MITSUBISHI HEAVY INDUSTRIES, LTD.
16-5, KONAN 2-CHOME, MINATO-KU
TOKYO, JAPAN

February 5, 2010

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-10037

Subject: MHI's Response to US-APWR DCD RAI No.483-3885 Revision 1

References: 1) "Request for Additional Information No.483-3885 Revision 1, SRP Section: 09.04.03 – Auxiliary and Radwaste Area Ventilation System, Application Section: 9.4.3" dated November 9, 2009.

With this letter, Mitsubishi Heavy Industries, Ltd. ("MHI") transmits to the U.S. Nuclear Regulatory Commission ("NRC") a document entitled "Response to Request for Additional Information No.483-3885 Revision 1".

Enclosed are the responses to 3 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. Response to Request for Additional Information No. 483-3885, Revision 1

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

Contact Information
C. Keith Paulson, Senior Technical Manager
Mitsubishi Nuclear Energy Systems, Inc.
300 Oxford Drive, Suite 301
Monroeville, PA 15146
E-mail: ck_paulson@mnes-us.com
Telephone: (412) 373-6466

D081
NRO

Enclosure 1

UAP-HF-10037
Docket Number 52-021

Response to Request for Additional Information No. 483-3885, Revision 1

February, 2010

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

02/05/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 483-3885 REVISION 1**
SRP SECTION:	**09.04.03 - AUXILIARY AND RADWASTE AREA VENTILATION SYSTEM**
APPLICATION SECTION:	**9.4.3**
DATE OF RAI ISSUE:	**11/09/2009**

QUESTION NO.: 09.04.03-08

Part I

The staff finds the applicants response to Question 09.04.03-5 of RAI 355-2492 (dated 7/17/09, MHI Ref: UAP-HF-09385, ML092030376) as incomplete. There is nothing in Preoperational Test 14.2.12.1.99 "Auxiliary Building HVAC System Preoperational Test" nor in Tier 1 Subsection 2.7.5.4.1.1 and Table 2.7.5.4-2 that specifically requires that the COL applicant satisfies the four design bases of:

Provide and maintain proper operating environment within the required temperature range (Table 9.4-1) for areas housing mechanical and electrical equipment within the A/B, R/B, PS/B and AC/B during normal plant operation. (this needs to be demonstrated through tests and analyses for the most extreme winter and summertime conditions at the COL applicant's site)

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 first design basis ensures that the operating environment within the A/B, R/B, PS/B and AC/B during normal plant operation satisfies the requisite operability environment of safety-related equipment. The remaining three are required to satisfy the requirements of GDC 60 (10CFR20, ALARA, et al.). The staff believes that all require elevated emphasis.

The staff requests that the applicant amend either Preoperational Test 14.2.12.1.99 or ITAAC Table 2.7.5.4-2 (OR both) to ensure that these design bases are incorporated into the design and preoperational testing of the plant.

Part II

In addition, the staff finds that none of the applicant's responses for parts (b) (c) and (d) of Question No. 09.04.03-5 (RAI No. 355-2492) satisfy the regulatory requirements of GDC 60 contained in 10CFR50 Appendix A. All three parts of the RAI question pertain to the preventing of un-monitored radiological releases from the Auxiliary Building to the Turbine Building and from the Reactor Building to the Turbine Building.

The Auxiliary Building is maintained under a constant and slightly negative pressure, as compared to the outside environment, to prevent the uncontrolled leakage of potentially contaminated air to the outside environment.

The answer is incomplete in that it does not address:

b. The potential flow from a potentially contaminated area to an unmonitored area due to a pressure differential between the Turbine Building (which has its own ventilation system) and the A/B through the interconnection of the two buildings via the nonradiological sump drain system as noted on Figure 9.3.3-1. The applicants use of the words in their response "... will be minimal" and "... should not have significant impact." do not provide the staff with reasonable assurance that unmonitored releases will not take place during the life-cycle of the US-APWR plant. The staff requests that the applicant provide an engineering solution that the COL applicant demonstrates as adequate with ITAAC per "d." below.

c. The staff noted that the applicant did not identify any COL actions regarding methods or process controls that are required to prevent an unmonitored release through the Turbine Building. Again, the use of the words "is not expected" in the applicant's response does not provide the staff with reasonable assurance that such methods or process controls are not required to prevent an unmonitored release during the life-cycle of the US-APWR plant. In addition to the need for the applicant to establish an ITAAC per "d." below, the staff requests that the applicant create a COL item that requires the COL applicant to establish process controls. These process controls are to prevent ventilation system alignments that could lead to un-monitored radiological releases from the Auxiliary Building to the Turbine Building and from the Reactor Building to the Turbine Building.

d. No ITAAC are present for verifying that an unmonitored release will not occur under credible worst case ventilation balance conditions. The staff requests that the DC applicant create ITAAC line items in support of the resolutions of "b." and "c." above.

