ArevaEPRDCPEm Resource

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Sent: Monday, June 28, 2010 7:28 PM
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Cc: WILLIFORD Dennis (AREVA); NOXON David (AREVA); ROMINE Judy (AREVA); COLEMAN Sue (AREVA); PATTON Jeff (AREVA); SANDERS Harris (AREVA); GARDNER George Darrell (AREVA)
Subject: Draft Response to U.S. EPR Design Certification Application RAI No. 360, FSAR Ch 12, Supplement 3 - PHASE 4 RAI Questions 12.03-12.04-20, 12.03-12.04-21 part 2
Attachments: RAI 360 Supplement 3 Response - DRAFT.pdf

Getachew,

Earlier today, June 28, 2010, AREVA NP provided a revised schedule for Questions 12.03-12.04-20, and 12.03-12.04-21 part 2 (July 30, 2010). To support the NRC review, a draft of this response is provided in the attached file. Please let me know if the staff has additional questions, or if this response can be sent as final.

Thanks,

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Hearing Identifier: AREVA_EPR_DC_RAIs
Email Number: 1625

Mail Envelope Properties (BC417D9255991046A37DD56CF597DB7106B12158)

Subject: Draft Response to U.S. EPR Design Certification Application RAI No. 360, FSAR Ch 12, Supplement 3 - PHASE 4 RAI Questions 12.03-12.04-20, 12.03-12.04-21 part 2
Sent Date: 6/28/2010 7:27:42 PM
Received Date: 6/28/2010 7:27:45 PM
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Files	**Size**	**Date & Time**
MESSAGE	561	6/28/2010 7:27:45 PM
RAI 360 Supplement 3 Response - DRAFT.pdf		463347

Options
Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

Response to

Request for Additional Information No. 360, Supplement 3

3/04/2010

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: 12.03-12.04 - Radiation Protection Design Features

QUESTIONS for Health Physics Branch (CHPB)

Question 12.03-12.04-20:

This is a follow-up to OPEN ITEM RAI 228, Question No. 12.3-12.4-10

In response to RAI 12.3-12.4-10, the applicant stated that the demineralized water distribution system would have no buried piping associated with its connections to contaminated systems. However, the applicant did not address this system's connection with the condensate storage and transfer system, which can also become contaminated over time due to steam generator tube leaks and tritium diffusion. Recent operating experience from several operating reactors has demonstrated that buried condensate piping can corrode and leak to the ground, resulting in environmental contamination. These leaks have then become the focus of NRC oversight and public concern. Therefore provide the following information to demonstrate compliance with 10 CFR 20.1406:

1. Tier 2, Section 9.2.6, “Condensate Storage Facilities,” of the EPR FSAR states that the EPR stores condensate in the condenser hotwell and in the demineralized water storage tank. Given that the demineralized water storage tanks are located outdoors, provide information on whether there is any buried piping connecting these tanks to the condensate system. If there is buried piping describe how the piping will allow for inspection and/or monitoring to prevent unmonitored releases to the environment, or justify an alternative methodology for demonstrating compliance with 10 CFR 20.1406.
2. Describe whether the EPR design will have buried piping connected to any contaminated or potentially contaminated systems (such as condensate/feedwater storage and transfer systems). If so, describe how this piping will allow for inspection and/or monitoring to prevent unmonitored releases to the environment.
3. Update the FSAR to include an overview of the EPR's use of buried piping for any contaminated and potentially contaminated systems, including discussion on how this buried piping complies with 10 CFR 20.1406, as provided in the answers to questions 1 and 2 above.
4. Describe design features of the condensate/feedwater storage and transfer system as well as the main steam and auxiliary steam systems which demonstrate compliance with 10 CFR 20.1406. If these design features are not already in the FSAR, update the FSAR sections for the system.

Response to Question 12.03-12.04-20:

Part 1

This question has been addressed in the Response to RAI 360, Supplement 1.

Part 2

The U.S. EPR does not have a condensate storage tank (See the response to Part 4). .

In the U.S. EPR design, structures, systems, and components (SSC) which have the potential to generate, process, or store radioactive material will be designed with a contaminant management philosophy. The principles embodied in this philosophy are:

- Prevention of unintended releases.

- Early detection, if there is an unintended release of radioactive contamination.
- Prompt and aggressive cleanup, should there be an unintended release of radioactive contamination.

