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April 14, 2009

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-09170

Subject: MHI's Second Response to US-APWR DCD RAI No. 249-1978 REVISION 0

- References:**
- 1) "Request for Additional Information No. 249-1978 Revision 0, SRP Section: 11.05 – Process and Effluent Radiological Monitoring Instrumentation and Sampling Systems, Application Section: 11.5," dated March 2, 2009.
 - 2) Letter MHI Ref: UAP-HF-09138 from Y. Ogata (MHI) to the U.S. NRC, "MHI's Response to US-APWR DCD RAI No. 249-1978 REVISION 0," dated March 31, 2009.

With this letter, Mitsubishi Heavy Industries, Ltd. ("MHI") transmits to the U.S. Nuclear Regulatory Commission ("NRC") documents as listed in Enclosure.

Enclosed are the second responses to the RAIs (Questions 11.05-6, 11.05-7, and 11.05-8) contained within Reference 1. The initial responses (Questions 11.05-5, 11.05-9, 11.05-10 and 11.05-11) have been submitted with Reference 2.

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,



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

Enclosure:

1. Second Responses to Request for Additional Information No. 249-1978 Revision 0

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

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Contact Information

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Docket No. 52-021
MHI Ref: UAP-HF-09170

Enclosure 1

UAP-HF-09170
Docket Number 52-021

Second Responses to Request for Additional Information
No. 249-1978 Revision 0

April 2009

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

04/13/2009

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

RAI NO.: NO. 249-1978 REVISION 0
SRP SECTION: 11.05 – Process and Effluent Radiological Monitoring
Instrumentation and Sampling Systems
APPLICATION SECTION: 11.5
DATE OF RAI ISSUE: 3/2/2009

QUESTION NO. : 11.05-6

Staff review of DCD Tier 2 (Rev 1) Sections 11.5.2.1 and 5.4.2, and Technical Specifications (TS) 5.5.9 and TS B.3.4.17.1 indicate insufficient information is provided in regards to primary-to-secondary leakage radiation monitor sensitivities to satisfy the leakage rate detection sensitivity technical basis. NEI 97-06 and EPRI Guidelines referenced in Section 5.4.2 and TS B.3.4.17.1 establish radiation monitor sensitivity requirements for a leakage detection capability of 30 gpd. However, Section 11.5.2.2 and Table 11.5-1 only present design information on monitor ranges and do not describe the methodology to demonstrate that radiation monitors selected by the COL applicant for primary-to-secondary leakage detection instrumentation are capable of satisfying the technical basis using a realistic radioactive concentration in the RCS. Please address the following items and revise the DCD to include this information.

1. Revise Table 11.5-1 to identify the radiation monitors provided to satisfy the NEI 97-06 primary-to-secondary leakage detection requirement, and to reflect the minimum required radiation monitor sensitivities for the radiation monitors necessary to satisfy the required leakage rate technical basis.
2. In Section 11.5.2.2, provide the methodology to demonstrate that radiation monitors selected by the COL applicant are capable of satisfying the technical basis for primary-to-secondary leakage detection instrumentation using a realistic radioactive concentration in the RCS. Include in the methodology, model assumptions, parameters values and their basis, and references.

ANSWER:

1. The following radiation monitors are used to detect primary-to-secondary leakage as described in DCD Chapter 5, Section 5.2.5.3.
 - Steam generator blowdown water radiation monitor (RMS-RE-55)
 - High sensitivity main steam line monitors (RMS-RE-65A, 65B, 66A, 66B, 67A, 67B, 68A, 68B)
 - Condenser vacuum pump exhaust line radiation monitors (RMS-RE-43A, 43B)

The ranges of these three types of radiation monitors described in DCD Tables 11.5-1 through 11.5-3, respectively, are sufficient to provide the capability to detect 30 gpd primary-to-secondary leakage. This conforms to the requirement of NEI 97-06 and EPRI Guidelines and no specific sensitivity requirement needs to be stated in DCD Tables 11.5-1 through 11.5-3.