ANSWER:

Part I

The first design basis states that the Auxiliary building ventilation system will maintain the proper environmental conditions during normal operation. An ITAAC item, which includes a test and analysis, is being added to Table 2.7.5.4-3 to verify that the Auxiliary Building ventilation system can maintain the proper environmental conditions during normal operation.

The last three design bases have been addressed by the addition of more information on the ventilation system to DCD revision section 9.4.3.2.1. The system has two additional design basis identified for monitoring radiation in the ductwork and the cross tie between the containment low volume purge system and the Auxiliary building HVAC system.

In addition, the differential pressure indicators are provided for the penetrations and safe guards areas that are adjacent to the containment. This provides a means of identifying that negative pressure is being maintained between these areas and other areas of the Reactor building that are adjacent to them.

An ITAAC will be added to verify the flow rate of the ventilation system to create a slightly negative pressure during normal operation in the controlled areas.

Part II

Tier 1 ITAAC address the design features that preclude an unmonitored release. There are radiation monitors located in the exhaust ductwork of the fuel handling area, penetration and safeguard component area, R/B controlled area, A/B controlled area, and the sampling/laboratory area. ITAAC item 1 in Tier 1 Table 2.7.6.13-3 verifies the existence and functional arrangement of the radiation monitors. An alarm will be actuated in the MCR when high radiation is detected. The normal supply and exhaust from the affected area are manually isolated remotely from the MCR and the flow is diverted to the containment low volume purge filtration system for the areas mentioned above. The low volume purge system exhausts through the vent stack which contains radiation monitors. These monitors operate during all modes of operation as indicated in DCD Tier 2 section 9.4.3.2.1 revision 2. An ITAAC item is being added to verify the flow rates of the ABVS. The exhaust fans have a redundant standby fan that can start upon failure of one train. The supply system has two trains with 50% capacity. The exhaust fans have three 50% capacity trains with one in standby mode. If one exhaust fan would fail, the radiologically controlled areas would remain at negative pressure with respect to adjacent clean areas, since the standby fan would start to maintain negative pressure.

Impact on DCD

The following two ITAAC will be added to Table 2.7.5.4-3

9. The ABVS provides conditioning air to maintain design temperature limits for the area houses the safety-related components during normal plant operations.	9. Tests and analyses of the as-built ABVS will be performed.	9. The as-built ABVS is capable of providing conditioned air to maintain design temperature limits for the area houses the safety-related components during normal plant operations.
10. The ABVS is capable of providing proper flow rate to maintain a slightly negative pressure in the controlled areas.	10 Tests and analyses of the as-built ABVS will be performed.	10. The as-built ABVS is capable of providing a proper flow rate to maintain a slightly negative pressure in the controlled areas.

Add the following paragraphs to Tier 1 section 2.7.5.4.1.1 Location and functional arrangement:

"The auxiliary building HVAC system and containment low volume purge system are cross tied. This crosstie allows the exhaust flow from the auxiliary building HVAC system to be redirected to the containment low volume purge manually upon a high radiation alarm in the auxiliary building HVAC ductwork. The HVAC arrangement meets the GDC 60 requirements for normal plant operation based on compliance with RG 1.140."

Add the following Key Design features to Tier 1 section 2.7.5.4.1.1:

- **<u>The auxiliary building HVAC system and containment low volume purge system are cross connected to allow the exhaust from the radiological controlled areas to be filtered by the containment low volume purge exhaust filtration units.</u>**

- **<u>Airborne radioactivity is monitored inside the exhaust air duct from the controlled areas.</u>**

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

02/05/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 483-3885 REVISION 1**
SRP SECTION:	**09.04.03 - AUXILIARY AND RADWASTE AREA VENTILATION SYSTEM**
APPLICATION SECTION:	**9.4.3**
DATE OF RAI ISSUE:	**11/09/2009**

QUESTION NO.: 09.04.03- 09

The following is the staff's further assessment of and rebuttal to the applicant's responses for RAI No. 68(-841) Question No: 09.04.03-1, RAI 9.4.3-4 (dated 10/8/08, MHI Ref: UAP-HF-08229, ML082840131) and RAI No. 355-2492, Question No. 09.04.03-2 (MHI Ref: UAP-HF-09385, ML092030376).

