 Bases in the background section. Testing of the dampers to actuate properly is conducted SR 3.7.11.3 and testing that envelopes integrity of the dampers to isolate the Annulus Exhaust System from the Auxiliary Building HVAC System is conducted in SR 3.7.11.4.

Impact on DCD

DCD Subsection 9.4.3.4.1 will be revised as follows:

9.4.3.4.1 Auxiliary Building HVAC System

"In addition to the general requirements in Section 9.4.3.4, the auxiliary building HVAC system safety-related isolation dampers are inspected periodically and the damper seats are replaced as required **and tested in accordance with technical specification surveillance requirements for the Annulus Emergency Exhaust System.**"

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

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DATE OF RAI ISSUE:	**9/08/2008**

QUESTION NO. : 09.04.03-1, RAI 9.4.3-17

SRP 9.4.3 section III.2.A address reviews to ensure the component descriptions address the equipment used and divisions between essential and nonessential portions of the system. The last sentence of the second paragraph of DCD Section 9.4.3.2.2 "Non-Class 1E Electrical Room HVAC System" reads "Return air from the electrical room is drawn through the return air ductwork by the system's return air fans. Both air handling units are connected to a common air distribution ductwork through their discharge air isolation dampers." Clarify if this sentence should read "Return air from the Non-Class 1E Electrical Room, Non- Class 1E I&C Room and Computer Room is drawn through the return air ductwork by the system's return air fans. Both air handling units are connected to a common air distribution ductwork through their discharge air isolation dampers." Reference Figure 9.4.3-2.

ANSWER:

MHI concurs to NRC recommendation. The text in Section 9.4.3.2.2 will be revised in revision 2 of DCD.

Impact on DCD

In DCD Subsection 9.4.3.2.2, revise the third sentence of the second paragraph as follows:

"Return air from the **Non-Class 1E Electrical Room, Non-Class 1E I&C Room, and Computer Room** is drawn through the common return air ductwork by the system's return air fans.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

10/08/2008

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO.68-841 REVISION 0**
SRP SECTION:	**09.04.03 – Auxiliary and Radwaste Area Ventilation System**
APPLICATION SECTION:	**Tier 2 FSAR Section 9.4.3**
DATE OF RAI ISSUE:	**9/08/2008**

QUESTION NO. : 09.04.03-1, RAI 9.4.3-18

SRP 9.4.3 Section I "Review Interfaces" #7 reads "...review to determine the adequacy of the design, installation, inspection, and testing of all essential electrical components (sensing, control, and power) required for proper operation."

The first bullet of DCD Section 9.4.3.1.2.3 "Main Steam/Feed water Piping Area HVAC System" reads: "Provide and maintain proper environmental conditions within the required temperature range (Table 9.4-1) suitable to support the operation and provide assurance of the electrical and mechanical components reliability."

DCD Section 9.4.3.1.2.3 "Main Steam/Feed water Piping Area HVAC System" reads: "There are no safety design bases for the main steam/feed water piping area HVAC system. However, required ductwork will be supported to prevent adverse interaction with other safety-related systems during a seismic event." This indicates that safety-related electrical and mechanical components may be located within the Main Steam/Feed water Piping Areas cooled by the Main Steam/Feed water Piping Area HVAC System as displayed on Figure 9.4.3-3.

If this is so, please provide additional information and clarification for the following:

- What safety-related systems and safety-related electrical and mechanical components are located within these areas?
- Would non-essential chilled water system provide cooling to these areas during a LOOP or other abnormal condition?
- Would the Main Steam/Feed water Piping Ares AHUs the system instrumentation and system AOV's have electrical power and motive air during a LOOP or other abnormal condition?
- What are the Min and Max expected temperatures within these areas beyond the "Normal conditions" (e.g. LOOP, SBO etc) of Table 9.4-1 "Area Design Temperature and Relative Humidity (Sheet 3 of 3)" for the Main Steam / Feed water Piping Areas?
- If there are safety related components within the vicinity of the two Main Steam/Feed water

Piping Areas Air Handling Units, are the AHUs designed to preclude internally generated missiles from the AHU fans?

ANSWER:

The Main Steam/Feedwater Piping HVAC system is housed in the MS / FDW piping area. The ductwork will drop down into the piping area and be routed in the piping area as required. Main Steam/Feedwater piping in the piping area is safety-related and seismic category I. Therefore, this HVAC system's ductwork, or portions thereof routed over safety-related equipment, should be designed to seismic category II requirements.

To answer the five bullets of the question:

1st bullet – It is not necessary to detail what safety-related electrical and mechanical components are located in this area. It is sufficient to say there is safety-related equipment in the area and any ductwork located over this equipment shall be seismically (category II) supported.

2nd bullet – The Main Steam/Feedwater piping area is not active during a LOOP or other abnormal condition, Therefore, the non-essential chilled water system does not provide cooling in the piping area..

3rd bullet – This system is non-safety related and does not need to operate during an event, Therefore, this system has no electrical power and is inoperable during a LOOP or other abnormal event.

4th bullet – These values will be discussed in Technical Report, "US-APWR Equipment Environmental Qualification Program" (assumed name).

5th bullet – These AHUs will be design to preclude internally generated missiles from the AHU fans if safety related components are located within the vicinity of the two AHUs

Impact on DCD

Revise Sections 9.4.3.1.1.3 and 9.4.3.2.3 to include statement clarifying that the design will include ductwork that is seismic category II where applicable and located over Safety-related equipment. Also, revise Table 3.2.2 Sheet 44 of 50 to denote ductwork as such. (see also RAI. 9.4.3-5 for related issue).

