## ArevaEPRDCPEm Resource

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| **From:** | Tesfaye, Getachew |
| **Sent:** | Tuesday, June 09, 2009 6:10 PM |
| **To:** | 'usepr@areva.com' |
| **Cc:** | Poehler, Jeffrey; Terao, David; Andrukat, Dennis; Radlinski, Robert; Hearn, Peter; Colaccino, Joseph; ArevaEPRDCPEm Resource |
| **Subject:** | U.S. EPR Design Certification Application RAI No. 223 (2677, 2678, 2509), FSAR Ch. 9 |
| **Attachments:** | RAI_223_CIB1_2677_2678_SFPT_2509.doc |

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on May 11, 2009, and discussed with your staff on June 9, 2009. Draft RAI Questions 09.05.01-69 was modified as a result of that discussion. The schedule we have established for review of your application assumes technically correct and complete responses within 30 days of receipt of RAIs. For any RAIs that cannot be answered within 30 days, it is expected that a date for receipt of this information will be provided to the staff within the 30 day period so that the staff can assess how this information will impact the published schedule.

Thanks,
Getachew Tesfaye
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**Hearing Identifier:** AREVA_EPR_DC_RAIs
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Request for Additional Information No. 223 (2677, 2678, 2509), Revision 0

6/09/2009

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 09.01.02 - New and Spent Fuel Storage
SRP Section: 09.03.02 - Process and Post-Accident Sampling Systems
SRP Section: 09.05.01 - Fire Protection Program
Application Section: FSAR Ch. 9

QUESTIONS for Component Integrity, Performance, and Testing Branch 1 (AP1000/EPR Projects) (CIB1)
QUESTIONS for Fire Protection Team (SFPT)

09.01.02-27

Background

As one of the measures to assist in compliance with 10 CFR 20.1406 with respect to minimizing, to the extent practicable, contamination of the facility and the environment, RG 4.21 Appendix A recommends the following:

> Use leak detection methods (e.g., instrumentation, automated samplers) capable of early detection of leaks in areas where it is difficult or impossible to conduct regular inspections (such as for spent fuel pools, tanks that are in contact with the ground, and buried, embedded, or subterranean piping) to avoid release of contamination from undetected leaks and to minimize contamination of the environment,

In the response to RAI 12.03 and 12.04-1(Reference 1), the applicant provided information related to the spent fuel pool leakage detection system. In the section of the RAI response regarding "System Specific Design Features," Fuel Storage and Handling, (i) Facility Contamination," the following is presented:

> "In case of a leak, leak detection channels are provided behind seams in the liner plate for collection and monitoring of potential pool leaks. Any water collected is routed to the floor and equipment drain system and transferred to the liquid radwaste system for processing. Instrumentation is provided to detect and to alarm the main control room (MCR) when low water level occurs in the spent fuel pool, and area radiation monitors are provided in the fuel storage area for personnel and facility contamination protection. These area monitors alarm locally and in the MCR."

Additionally, under "System Specific Design Features," Fuel Storage and Handling, (ii) Environmental Contamination", it is stated:

> "There are no portions of the spent fuel pool system handling potentially contaminated material that are buried or routed through exterior boundaries. The

leak detection system under the spent fuel pool provides coverage in case of a leak and leak detection equipment in channels aid in identifying the location of the leak. Sumps that collect potential spent fuel pool leakage are double-lined with non-porous material. In addition, walls and curbs are used around locations of potential leaks of contaminated fluids to prevent the spread of these fluids."

Similar monitoring systems in operating U.S. plants have proven to be inadequate to determine or assess the presence of small ongoing leaks. The response to RAI 86 Question 09.01.02-20 (Reference 2) also did not provide design specifications for this system that has the potential for environmental interface. In operating plants, the interface between the stainless steel liner of the SFP and the concrete to which it is attached has typically been used as the leak pathway from the SFP liquid to the collection sump. Liquid that flows through these channels has the ability to come directly into contact with concrete surfaces. Experience in the US has shown that these systems can become clogged with boric acid deposits from low flow leaks (0.01 to 10 gpd) from weld imperfections in the stainless steel liner. These clogs prevent flow to the sump and thus do not show up as any detectable leak. Additionally the backed up liquid saturates the exposed concrete and allows diffusion of tritium to outside the boundaries of the nuclear island.

GDC 61 requires, in part, that the spent fuel storage facilities provide containment of radioactive materials. Per SRP Section 9.1.2, Technical Rationale #4, containment is provided by the spent fuel pool liner, liner leakage collection, and appropriate floor sumps. Provision of an effective leak detection system to ensure pool liner integrity helps ensure effective containment.