Question No: 09.04.03-1, RAI 9.4.3-4 pertained to the staff's fundamental request for the applicant to justify 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.

In its response to Question No. 09.04.03-2, the applicant responded that:

> "The charging pumps provide the capability for transferring makeup water to the RCS from the volume control tank, and potentially other sources, if necessary. The letdown water is treated by CVCS filters and demineralizers to remove most of the radioactive nuclides, then, is sent to the volume control tank. The charging pump does not perform an ECCS function, but this pump is expected to keep the same radioactive material as contained during normal operation. However, the radiation level of this pump is much smaller than that of the recirculation water in accident condition. The CVCS can be used following an accident, but this system is not operated when high containment radiation levels exist. DCD section 12.3.2.2.3 will be revised as shown in ..."

The staff finds the applicant's response incomplete.

The staff notes that the DCD still contains conflicting information with the following sections of the DCD and the regulatory guidance of NUREG 0737, NUREG 0578 and 10CFR50 Appendix A General Design Criterion 60:

1). US-APWR Technical Specification leakage monitoring program specifically includes CVCS. DCD Chapter 16 section 5.5.2 "Primary Coolant Sources Outside Containment" includes the words.... "The program provides controls to minimize leakage from those portions of systems outside containment that could contain highly radioactive fluids during a serious transient or accident to levels as low as practicable."

2). With respect to post LOCA (after accident) EQ requirements, DCD Chapter 3 Table 3D-2 notes that the charging pumps purpose is ESF and the operational duration is at least 2 weeks. Components in the CVCS system listed on pages 3D-20, 3D-31 and 3D-56 of the Table, located in the R/B (not containment or the annulus area) are also required to be EQ qualified. The applicant's response to Question No. 09.04.03-2 is not consistent with this Table.

3). Based on the source terms listed in chapter 12.2, during power operations the CVCS system will contain more than trivial amounts of radioactivity from operation at 1% fuel defects, (the design basis for this plant). The applicant's statement that most of the activity would be removed is not consistent with other information provided by MHI, with respect to filter and demineralizer bed loading.

4). NUREG 0737 "Clarification of TMI Action Plan Requirements" specifically includes the CVCS system as one of the systems expected to be included in the highly radioactive fluid leakage monitoring program. Refer to section II.B.2 page II.B.2-3, paragraph (2) "Systems Containing the Source"

5). The inclusion of the CVCS system as a system most likely to contain highly radioactive water is based on NUREG-0578 "TMI-2 Lessons Learned Task Force Status Report and Short Term Recommendations". This report notes that some systems outside containment (like CVCS), may contain highly radioactive fluid as a result of events (Appendix A, section 2.1.6.a) *that do not immediately generate an ESF isolation signal.*

6). Technical Rationale 3 for the SRP Acceptance Criteria of NUREG-0800 SRP section 9.4.3 reads:

> "GDC 60 requires provisions to be included in the nuclear power unit design to ensure suitable controls on the release of radioactive materials in gaseous effluents during normal reactor operation, including anticipated operational occurrences.
>
> GDC 60 requirements apply to the design of the ARAVS because its function is to control the quantities of radioactive materials in gaseous effluents released to the environment from normal ventilation systems. RGs 1.140 and 1.52 provide design, testing, and maintenance criteria acceptable to the staff for air filtration and adsorption units of normal ventilation exhaust systems and for engineered safety-feature atmospheric cleanup systems in light-water-cooled nuclear power plants.
>
> Meeting the GDC 60 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."

Based on 1), 2) and 3) above the staff is led to conclude by these DCD passages that the CVCS system and the A & B charging pump areas (as displayed on Figure 9.4.5-5 sheet 2 of 2) could be a high radiation and/or contamination areas during power operations, during an accident and after an accident.

