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US-APWR
Design Center Working Group Meeting for Chapter 11,"Radioactive Waste Management"

To:

Mitsubishi Heavy Industries (MHI) and Luminant Generation Company, LLC

By:

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Purpose

- The Nuclear Regulatory Commission (NRC), Mitsubishi Heavy Industries (MHI), LTD, and Luminant Generation Company, LLC will discuss Design Certification Document (DCD), Chapter 11, "Radioactive Waste Management" Request for Additional Information (RAI) responses related to epoxy coatings, radiation monitors, tank failure analysis, and effluent releases.

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Background

- The Staff has completed an initial review and sent the RAI that included 23 questions.
- All responses have been received.
- About half of the responses appear to be satisfactory.
- The Staff has follow-up questions on remaining responses.

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Agenda – Open Session

- Design Change Using Epoxy Coatings
- Containment Particulate Radiation Monitor
- Primary-to-Secondary Radiation Monitors

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Design Change Using Epoxy Coatings (Sections 11.2 and 11.4)

- Use of epoxy coatings for LWMS cubicles and SWMS cubicles/rooms instead of stainless steel (LWMS) and steel (SWMS) to comply with 10 CFR 20.1302, 10 CFR 20.1406 and RG 4.21.
  - Tank cubicles in LWMS are "lined with epoxy up to a wall height sufficient to contain the entire tank contents. This epoxy will serve as a barrier to minimize contamination of the facility, environment, and groundwater, from any leaks from the equipment." (Response to RAI 164-1925, Questions 11.02-1, 11.02-2)
  - For tank cubicles and SRST rooms in the SWMS, similar statements are made on epoxy coatings to minimize contamination of the environment and groundwater in the event of a failed/overflowed tank, or to contain leaks. (Response to RAI 185-2031, Question 11.04-1)

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Design Change Using Epoxy Coatings (Sections 11.2 and 11.4) (Cont.)

- Unlike stainless-steel liners, coatings are not approved as mitigating design feature for retention of liquids for compliance with 10 CFR 20.1302 and conformance with SRP 2.4.13, 11.2.3, and BTP 11-6.
  - "Credit is not allowed for retention by coatings or leakage barriers outside the building foundation." (BTP 11-6)

- Coatings applied to all areas inside A/B including floor under pumps.

- Application of decontaminable paints and smooth-surface coatings to concrete floors and walls.

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Design Change Using Epoxy Coatings (Sections 11.2 and 11.4) (Cont.)

- Appendix A of RG 4.21 lists design features considered for compliance with 10 CFR 20.1406
  - Impermeable, durable, and readily cleanable floor liners and catch basins (A-1, item e)
  - Material selection for SSCs such as liners for storage and transport of radioactive liquids (A-1, item s)
  - Appropriate sealers and a maintenance and inspection program for seal integrity over facility life (A-1, item t)
  - Solidly constructed catch basins that are sealed, leak proof, and sufficiently larger capacity to hold entire tank contents (A-2, item c)

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Follow-up Questions on Design Change Using Epoxy Coatings (Sections 11.2 and 11.4)

- Justify use of epoxy coatings as an acceptable liner for LWMS cubicles and SWMS cubicles/rooms to minimize contamination of the environment and groundwater.

- Describe the maintenance and inspection program that will be implemented to ensure the integrity of epoxy coatings for sealing floor and wall surfaces to minimize contamination of the facility.

- Include ITP described for coating systems (ASTM D4537-04a).

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Containment Particulate Radiation Monitor (Section 11.5)

- Containment gaseous radiation monitor was deleted from TS leakage detection methods, but containment particulate radiation monitor remains as diverse detection method.
  - IN 2005-24, RG 1.45 (Rev 1), RIS 2009-02

- Information requested on the containment particulate radiation monitor necessary to satisfy RCS leakage rate technical basis for detecting an increase of 1 gpm within 1 hour using a realistic primary coolant concentration was not provided.
  - "This range provides the capability to detect leakage of less than 0.5 gpm within one hour of detector response time. This conforms to the requirement to detect 1 gpm as stated in RG 1.45." (Response to RAI 249-1978, Question 11.05-5)

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Follow-up Questions on Containment Particulate Radiation Monitor (Section 11.5)

- Provide a detailed evaluation to demonstrate the containment particulate radiation monitor range is capable to detect leakage less than 0.5 gpm within 1 hour of detector response time using a realistic radioactive concentration in the RCS, or describe the program and procedure that will satisfy this RCS leakage rate technical basis issue.

- Update reference to RG 1.45 (Rev 1) in Table 1.9.1-1 of DCD Section 1.9, and Sections 5.2.5.4.1.2 and 5.2.7.

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Primary-to-Secondary Radiation Monitors (Section 11.5)

- Information requested on primary-to-secondary radiation monitors necessary to satisfy the 30 gpd primary-to-secondary leakage technical basis using a realistic primary coolant concentration in the RCS was not provided.
  - "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." (Response to RAI 249-1978, Question 11.05-6)

- Not clear on "other monitors" used to calculate leakage rates.
  - "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." (Response to RAI 249-1978, Question 11.05-6)

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Primary-to-Secondary Radiation Monitors (Section 11.5) (Cont'd)

- Information on condenser vacuum pump exhaust monitors as the primary monitors and method to estimate primary-to-secondary leakage is absent in Section 11.5.2.4.2.
  - "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." (Response to RAI 249-1978, Question 11.05-6)

- Not clear on "other isotopes such as Ar-41" to estimate primary-to-secondary leakage rate in condenser exhaust gas since Ar-41 composition in air is very small (<1%).

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Primary-to-Secondary Radiation Monitors (Section 11.5) (Cont'd)

- ITAAC information requested on SG tube leakage detection instruments to verify compliance with the design was not provided.
  - "The ranges of the radiation 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." (Response to RAI 249-1978, Question 11.05-7)

- ITP information requested for preoperational testing and initial operations on SG tube leakage rate to verify compliance with the design was not provided.
  - "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. (Response to RAI 249-1978, Question 11.05-8)

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Follow-up Questions on Primary-to-Secondary Radiation Monitors (Section 11.5)

- Provide a detailed evaluation to demonstrate the ranges of primary-to-secondary radiation monitors are sufficient to provide the capability to detect 30 gpd primary-to-secondary leakage using a realistic radioactive concentration in the RCS, or describe the program and procedure that will be used to satisfy this primary-to-secondary leakage rate technical basis issue.

- Identify the "other monitors" used to calculate primary-to-secondary leakage rates and describe how they ensure the validity of the method for comparing leakage rates.

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Follow-up Questions on Primary-to-Secondary Radiation Monitors (Section 11.5) (Cont'd)

- Include design information on condenser vacuum pump exhaust monitors as the primary monitors and method using fission gas activity to estimate primary-to-secondary leakage.

- Provide ITAAC in the DCD Tier 1 to address the sensitivity, response time, and alarm limit of SG tube leak detection instruments.

- Provide preoperational tests in DCD Tier 2 to demonstrate the sensitivity, response time, and alarm limit of SG tube leak detection instruments.