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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-09296

Subject: MHI's Response to US-APWR DCD RAI No. 346-2641 REVISION 1

Reference: 1) "Request for Additional Information 346-2641 Revision 1, SRP Section: 09.03.02 - Process and Post-Accident Sampling Systems, Application Section: 9.3.2" dates April 27, 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. 346-2641 Revision 1."

Enclosed is the response to the RAI 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
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Mitsubishi Heavy Industries, LTD.

Enclosure:

1. Response to Request for Additional Information No. 346-2641 Revision 1

CC: J. A. Ciocco
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Enclosure 1

UAP-HF-09296
Docket Number 52-021

Response to Request for Additional Information
No. 346-2641 Revision 1

June 2009

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

6/8 /2009

US-APWR Design Certification
Mitsubishi Heavy Industries
Docket No. 52-021

RAI NO.:	**NO. 346-2641 REVISION 1**
SRP Section:	**09.03.02 – Process and Post-Accident Sampling Systems**
APPLICATION SECTION:	**9.3.2**
DATE OF RAI ISSUE:	**4/27/2009**

QUESTION NO. : RAI 09.03.02-10

Background

Three Mile Island (TMI) Action Plan Item III.D.1.1 in NUREG-0737 and 10 CFR 50.34(f)(2)(xxvi) require a leakage control program to minimize the leakage from those portions of the Process Sampling Systems (PSS) outside of the containment that contain or may contain radioactive material following an accident. Systems listed by Item III.D1.1 as potentially in scope of the requirement are residual heat removal (RHR), containment spray recirculation, high-pressure injection recirculation, containment and primary coolant sampling, reactor core isolation cooling, makeup and letdown (PWRs only), and waste gas (includes headers and cover gas system outside of containment in addition to decay or storage system)

DCD Table 6.3-1, Sheet 2, describes design features facilitating compliance with NUREG-0737 Item III.D.1.1 for the ECCS systems. However, no similar design details are provided for other systems that may be in scope of the requirement, including process sampling, CVCS, and RHRS. NUREG-0737 Item III.D.1,1 or 10 CFR 50.34(f)(2)(xxvi) are not listed among the design bases for the RHR, CVCS, or gaseous waste management system. Although DCD Section 9.3.2 lists NUREG-0737 Item III.D.1.1 and 10 CFR 50.34(f)(2)(xxvi) among the design bases for the process and postaccident sampling systems, no further detail is provided in DCD section 9.3.2 on how leakage control is ensured. Additionally, DCD Chapter 16, Technical Specification 5.5.2, "Primary Coolant Sources Outside Containment," states the following:

This 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. The systems include Containment Spray, Safety Injection, Chemical and Volume Control, and Sampling System. The program shall include the following:

a. Preventive maintenance and periodic visual inspection requirements and
b. Integrated leak test requirements for each system at least once per 24 months.

This appears to describe a program intended to fulfill the requirements of NUREG-0737 Item III.D.1.1. However, Technical Specification 5.5.2 does not contain all the elements required by NUREG-0737 Item III.D.1.1. Finally, the initial and periodic tests required by Item III.D1.1 would be performed by the COL holder. However, the US-APWR DCD does not identify a COL information item to ensure the COL holder has a leakage control program, and the initial leak test is not addressed in the initial test program information included in the DCD.

Requested Information

1. List the systems considered to be in scope of the requirements of NUREG- 0737 Item III.D.1.1 or 10 CFR 50.34(f)(2)(xxvi). If any systems expected to contain radioactive materials after an accident are excluded from the leakage detection program, justify the exclusion of these systems.

2. Describe the design provisions that facilitate minimization and detection of leakage for each of the systems considered to be in scope of item III.D.1.1 or 10 CFR 50.34(f)(2)(xxvi), if not already described in the DCD.

3. Discuss the need to include a COL information item in the DCD to ensure the COL holder develops a program for leakage monitoring and prevention to fulfill the requirements of NUREG-0737 Item III.D.1.1 and 10 CFR 50.34(f)(2)(xxvi).

4. Clarify whether proposed Technical Specification 5.5.2 intended to fulfill the requirements of Item III.D.1.1 in NUREG-0737 and 10 CFR 50.34(f)(2)(xxvi). If so, these criteria should be referenced in the technical specification.

5. In DCD Tier 1 and Tier 2, provide the initial test program information for leakage control and detection for all systems outside containment that contain (or might contain) accident source term radioactive materials following an accident.