Given these above inconsistencies with the applicant's most recent response and the incompatibility of the response the regulatory positions of SRP 9.4.3, NUREG-0737 and NUREG-0578, the staff can not conclude that the applicant has satisfied the regulatory requirements of 10CFR50 Appendix A, GDC 60.

For the deficiency identified in the original RAI Question No: 09.04.03-1, RAI 9.4.3-4 and in light of the inconsistencies contained in the DCD with the applicant's response of RAI No. 355-2492, Question No. 09.04.03-3 , the staff requests that the applicant provide additional information as to how the final US-APWR design will satisfy the regulatory requirements of GDC 60.

ANSWER:

Although the CVCS, including the charging pump areas, does not contain highly radioactive fluids during normal operation, the design includes the considerations that these system areas may become contaminated during and post accident events. This design approach is consistent with the findings in NUREG-0737 "Clarification of TMI Action Plan Requirements" and NUREG-0578 "TMI-2 Lessons Learned Task Force Status Report and Short Term Recommendations" which include the CVCS in the systems outside containment which may potentially contain highly radioactive fluid. To ensure that there are adequate controls on the release of radioactive materials in gaseous effluents, provisions, such as radiation monitors are included in the Auxiliary Building HVAC System design.

The CVCS areas are ventilated by the auxiliary building HVAC system during normal reactor operation. The Auxiliary Building HVAC system, which is the normal HVAC system for the controlled areas of the Reactor Building (R/B) and the Auxiliary Building (A/B), does not serve any safety function with the exception of the safety-related isolation dampers, and is therefore not safety-related.

Figure 9.4.3-1 "Auxiliary Building HVAC System Flow Diagram" in Revision 2 of the DCD shows the merging in one duct of the A/B Charging Pump Areas and the A/B Annulus Emergency Exhaust Filtration Unit Areas within the controlled area of the Reactor Building. The airflow in this duct is monitored by radiation monitor RE-48A to determine if high levels of radioactivity are present. Under normal operating conditions, when high levels of radioactive material are not present, the airflow is routed through the normally open, air operated damper (VAS-AOD-372-N) to the Auxiliary Building Exhaust Fans and then to the vent stack for release. Upon detection of high levels of radioactivity in this duct exiting the controlled area of the Reactor Building, the normally closed, air operated damper (VAS-AOD-373-N) is opened and the normally open damper (VAS-AOD-372-N) is closed. The airflow in the duct is then routed to connect with the duct to the Containment Low Volume Purge Exhaust Filtration Units, as shown on Figure 9.4.3-1, which will pass the radioactive exhaust air through a HEPA filter as well as through charcoal absorber filters. This filter arrangement will effectively remove the majority of radioactive materials from the exhaust air stream before it is sent to the vent stack for release. The vent stack also contains radiation monitors which are used during all modes of operation to provide assurance that the release of radioactive materials contained in gaseous effluents will not exceed the limits specified in 10 CFR Part 20.

The cross connection between the auxiliary building HVAC system and the containment low volume purge system are further described in Section 9.4.3.2.1 "Auxiliary Building HVAC System" in Revision 2 of the DCD. This arrangement, which allows the radiological controlled areas of the Auxiliary Building and Reactor Building to be filtered by the containment low volume purge exhaust filtration units meets the requirements of 10 CFR 50 Appendix A General Design Criterion 60.

The concerns listed by the NRC are addressed as follows:

1) The charging pumps are used during normal and accident conditions. It is unlikely that the water will contain high concentrations of radioactive contaminants. However, the pumps are part of the CVCS, and are thus being considered to have the potential to have highly radioactive fluids outside containment. Therefore, the system is included in the leakage

detection and control program in DCD Chapter 16, Section 5.5.2 in accordance with 10CFR50.34 (f) (xxvi). In addition, the system design complies with the TMI action plan requirements II.B.2 and III.D.1.1 and the TMI lessons learned short term recommendations Appendix A section 2.1.6a. The description in DCD Chapter 16, Section 5.5.2 is consistent with the above general response.

2) The charging pumps of the CVCS, as described in the response to part 1 above, may operate after an accident and perform an ESF function. Per Table 3D-2, the CVCS charging pumps and their ancillary components are also EQ (mildly). Ancillary components of the CVCS system are listed on pages 3D-20, 3D-31 and 3D-56 of the DCD Revision 1 Table and reflected on pages 3D-22, 3D-32 and 3D-61 of the DCD Revision 2 Table.
This response supersedes the previous responses provided for RAI No. 68(-841) Question No: 09.04.03-1, RAI 9.4.3-4 (dated 10/8/08, MHI Ref: UAP-HF-08229, ML082840131) and RAI No. 355-2492, Question No. 09.04.03-2 (MHI Ref: UAP-HF-09385, ML092030376).

