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TOKYO, JAPAN

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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-09035

Subject: MHI's Responses to US-APWR DCD RAI No.130-1715 Revision 1

Reference: 1) "REQUEST FOR ADDITIONAL INFORMATION NO. 130-1715 REVISION 1, SRP Section: 11.05 - Process and Effluent Radiological Monitoring Instrumentation and Sampling Systems" dated December 18, 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.130-1715 Revision 1."

Enclosed is the responses to Questions 11.05-01 through 11.05-04 that are 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.130-1715 Revision 1

CC: J. A. Ciocco
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*DCS/
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Contact Information

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Enclosure 1

UAP-HF-09035
Docket No. 52-021

Responses to Request for Additional Information No.130-1715
Revision 1

January 2009

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

1/30/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI No.: No. 130-1715 Revision 1

SRP Section: 11.05 – Process and Effluent Radiological Monitoring Instrumentation and Sampling Systems

APPLICATION SECTION: 11.5

DATE of RAI issue: 12/18/2008

QUESTION NO.: 11.05-1

Section 11.5.1.2, "Design Criteria," 7th bullet down on page 11.5-2 states "The monitoring and sampling systems shall also activate appropriate safety controls." Is this in reference to controls for the Main Control Room isolation initiated by the Main Control Room Outside Air Intake Radiation Monitors? Are these the only safety controls activated by this system? Please stipulate.

ANSWER:

General Design Criterion 63 specifies that, "Appropriate systems shall be provided in fuel storage and radioactive waste systems and associated handling areas (1) to detect conditions that may result in loss of residual heat removal capability and excessive radiation levels and (2) to initiate appropriate safety actions."

In the event the fuel storage and radioactive waste systems and the associated handling areas have high radiation levels, the Process Effluent Radiation Monitoring and Sampling System (PERMS) performs the following automatic safety controls:

- The Gaseous Radwaste Discharge Monitor measures the activities in gaseous effluent before it reaches the plant vent. Detection of radioactivity levels exceeding the predetermined setpoint automatically closes the discharge valve to isolate the gaseous discharge from the vent. This terminates the gaseous discharge operation and the gas is recycled for additional processing (see DCD Section 11.5.2.2.5).
- Detection of radioactivity levels by the Liquid Radwaste Discharge Monitor exceeding the predetermined setpoint automatically closes the liquid discharge valve (see DCD Section 11.5.2.5.1).

If the radioactivity concentration in the exhaust air inside the fuel storage area is elevated, the following actions are taken, not by PERMS, but by the Fuel Handling Area HVAC Radiation Gas Monitor:

- Airborne radioactivity is monitored inside the exhaust air duct from the fuel handling area by the Fuel Handling Area HVAC Radiation Gas Monitor. An alarm will be actuated in the main control room when the radiation levels exceed a predetermined setpoint. If high airborne radioactivity is detected, the supply and exhaust duct isolation dampers of the affected high airborne radioactivity area are manually closed (see DCD Sections

12.3.4.2.8.1 and 9.4.3.2.1).

Detection of radioactivity levels by the Main Control Room Outside Air Intake Radiation Monitors exceeding the predetermined setpoint automatically activates main control room isolation (see DCD Section 11.5.2.2.6).

For a fuel handling accident at the spent fuel pit, the dose evaluation has been performed assuming main control room isolation due to the safety-related Main Control Room Outside Air Intake Radiation Monitors. This dose evaluation confirms that the dose limit is not exceeded (see the response to questions 06.04-1 and 06.04-2 of RAI 26).

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

1/30/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI No.: **No. 130-1715 Revision 1**

SRP SECTION: **11.05 – PROCESS AND EFFLUENT RADIOLOGICAL
MONITORING INSTRUMENTATION AND SAMPLING SYSTEMS**

APPLICATION SECTION: **11.5**

DATE of RAI issue: **12/18/2008**

QUESTION NO.: 11.05-2

Section 11.5.2.2.6 identifies the Main Control Room Outside Air Intake Radiation Monitors as safety related. The conformance to applicable requirements of IEEE Std. 603-1991 is required by 10 CFR 50.55a(h)(3) which should be stipulated for these Monitors and any other portions of this system which are safety-related. The Final Safety Analysis Report should discuss how such equipment meets the requirements outlined in IEEE Std. 603-1991.

ANSWER:

Process and effluent radiological monitoring instrumentation is part of the Instrumentation and Controls (I&C) systems. General design requirements for I&C are described in DCD Chapter 7 and the main control room monitors are described in Section 7.3 Engineered Safety Feature Systems. Table 7.1-2 Regulatory Requirements Applicability Matrix indicates that IEEE Standard 603-1991 will be applied to the design of the Engineered Safety Features Actuation System (ESFAS) which encompasses the safety-related Main Control Room Outside Air Intake Radiation Monitors. Only specific requirements for radiation monitoring are described in Chapter 11. Detailed discussion of conformance to IEEE Std 603-1991 is described in the topical report (TR), MUAP-07004 which is referenced in Section 7.1.