With respect to piping that contains or can potentially contain radioactive fluids, the design requirements for minimizing contamination from pipe leakage include the following:

- Pipes embedded in concrete structures are to be avoided to the extent practical.
- Concrete embedment will not be relied upon as a shielding option since pipes embedded in concrete impede inspections and repairs, and increase dose and waste during decommissioning.
- Floor drain pipes at the lowest elevation are embedded in concrete and are provided with a concentric guard pipe fitted with an alarm moisture detection monitor.
- The only pathway allowed for the discharge of radioactive liquid effluent is subsequent to treatment by the liquid waste management system. Piping outside the Radioactive Waste Processing Building (RWB) will be provided with a concentric guard pipe. The outer pipe will be fitted with an alarmed leakage detection monitor, which detects any leakages. The double pipe system will extend to the discharge pipe outlet into the cooling water outfall. Samples can be taken from the outer pipe in the RWB in case of any leakage.
- To minimize the leakage of radioactive fluids to ground water, and the leakage of ground water into buildings, system and structural designs will avoid the use of below-grade conduit and piping penetrations through walls that form exterior boundaries. This is particularly applicable to penetrations at or through the floor level.
- Penetrations through outer walls of a building containing radioactive systems will be sealed to prevent leaks to the environment. The integrity of such seals will be periodically verified.

Part 3

The Response to RAI 228, Question 12.03-12.04-9, Parts 2 and 3, and Question 12.03-12.04-10, included the U.S. EPR FSAR Tier 2 markup for new Section 12.3.6.5, “Contamination Controls for Systems.” This new section will be supplemented with new subsection 12.3.6.5.12, “Piping Design Requirements” that will include the response to Part 2. The demineralized water distribution system (DWDS) piping configuration described under Part 1 is already addressed in U.S. EPR Tier 2, Section 12.3.6.5.11, “Demineralized Water Distribution System.”

Part 4

This question was addressed in the Response to RAI 360, Supplement 1.

FSAR Impact:

U.S. EPR FSAR Tier 2, Section 12.3.6.5 will be revised as described in the response and indicated on the enclosed markup.

Question 12.03-12.04-21:

This is a follow-up to OPEN ITEM RAI 228, Question No. 12.3-12.4-9

1. A review of Areva's response to RAI 228, Question 12.03-12.04-9, part 3, indicates that much of the information presented is a recap of system features and operational concepts already described in the FSAR. However, one aspect that is not well discussed for Section 11.5 are 10 CFR 20.1406 design features associated with process and effluent monitoring and sampling systems. There is a need to expand the discussion on design features of the process and effluent monitoring and sampling systems and their interconnections to non-radioactive systems. Subsystem interconnections to non-radioactive systems include purge air, purge water, instrument air, and makeup water for filling loop seals. The design features should describe how these non-radioactive system interconnections are protected from contamination due to leakage, spillage, valving errors, or other operating conditions. For example, for equipment requiring the use of purge air, the air should be taken from ambient or room atmosphere where the sampling subsystem is located, passed through prefilters, and then, upon demand, made available for purging, with the purged flow not returned to its supply source. For liquid process or effluent rad monitors that require flush water, the design of these interconnections should confirm that flush water supply is either temporarily connected during maintenance and then completely removed upon termination of the flush, or, if permanently connected, protected by backflow preventers and pressure differentials. Again, the purge flow should be forwarded to the most appropriate radioactive system and not returned to its supply source. Where loop seals are utilized, the loop seals should be isolated from the makeup water source by use of isolation valves and backflow preventers. Similar design features should be described for instrument air. This expanded discussion should be presented in FSAR Section 12.3.6.5.2 or 12.3.6.5.4, with internal cross-referencing. If, as part of this response, new or additional design features are described, then they should all be incorporated into the relevant FSAR sections where the systems are described.
2. In response to RAI 228, Question 12.03-12.04-9 part 4, the applicant provided an FSAR mark up showing the addition of text in FSAR Sections 11.2 to 11.4 which references information presented in FSAR Section 12.3.6.5.4 for details on compliance with 10 CFR Part 20.1406. However, no similar insert was suggested for Section 11.5. As with FSAR Sections 11.2 to 11.4, the following insert should be added to FSAR Section 11.5:

"Refer to Sections 12.3.6.5.2 and 12.3.6.5.4 for process and effluent monitoring and sampling systems design features which demonstrate compliance with the requirements of Part 20.1406 and guidance of IE Bulletin 80-10."

Response to Question 12.03-12.04-21:

Part 1

A response to this question will be provided by September 16, 2010.

Part 2

U.S. EPR FSAR Tier 2, Section 11.5.2 will be modified to provide a cross-reference to Section 12.3.6.5.4 for a description of radioactive waste management system design features that demonstrate compliance with the requirements of 10 CFR 20.1406. This cross-reference will be similar to those already provided in U.S. EPR FSAR Tier 2, Sections 11.2 – 11.4.