3) The design of the US-APWR, including the CVCS, is based on two source terms. The design basis source term, which is based on 1% fuel defects, is used to calculate the maximum and allowable activities for the CVCS equipment, as presented in DCD Section 12.2. The design basis source terms are applied for the purposes of shielding, to establish operating range. For normal operation, which includes anticipated operational occurrences (startup and refueling), the system operation, equipment loading under normal conditions, effluent specifications, and solid waste classifications, are based on the realistic source terms in accordance with ANSI/ANS-18.1. The parameters applied to calculate the realistic source terms and the resulting values for each nuclide are presented in DCD Section 11.1 and Section 11.2. The above design approach is consistent with the stipulations described in RG 1.206 and the SRP for liquid, gas, and solid waste management systems.

   It should be noted that although the US-APWR is designed by applying the design basis source terms, plant operational procedures will be in place to control and limit the continuance of operation under design basis (1% failed fuel) conditions. Radiation levels in the primary side are continuously monitored (by RE-70 in the letdown stream) to avoid excessive contamination of the plant systems due to continual operation with high fuel defects. Continual operation at a high fuel defect level would lead to the contamination and potential damage of system equipment and the plant environment, which could also result in high radiation exposure to plant workers and costly cleanup efforts. Hence, the US-APWR is designed with reactivity controls consistent with US plant operation practices. It should also be noted that filter and ion exchange resin loading includes consideration of transportation requirements and waste acceptance criteria in terms of radiation levels. When operation continues at a higher fuel defect level, more frequent changes of filters and resin are required to conform to the waste handling and acceptance criteria.

4) The guidance in NUREG-0737 is consistent with the above general response.

5) The guidance in NUREG-0578 is consistent with the above general response.

   See the general response above and "Impact on DCD" section of this response for a description of the design features which assure that the US-APWR design meets the regulatory requirements of GDC 60 as described in NUREG-0800 SRP Section 9.4.3.

Impact on DCD

Insert the following paragraph to section 9.4.3.2.1, after 10th paragraph in DCD Revision 2,

"Airborne radioactivity is monitored inside the charging pumps areas. As shown in Figure 9.4.3-1 the merging in one duct of the A/B Charging Pump Areas and the A/B Annulus

Emergency Exhaust Filtration Unit Areas within the controlled area of the Reactor Building the airflow in this duct is monitored by radiation monitor to determine if high levels of radioactivity are present. Under normal operating conditions, when high levels of radioactive material are not present, the airflow is routed through the normally open, air operated damper to the Auxiliary Building Exhaust Fans and then to the vent stack for release. Upon detection of high levels of radioactivity in this duct exiting the controlled area of the Reactor Building, the normally closed, air operated damper is opened and the normally open damper is closed. The airflow in the duct is then routed to connect with the duct to the Containment Low Volume Purge Exhaust Filtration Units, as shown on Figure 9.4.3-1, which will pass the radioactive exhaust air through a HEPA filter as well as through charcoal absorber filters. This filter arrangement will effectively remove the majority of radioactive materials from the exhaust air stream before it is sent to the vent stack for release. The vent stack also contains radiation monitors which are used during all modes of operation to provide assurance that the release of radioactive materials contained in gaseous effluents will not exceed the limits specified in 10 CFR Part 20. The arrangement shown in Figure 9.4.3-1, which allows the radiological controlled areas of the Auxiliary Building and Reactor Building to be filtered by the containment low volume purge exhaust filtration units, meets the GDC 60 requirements for normal plant operation based on compliance with RG 1.140."

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

02/05/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 483-3885 REVISION 1**
SRP SECTION:	**09.04.03 - AUXILIARY AND RADWASTE AREA VENTILATION SYSTEM**
APPLICATION SECTION:	**9.4.3**
DATE OF RAI ISSUE:	**11/09/2009**

QUESTION NO.: 09.04.03-10

The staff requests that the applicant redress their response to RAI No. 355-2492, Question No. 09.04.03-3 (MHI Ref: UAP-HF-09385, ML092030376).