Impact on DCD

We will add the underlined description after the last paragraph of DCD Section 11.5.2.2.6 that will change described below.

“Piping taps are provided for the purging and cleaning of the monitors. These monitor sets are safety-related and are connected to the emergency power supply system. The redundant monitor sets have independent backup power units

The Main Control Room Outside Air Intake Radiation Monitors are part of the ESF Systems described in Section 7.3. The I&C design of the ESF Systems, including the Main Control Room Outside Air Intake Radiation Monitors, conform to the requirements of IEEE Standard 603-1991.”

And IEEE Standard 603-1991 will be added as a reference of DCD Section 11.5.6 as described below.

11.5-34 IEEE Standard Criteria for Safety Systems for Nuclear Power Generating Stations, IEEE Std 603-1991.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

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SRP SECTION: 11.05 – PROCESS AND EFFLUENT RADIOLOGICAL
MONITORING INSTRUMENTATION AND SAMPLING SYSTEMS

APPLICATION SECTION: 11.5

DATE of RAI issue: 12/18/2008

QUESTION NO.: 11.05-3

Describe how EPRI TR-106439, "Guideline on Evaluation and Acceptance of Commercial Grade Digital Equipment for Nuclear Safety Applications," was considered in the selection of digital equipment for the process effluent radiation monitoring and sampling system.

10 CFR Part 50, Appendix A, General Design Criteria 1, "Quality Standards and Records," requires structures, systems, and components important to safety to be designed, fabricated, erected, and tested to quality standards commensurate with the importance of the safety functions to be performed. Section 7.7 of NUREG-0800, "Standard Review Plan," addresses the use of digital systems and states that to minimize the potential for control system failures that could challenge safety systems, control system software should be developed using a structured process similar to that applied to safety system software. The applicant stated that to ensure that quality assurance is maintained, only instruments designed and manufactured for the intended services, and instruments with industry-proven performances, are used. The staff needs additional information regarding the process by which radiation monitoring instruments are selected to address quality. Specifically, if commercial equipment is used, what standards and processes (i.e., EPRI TR-106439) are used to ensure adequate quality.

ANSWER:

Safety related monitors are purchased as Class 1E components. They are not commercially dedicated, therefore EPRI TR 106439 does not apply. Other radiation monitors are not safety related, therefore EPRI TR 106439 does not apply. MHI selects these non-safety radiation monitors based on proven performance in similar applications. The non-safety related monitors are designed in accordance with ANSI N42.18-2004, and are qualified in accordance with RG 1.143 Section IV (See DCD Section 11.5.2.6). The process and effluent radiological monitoring and sampling functions are part of the PCMS. The software for the PCMS is developed using a structured process comparable to the safety related software for the PSMS. The quality program for the PCMS will be described in Chapter 7.7

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

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SRP SECTION: 11.05 – PROCESS AND EFFLUENT RADIOLOGICAL
MONITORING INSTRUMENTATION AND SAMPLING SYSTEMS

APPLICATION SECTION: 11.5

DATE of RAI issue: 12/18/2008

QUESTION NO.: 11.05-4

Describe what means are provided to ensure that radiation monitoring instrumentation will function properly for possible environmental conditions. 10 CFR Part 50, Appendix A, General Design Criteria 13, "Instrumentation and Control," states that instrumentation shall be provided to monitor variables and systems over their anticipated ranges for normal operation, anticipated operational occurrences, and for accident conditions as appropriate to assure adequate safety. The staff needs additional information that will address how the instrumentation design and/or environmental control systems are available to protect radiation monitoring instrumentation from the effects of environmental stressors. Examples of environmental conditions include freezing conditions, high temperatures, electromagnetic interference, high humidity, seismic/vibration conditions, and high radiation.

ANSWER:

The MCR monitors RMS-RE-83A, -83B, -84A, -84B, -85A, -85B, are safety-related monitors, required to function during AOOs and accidents as well as during normal operation, and are designated Class 1E. The environmental qualification of these monitors is discussed in DCD Subsection 3.11 and is thoroughly discussed in the "US-APWR Equipment Environmental Qualification Program" Technical Report. Specifically with respect to environmental conditions, the document defines applicable environmental parameters, identifies test parameters, describes the methodology used to qualify the equipment located in harsh environments, and includes a summary of environmental conditions and qualified conditions for equipment located in harsh environments.

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.