Requested Information

1. Provide the means employed by the EPR design to prevent clogging of the leakage detection channels, saturation of the concrete with borated water, and diffusion of tritium outside the boundaries of the nuclear island.
2. Provide the minimum leak rate that can be detected by the collection system.
3. Confirm that there is a groundwater monitoring system outside the nuclear island that monitors for this type of radiological release.
4. Identify the "non-porous" material used.
5. Confirm that the sump material being "double lined" means one layer of the non-porous material on each side of the concrete (one side that faces the system and the other side faces the environment).
6. Confirm that the channels of the leak detection system are accessible for maintenance other than through their terminal end at the collection sump.

References

1. Response to Request for Additional Information No. 23, Supplement 1, Revision 0, 06/24/2008 U.S. EPR Standard Design Certification AREVA NP Inc. Docket No. 52-020 SRP Section: 12.03-12.04 – Radiation Protection Design Features Application Section: 12 CHPB Branch (ADAMS Accession No. ML083091032)

2. Response to Request for Additional Information No. 86 Supplement 2 (1216,1143,1227,1106), Revision 0, 10/3/2008 U. S. EPR Standard Design Certification, AREVA NP Inc., Docket No. 52-020, SRP Section: 09.01.01 - Criticality Safety of Fresh and Spent Fuel Storage and Handling SRP Section: 09.01.02 - New and Spent Fuel Storage, SRP Section: 09.01.03 - Spent Fuel Pool Cooling and Cleanup System, SRP Section: 09.05.04 - Emergency Diesel Engine Fuel Oil Storage and Transfer System, Application Section: FSAR Ch. 9, CIB1 Branch (ADAMS Accession No. ML090210803)

09.03.02-14

Background

The staff developed Regulatory Guide 4.21 in order to provide guidance to the industry on meeting the requirements of 10 CFR 20.1406 with respect to minimizing, to the extent practicable, contamination of the facility and the environment, facilitating eventual decommissioning, and minimizing, to the extent practicable, the generation of radioactive waste.

In RAI 12.03 and 12.04-1, the staff requested that the applicant describe the design features to enable compliance with RG 4.21 specifically for a number or systems, including the process sampling system.

In the response to RAI 12.03 and 12.04-1(Reference 1), the applicant provided information related to the process sampling system. Under "System Specific Design Features, Process Sampling System, (i) Facility Contamination," the response includes the statement:

> "Samples from tanks are taken from the bulk volume to avoid low points and sediment traps".

SRP Section 9.3.2, SRP Acceptance Criteria 3.A states, in part "Provisions should be made to ensure representative samples from liquid process streams and tanks. For tanks, provisions should be made to sample the bulk volume of the tank and to avoid sampling from low points or from potential sediment traps." This is virtually the same statement as included in the RAI response. However, the staff requires additional detail is on achieving representative sampling of tanks.

Additionally, it is stated that decontamination fluid can be injected into the process sampling system via dedicated nozzles to facilitate decontamination. Decontamination fluid could potentially cause corrosion of the sampling system piping or the piping of the systems that are sampled, if not carefully controlled and removed. GDC 14 requires minimizing the possibility of corrosion-induced failure of the reactor coolant pressure boundary. Use of decontamination fluids without proper controls could threaten compliance with GDC 14.

Requested Information

1. Provide more detail on the location of the sample points for tanks that ensure representative samples from the bulk volume.
2. Confirm that the tanks are recirculated prior to taking these samples so that a representative sample of both fluid and any suspended matter is accounted for in the sampling process.

3. Provide the chemical nature of the decontamination fluid.
4. Provide the schedule for performing the decontamination activities.
5. Provide the procedural or engineering controls that are provided to ensure that the decontamination chemicals do not get into the process sampling system or the systems that they are sampling (since during normal sampling the flushed liquid is returned to the parent system).

References


1. Response to Request for Additional Information No. 23, Supplement 1, Revision 0, 06/24/2008 U.S. EPR Standard Design Certification AREVA NP Inc. Docket No. 52-020 SRP Section: 12.03-12.04 – Radiation Protection Design Features Application Section: 12 CHPB Branch (ADAMS Accession No. ML083091032)


09.03.02-15

Background

As measures to assist in compliance with 10 CFR 20.1406 with respect to minimizing, to the extent practicable, contamination of the facility and the environment, RG 4.21 Appendix A recommends, in part:

- Provide for adequate leak detection capability to provide prompt detection of (radioactive) leakage for any structure, system, or component which has the potential for leakage,

- Use leak detection methods (e.g., instrumentation, automated samplers) capable of early detection of leaks in areas where it is difficult or impossible to conduct regular inspections (such as for spent fuel pools, tanks that are in contact with the ground, and buried, embedded, or subterranean piping) to avoid release of contamination from undetected leaks and to minimize contamination of the environment,