In particular, the staff requests the following.

DCD section 15.0.0.1.1 reads --

"Anticipated operational occurrences (AOOs) are events in which the reactor plant conditions are disturbed beyond the normal operating range. AOOs are expected to occur one or more times during the lifetime of the plant. During a transient caused by an assumed AOO, the reactor core must be undamaged and be ready to return to normal operation. AOOs are also referred to as incidents of moderate frequency and infrequent incidents in RG 1.206 (Ref. 15.0-2). AOOs generally result from one of the following:

- A single component failure.
- A single malfunction, including passive failures such as leaks or minor pipe breaks, which could occur during the life of the plant while the plant is operating.
- A single operator error.

Furthermore, the staff notes that SRP 9.4.3 Technical Rationale "1" reads:

> "The function of the ARAVS is to maintain ventilation, to permit personnel access, and to control airborne radioactivity in the auxiliary and radwaste areas during normal operation and anticipated operational occurrences and during and after postulated accidents, including loss of offsite power. This requirement ensures that in the event of a design-basis earthquake, essential portions of the ARAVS will remain functional and the failure of any nonessential portion of the system or of other systems not designed to seismic Category I standards will not result in offsite doses in excess of 5 mSv (0.5 rem) to the whole body or an equivalent dose to any part of the body."

The applicant in its response to Question No. 09.04.03-3 did not provide the staff with the information the staff sought. The applicant's response does not address the airborne activity concentrations that would be present in the plant during the design basis AOO.

- Please provide the design basis for the auxiliary building ventilation system?

- What is the limiting design basis AOO?

- Provide the expected most limiting case airborne activities and dose consequences in the Reactor Building and Auxiliary Building during this design basis event. More specifically, the effects on the workers under the conditions of a leak in the effected equipment areas.

- Explain why sweeping ventilation (or a RG 1.140 system) is not needed to keep occupational dose limits below 10 CFR Part 20?

ANSWER:

The design bases for the auxiliary building ventilation system are indicated in DCD Revision 2 Section 9.4.3.1.1.1and 9.4.3.1.2.1. The following design bases have been added to DCD revision 2, Tier 2 section 9.4.3.1.2.1 to address airborne radioactivity:

- The auxiliary building HVAC system and containment low volume purge system are cross connected to allow the exhaust from the radiological controlled areas to be filtered by the containment low volume purge exhaust filtration units.

- Airborne radioactivity is monitored inside the exhaust air duct from the controlled areas (Subsection 12.3.4.2.8).

DCD revision 2, Tier 2 Subsection 9.4.3.2.1 has been revised to discuss the system's design for controlling airborne radioactivity. This discussion includes a description of the cross tie to the low volume purge ventilation system, radiation monitors in the ductwork, MCR alarms and displays, flow volumes for radioactivity control in the ductwork and dilution of the exhaust with treated effluents from the gaseous waste management system.

The system configuration for the fuel handling building complies with the guidance in RG 1.140 and GDC 60. However, as shown in section 15.7.4, the fuel handling accident does not take credit for any filtration of the released radionuclides and the dose limits are well within the guidelines of 10CFR50.34.

As indicated in the design bases in Subsection 9.4.3.1.2.1, the system provides sufficient supply and exhaust air flow to keep the dose levels from airborne radioactivity below 10CFR20 limits. A minimum air flow value of 2,500 cubic feet per minute is required to avoid settling out of airborne particulates and lowers the dose levels.

As defined in DCD section 15.0.0.1.1, reactor core must be undamaged and be ready to return to normal operation. Therefore, it is expected that the level of radioactivity would be equivalent to normal operation and occupational dose would be below the 10CFR20 limits.

Additionally, the Radiation Protection Program shall be used as governance with respect to operational dose control related to any Anticipated Operational Occurrence (AOO). As part of the Radiation Protection Program any individuals permitted to enter areas after an AOO shall be controlled by the Radiation Protection Program. Procedures for personnel radiation protection shall be prepared consistent with the requirements of 10 CFR Part 20 and shall be approved, maintained and adhered to for all operations (including response to AOOs) involving personnel radiation exposure. Elements of the Radiation Protection Program may include radiation monitoring, alarms, use of radiation protection personnel qualified for providing positive control over activities or other means of control or monitoring.

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.