ANSWER:

1. The systems which may contain radioactivity post-accident, as described in the RAI Background section and in NUREG-0737 are as follows:

    a. Residual Heat Removal System
    b. Containment Spray Recirculation System
    c. High-Pressure Injection Recirculation System
    d. Containment and Primary Coolant Sampling System
    e. Reactor Core Isolation Cooling System
    f. Makeup and Letdown System
    g. Waste Gas System

In US-APWR, systems considered to be in scope of the requirements of NUREG- 0737 Item III.D.1.1 or 10 CFR 50.34(f)(2)(xxvi) are Residual Heat Removal System (RHRS), Containment Spray System (CSS), High-Head Injection System (HHIS) and Post-Accident Sampling System (PASS).
See item 2 of this Answer for reasons for exclusion of any of these systems from the leakage detection program.

2. The design provisions for minimization and detection of leakage for each of the systems, or the reasons for exclusion of the system, are described below.

    a. RHRS – The leak detection program for the RHRS is described in Section 5.4.7.1. This section states, "The RHRS is provided with a leakage detection system to minimize the leakage from those portions of the RHR system outside of the containment that contain or may contain radioactive material following an accident." The leakage detection system is established in the rooms housing

ESF equipment and is included in the Equipment and Floor Drainage Systems described in Chapter 9, Subsection 9.3.3. This design feature is in accordance with NUREG-0737 Item III.D.1.1.

b. Containment Spray Recirculation System – The Containment Spray System is discussed in Section 6.2.2. The portions of this system which are outside the containment and may contain radioactivity are shared with the RHRS. These components are included in the leakage detection system described above for the RHRS.

c. High-Pressure Injection Recirculation System – This system is called the "High-Head Injection System in the US-APWR DCD and is an ECCS. This system's design features for minimization and detection of leakage have already been described in Table 6.3-1 (Sheet 2 of 2), as recognized in the Background section of the RAI.

d. Containment and Primary Coolant Sampling System – The Post-Accident Sampling System is described in Section 9.3.2.2.3. The samples taken are grab samples, and sampling is only performed when necessary. When post-accident sampling is not required, containment isolation integrity is maintained by inner and outer containment isolation valves. Any venting through the post-accident sampling system is released through the HVAC system, and then re-routed to a line with HEPA and charcoal filters when high radiation is detected.

e. Reactor Core Isolation Cooling System – As discussed in DCD Section 5.4.6, this system is not applicable to PWRs.

f. Makeup and Letdown System – The Makeup Water System is not expected to be radioactive after an accident and is therefore excluded from meeting the guidance in NUREG-0737. Also, the Chemical and Volume Control System (CVCS) does not perform an ECCS function and is not expected to contain radioactive material following an accident. The CVCS can be used following an accident, but this system is not operated when high containment radiation levels exist. The leak detection design provided for the system can appropriately detect the leakage when the system is used.

g. Gaseous Waste System – The Gaseous Waste Management System (GWMS) do not treat highly radioactive fluids following an accident. The system can be used following an accident, but this system is not operated when high containment radiation levels exist. As described in DCD Section 11.3, GWMS is designed to minimize leaks. Section 11.3.2.2 states, "The GWMS is designed, constructed, and tested to be as leak-tight as practical." The system does not allow any gases to be released from the system until they have been monitored for radiation, and the Auxiliary Building HVAC system ensures that no gases are vented unless they have been properly filtered.

3. A COL information item to ensure that the COL holder develops a program for leakage monitoring and prevention to fulfill the requirements of Item III.D.1.1 is not considered necessary. The systems have necessary features built into the design as listed above. Additional information on the leakage monitoring and prevention program is covered in Chapter 16, Technical Specification 5.5.2. The COL holder will need to comply with these Tech Specs and therefore will develop the leakage monitoring and prevention program as described in 5.5.2.

4. The Technical Specification 5.5.2 does not reference specific criteria. This format is in accordance with the Technical Specifications format as shown in NUREG-1431, "Standard Technical Specifications," Number 5.5.2 which does not include criteria in the Tech Spec. Note that Tech Spec 5.5.2 does not include the RHRS since the portions of CSS which are outside the containment are shared with the RHRS as described in item 2.b of this Answer.

5. The initial test program information for leakage detection in the ESF rooms is cited in Subsection 14.2.12.1.77. Containment isolation valves and HVAC systems are also tested in accordance with their initial test programs cited in Subsection 14.2.12.

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.

This completes MHI's response to the NRC's question.