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

10/08/2008

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO.68-841 REVISION 0**
SRP SECTION:	**09.04.03 – Auxiliary and Radwaste Area Ventilation System**
APPLICATION SECTION:	**Tier 2 FSAR Section 9.4.3**
DATE OF RAI ISSUE:	**9/08/2008**

QUESTION NO. : 09.04.03-1, RAI 9.4.3-19

Section IV.4 "Standard Design Certification" of SRP 13.3 "Emergency Planning" reads "The desired evaluation findings at the standard design certification stage should be substantially equivalent to the following:

b. General Description of Facilities The staff concludes that the information provided in the application pertaining to the [TSC, OSC, decontamination room, etc.] is consistent with the guidance identified in RG 1.101 and NUREG- 0696. As such, the staff finds this information meets the applicable requirements of 10 CFR 50.47(b)(8), 10 CFR 50.47(b)(11), and Subsections IV.E.3 and IV.E.8 of Appendix E to 10 CFR Part 50, and if applicable 10 CFR 50.34(f)(2)(xxv).

c. Technical Support Center Size The staff concludes that the information provided in the application pertaining to TSC size is consistent with guidance identified in RG 1.101. Specifically, the size conforms with the specifications of NUREG-0696 and is sufficient to accommodate and support NRC and licensee pre-designated personnel, equipment, and documentation, in conformance with Supplement 1 to NUREG-0737. As such, the staff finds that this information meets the applicable requirements of 10 CFR 50.47(b)(8) and Subsection IV.E.8 of Appendix E to 10 CFR Part 50.

d. Technical Support Center Habitability The staff concludes that the information provided in the application pertaining to the habitability of the TSC is consistent with the guidance identified in RG 1.101. As such, the staff finds that the DCD meets the applicable requirements of 10 CFR 50.47(b)(8) and (b)(11), Subsection IV.E.8 to 10 CFR Part 50, Appendix E, and if applicable 10 CFR 50.34(f)(2)(xxv)."

In consideration of the references detailed in the above SRP 13.3 excerpt, describe Technical Support Center (TSC) ventilation system design, in sufficient detail (i.e. a calculation summary), to demonstrate the ventilation system ensures TSC habitability. Specifically provide details of the analysis that supports the regulatory need that the TSC ventilation system design maintains exposures at or below 0.05 Sv (5rem) TEDE for the duration of an accident. Include input conditions and assumptions. These details should include the concentration of radioactivity which

is assumed to surround the TSC, the normal flow rates (infiltration/exfiltration) of the TSC ventilation system, filter performance capabilities, the size of the technical support center and the technical support center in-leakage rate, at a minimum.

The third paragraph of Regulatory Position 2.3 "Staffing and Training" in NUREG-0696 reads "The level of staffing of the TSC may vary according to the severity of the emergency condition. The staffing for each emergency class shall be fully detailed in the licensee's emergency plan."

The last paragraph of Regulatory Position 2.4 "Size" in NUREG-0696 reads: "The TSC working space shall be sized for a minimum of 25 persons, including 20 persons designated by the licensee and five NRC personnel. This minimum size shall be increased if the maximum staffing level specified by the licensee's emergency plan exceeds 20 persons."

The level of staffing and TSC size could be site specific. Both of these variables could impact the sizing of ventilation components that comprise the Technical Support Center HVAC System. Due to these site specific variables the staff requests that the DC applicant create a COL item in DCD Section 9.4.7 "Combined Licensee Information" that captures the impact of these variables.

The first paragraph of Regulatory Position 2.6 "Habitability" in NUREG- 0696 reads "Since the TSC is to provide direct management and technical support to the control room during an accident, it shall have the same radiological habitability as the control room under accident conditions. TSC personnel shall be protected from radiological hazards, including direct radiation and airborne radioactivity from in plant sources under accident conditions, to the same degree as control room personnel. Applicable criteria are specified in General Design Criterion 19; Standard Review Plan 6.4; and NUREG-0737, "Clarification of TMI Action Plan Requirements," Item II.B.2."

TSC in-leakage testing, filter train testing and AHU testing should be described. DCD Section 9.4.3.4 "Inspection and Testing Requirements" does not reflect this testing. The staff requests that the DC applicant amend Section 9.4.3.4 to capture these testing.

ANSWER:

TSC Habitability

MHI will revise all TSC HVAC system subsection descriptions as required to clarify compliance to these requirements. Include any additional system configuration, operational, testing and inspection criteria and design information where applicable. In addition, the TSC dose calculation models are disused in DCD Subsection 15.6.5.5.1.3 and the input parameters used in the analysis is shown in the RAI 38, Question No. 15.00.03-17.

COL item

Equipment design data of TSC HVAC System is shown in Table 9.4.3-1 as the standard US-APWR design.
The DCD Subsection 13.3, revision 1, states: "Interfaces of these features with site-specific designs and site parameters are the responsibility of the COL Applicant." If the design parameter (i.e. level of staffing, size of TSC) will be changed in accordance with the "Emergency Planning", the impact of the change will be addressed in COLA Subsection 13.3. Hence, MHI will not add the new COL item in DCD Subsection 9.4.7.

Impact on DCD

Revise all TSC HVAC system subsection descriptions as required to clarify compliance to these requirements. Include any additional system configuration, operational, testing and inspection criteria and design information where applicable.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.