FSAR Impact:

U.S. EPR FSAR Tier 2, Section 11.5.2 will be revised as described in the response and indicated on the enclosed markup.

U.S. EPR Final Safety Analysis Report Markups

AREVA NP Inc. has designed safety-related process and effluent radiological monitoring and sampling systems in accordance with the following criteria:

- Radiation detectors and black boxes are powered from the uninterruptible power supply system; sample pumps and heat-tracing systems are powered from Class 1E power.
- Components are environmentally qualified as applicable. Section 3.11 addresses the environmental qualification of instrumentation.
- Components are seismically qualified as applicable. Sections 3.10 and 3.11 address the qualification of instrumentation.
- Systems comply with the fire protection criteria addressed in Section 9.5.
- Multiple (redundant) systems are used and are physically separated in accordance with criteria addressed in Section 8.3.2.

Process and effluent radiological monitoring and sampling systems that sample airborne radioactive materials are designed in accordance with the general principles and guidance contained in ANSI Standard N.13.1-1999 (Reference 1). Use of this ANSI standard is in accordance with RG 1.21.

12.03-12.04-21

Refer to Section 12.3.6.5.4 for radioactive waste management system design features which demonstrate compliance with the requirements of 10 CFR 20.1406.

A COL applicant that references the U.S. EPR will fully describe, at the functional level, elements of the process and effluent monitoring and sampling programs required by 10 CFR Part 50, Appendix I and 10 CFR 52.79(a)(16). This program description, Offsite Dose Calculation Manual (ODCM), will specify how a licensee controls, monitors, and performs radiological evaluations of releases. The program will also document and report radiological effluents discharged to the environment.

A COL applicant that references the U.S. EPR design certification is responsible for deriving PERMSS subsystem's lower limits of detection or detection sensitivities, and set-points (alarms and process termination/diversion) for liquid and gaseous process radiation monitoring equipment not covered by the ODCM based on plant and site-specific conditions and operating characteristics of each installed radiation monitoring subsystem.

A COL applicant that references the U.S. EPR design certification is responsible for developing a plant-specific process and effluent radiological sampling and analysis plan for systems not covered by the ODCM, including provisions describing sampling and analytical frequencies, and radiological analyses for the expected types of liquid and gaseous samples and waste media generated by the LWMS, GWMS, and SWMS.

The DWDS interfaces with these contaminated systems in the RB, Safeguard Buildings, Nuclear Auxiliary Building, FB, and Radioactive Waste Processing Building. The DWDS is protected from contamination by system design and multiple interface barriers. The DWDS operating pressure is higher than the interfacing systems. The system pressure differential at the interface prevents contamination of the DWDS. Contamination of the DWDS when pressure is lost is prevented by defense in depth consisting of multiple barriers such as isolating valves, check valves, air gaps, and anti-siphoning features that isolate and prevent back flow. These mechanical barriers are part of the interfacing systems or DWDS to prevent contamination from reaching the DWDS. Additional barriers are in the DWDS to prevent upstream contamination such as isolating valves and check valves located at the NI Building entrances to further prevent upstream contamination outside of the NI. The overall design configuration of the DWDS and the contaminated interfacing systems contain sufficient barriers to prevent radioactive contamination of the DWDS.

12.03-12.04-20
Parts 2 & 3

12.3.6.5.12 Piping Design Requirements

With respect to piping that contains or can potentially contain radioactive fluids, the design requirements for minimizing contamination from pipe leakage include the following:

- Pipes embedded in concrete structures are to be avoided to the extent practical.
- Concrete embedment will not be relied upon as a shielding option because pipes embedded in concrete impede inspections and repairs, and increase dose and waste during decommissioning.
- Floor drain pipes at the lowest elevation are embedded in concrete and are provided with a concentric guard pipe fitted with an alarm moisture detection monitor.
- The only pathway allowed for the discharge of radioactive liquid effluent is subsequent to treatment by the liquid waste management system. Piping outside the Radioactive Waste Processing Building (RWB) will be provided with a concentric guard pipe. The outer pipe will be fitted with an alarmed leakage detection monitor, which detects any leakages. The double pipe system will extend to the discharge pipe outlet into the cooling water outfall. Samples can be taken from the outer pipe in the RWB in case of any leakage.
- To minimize the leakage of radioactive fluids to ground water, and the leakage of ground water into buildings, system and structural designs will avoid the use of below-grade conduit and piping penetrations through walls that form exterior boundaries. This is particularly applicable to penetrations at or through the floor level.
- Penetrations through outer walls of a building containing radioactive systems will be sealed to prevent leaks to the environment. The integrity of such seals will be periodically verified.