2. Primary-to-secondary leakage is verified by these radiation monitors and compared to leakage rates calculated by using other monitors to ensure the validity of these methods. In addition, radiochemical grab sampling is used to verify the performance of the radiation monitors, verify alarms, confirm leakage rate estimates, and provide early detection of levels or changes in radioactivity in the secondary system that are below the sensitivity of the radiation monitors.

The condenser vacuum pump exhaust line radiation monitors are the primary monitors used to estimate the primary-to-secondary leakage rate. The primary-to-secondary leakage rate can be estimated by comparing the fission gas activity, such as Xe-133, in the condenser exhaust gas to the fission gas activity in the reactor coolant system (RCS). When fission gas concentrations are low in the RCS, other isotopes such as Ar-41 can be used, taking into consideration the effect of their shorter half-lives.

These monitors satisfy the required primary-to-secondary leakage detection capability under realistic radioactive concentrations in the RCS.

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.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

04/13/2009

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

RAI NO.: NO. 249-1978 REVISION 0
SRP SECTION: 11.05 – Process and Effluent Radiological Monitoring
Instrumentation and Sampling Systems
APPLICATION SECTION: 11.5
DATE OF RAI ISSUE: 3/2/2009

QUESTION NO. : 11.05-7

The applicant has not provided adequate Tier 1 ITAAC information to verify the compliance with the design criteria. Because the reactor coolant system (RCS) is a safety-related system, steam generator (SG) tube integrity is a safety-related issue. 10 CFR 52.47(b)(1) requires that a DC application contain the proposed ITAAC that are necessary and sufficient to provide reasonable assurance that, if the inspections, tests, and analyses are performed and the acceptance criteria met, that a plant that incorporates the design certification is built and will operate in accordance with the design certification and the provisions of the Atomic Energy Act, and NRC regulations. The ITAAC should address the sensitivity, response time, and alarm limit for the SG Tube leakage detection instrumentation. The staff requests the applicant to provide ITAAC for this system in the DCD Tier 1.

ANSWER:

As described in the response to part 1 of RAI Question 11.05-6, SG Tube leakage is detected by three types of radiation monitors which are non-safety. The ranges of these monitors described in DCD Tables 11.5-1 through 11.5-3 provide the capability to detect SG Tube leakage of an amount in conformance with NEI 97-06 and EPRI Guidelines. These three types of radiation monitors are identified in DCD Tier 1 in Table 2.7.6.6-1 and the ITAAC information is given in Table 2.7.6.6-2.

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.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

04/13/2009

**US-APWR Design Certification
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RAI NO.: NO. 249-1978 REVISION 0
SRP SECTION: 11.05 – Process and Effluent Radiological Monitoring
Instrumentation and Sampling Systems
APPLICATION SECTION: 11.5
DATE OF RAI ISSUE: 3/2/2009

QUESTION NO. : 11.05-8

Applicants for standard plant design approval must provide plans for preoperational testing and initial operations in accordance with 10 CFR 50.34(b)(6)(iii) requirements. SRP Section 14.2, Subsection II, "Acceptance Criteria," states that the DC applicant can meet the above requirements by conforming to the criteria stated in RG 1.68. The staff reviewed Chapter 14, "Verification Programs" of DCD Tier 2 (Rev 1) to ensure the applicant conformed to Initial Plant Test requirements, but did not find test information related to SG tube leakage rate for compliance with the design criteria. The applicant is requested to identify the tests to demonstrate that SG tube leakage detection radiation monitors satisfy the technical basis leakage rate detection criteria.

ANSWER:

As described in the response to RAI Question 11.05-6, SG Tube leakage is detected by three types of radiation monitors and the ranges of these monitors described in DCD Tables 11.5-1 through 11.5-3 provide the capability to detect SG Tube leakage of an amount in conformance with NEI 97-06 and EPRI Guidelines. These monitors are the part of the Process and Effluent Radiological Monitoring System and their preoperational test is described in DCD Section 14.2.12.1.78 for operation.

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.