- Reduce the need to decontaminate equipment and structures by decreasing the probability of any release, reducing any amounts released, and decreasing the spread of the contaminant from the source,

In the response to RAI 12.03 and 12.04-1(Reference 1), the applicant provided information related to the process sampling system. Under “System Specific Design Features, Process Sampling System, (i) Facility Contamination,” the response states:

> “As described in U.S. EPR FSAR Tier 2, Section 11.5, the process sampling systems monitor radioactivity levels in plant process streams and atmospheres, indicate and alarm excessive radioactivity levels, …”

FSAR Section 11.5 describes the process and effluent radiological monitoring systems which “monitor, record, and (for certain subsystems) control the release of radioactive materials that may be generated during normal operation, anticipated operational occurrences ( AOOs), and postulated accidents.”

The US EPR FSAR Section 9.3.2 describes the four subsystems of the Process Sampling System (PSS) as the Nuclear Sampling Systems (NSS), Secondary Sampling System (SECSS), Severe Accident Sampling System (SASS) and Hydrogen Monitoring System (HMS). None of these systems have in-line or adjacent-to-line radiation monitors that perform monitoring functions on the PSS itself, nor does the PSS control or reduce the concentration of radionuclides. This was clarified in the licensee's response to Question 09.03.02-3 of RAI 113, and those changes are to be incorporated into FSAR Section 9.3.2.1 (Reference 2). Therefore, the process and effluent radiological monitoring systems appear to be a completely separate and distinct system from the PSS, but the response to RAI 12.03 and 12.04-1 describes the systems as if they are the same system.

Requested Information

1. Provide clarification as to which specific systems and subsystems have radiation monitors specifically associated with the function and monitoring of the individual system.
2. Describe the interface between the process sampling system described in section 9.3.2 and the process and effluent monitoring system described in section 11.5. Confirm that the systems share common piping or components or are the systems are completely separate.

References

1. Response to Request for Additional Information No. 23, Supplement 1, Revision 0, 06/24/2008 U.S. EPR Standard Design Certification AREVA NP Inc. Docket No. 52-020 SRP Section: 12.03-12.04 – Radiation Protection Design Features Application Section: 12 CHPB Branch (ADAMS Accession No. ML083091032)

2. Response to Request for Additional Information No. 113 (1284, 1455), Revision 0, 11/06/2008, U. S. EPR Standard Design Certification, AREVA NP Inc. Docket No. 52-020, SRP Section: 09.03.02 - Process and Post-Accident Sampling Systems, Application Section: FSAR Ch. 9, QUESTIONS for Component Integrity, Performance, and Testing Branch 1, (AP1000/EPR Projects) (CIB1), QUESTIONS for Health Physics Branch (CHPB) (ADAMS Accession No. ML083430814)

09.05.01-69

RCP Lube Oil Collection System:

The EPR design currently states the inclusion of an oil collection system; however, the staff notes that EPR FSAR Sections 5.4.1.2.2 and 9.5.1.6.1 along with Figure 5.1-4 do not provide an adequate level of detail that allows the staff to determine the effectiveness of these oil collection systems.

Provide the following details concerning the RCP oil collection design, in accordance with RG 1.189 (Rev. 1) Position 7.1:

a. Provide assurance that the the oil collection system will collect oil and prevent the oil from reaching outside the collection system. Include the oil collecting device details, collection system pump details and the location (if provided), and coverage areas of the RCP.

b. EPR FSAR Section 9.5.1.6.1 states that each RCP pump will have an RCP lube oil collection system. Provide the number of lube oil collection tanks, the number of RCPs served by each tank and the capacity of the tanks based on total oil volume per RCP.

c. EPR FSAR Section 9.5.1.6.1 states that the design of the RCP lube oil collection system is such "that its failure will not lead to fire during normal or design basis accident conditions". To justify this statement, identify the location and proximity of the lube oil collection tank(s) to equipment important to safety within the area as well as any ignition sources within the proximity. Also include design basis of the RCP water spray system.

d. EPR FSAR Section 9.5.1.6.1 states the collection system will be provided with means "to collect lube oil from all potentially pressurized and un-pressurized leakage sites in the RCP lube oil systems" for both the upper and lower bearings. Identify the locations of all sites (i.e. potential leakage points) to be covered by the lube oil collection system. Assure such sites also include mechanical joints.

e. EPR FSAR Section 9.5.1 calls certain areas surrounding the RCP units as "oil risk areas". The EPR PRA does not take into account an RCP lube oil fire. Provide an explanation for having "oil risk areas" but not including RCP lube oil fires as a potential risk in the PRA.

References:
U.S. EPR DCD FSAR Section 5.4.1.2.2, 9.5.1.6.1, and Figure 5.1-4 (Sheet 7 of 7)