ArevaEPRDCPEm Resource

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Sent: Wednesday, June 16, 2010 4:38 PM
To: Tesfaye, Getachew
Cc: ROMINE Judy (AREVA NP INC); KOWALSKI David J (AREVA NP INC); PATTON Jeff (AREVA NP INC); COLEMAN Sue H (AREVA NP INC); WILLIFORD Dennis C (AREVA NP INC); RYAN Tom (AREVA NP INC); BALLARD Robert W (AREVA NP INC); CONNELL Kevin J (AREVA NP INC)
Subject: DRAFT Response to U.S. EPR Design Certification Application RAI No. 298, FSAR Ch. 9, Supplement 6
Attachments: RAI 298 Supplement 6 Response - DRAFT.pdf

Getachew,

On June 16, 2010 (today) AREVA submitted RAI 298 Supplement 5 to provide a revised date for the final response of July 15, 2010. To support interactions with the NRC, a draft of RAI 298 Supplement 6 is provided for your review. Let me know if the staff has questions or if this response can be submitted as final.

Thanks,

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Response to

Request for Additional Information No. 298, Supplement 6

10/21/2009

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 Chapter 9

QUESTIONS for Balance of Plant Branch 1 (AP1000/EPR Projects) (SBPA)
QUESTIONS for Health Physics Branch (CHPB)
QUESTIONS for Balance of Plant Branch 1 (AP1000/EPR Projects) (SBPA)

Question 09.03.02-17:

Follow-up to RAI Question 9.3.2-15

The applicant stated in their "supplement 1" response to RAI 223, Question 9.3.2-15 (ML092370014), that the Severe Accident Sampling System (SASS) has no radiation monitors associated with it. However, GDC 64 states, in part, that means shall be provided to monitor spaces containing components for recirculation of loss-of-coolant accident fluids and to monitor the plant environs for radioactivity that may be released during postulated accidents. Section 12.3.5.2, Postaccident Access to Radiological Vital Areas," states that the Post-LOCA SASS room and the Post-LOCA SASS ventilation air sampling room, both of which are located in the fuel building, may be accessed after an accident. In accordance with the requirements of GDC 64, provide information on the means that will be used to monitor the severe accident sampling rooms for radioactivity during post-LOCA sampling vital area missions, such that worker exposure due to the operation of the SASS will be maintained ALARA. Revise Tier 2, Sections 12.3 and 9.3.2 of the FSAR to include information on the radiation monitoring of the SASS rooms, as appropriate.

Response to Question 09.03.02-17:

The design of the U.S. EPR severe accident sampling system (SASS) varies from those found in current plants in that the in-containment refueling water storage tank (IRWST) and containment atmosphere (i.e., liquid and gas) is recirculated and sampled in an inaccessible, remotely controlled module; and then diluted and pumped to a sample station. The gas and liquid recirculation and dilution sampling modules are in Safeguards Building (SB) 4. The room is a locked, therefore, high radiation area and entry is not required for sampling. The sampling modules (i.e., sump, gas, and scrubbing liquid) are installed at +0.00 ft inside SB 4; this is only one level above the severe accident heat removal system (SAHRS) heat exchanger room. The existing layout provides sufficient shielding against gamma radiation from SAHRS equipment. No other equipment is in the room and this room does not require entry to operate the SASS.

After recirculation and dilution, the highly diluted samples are pumped to the Fuel Building where a manual sample is taken. The sample ports are designed as a septum to enable sample withdrawal using a syringe. The operator enters the Fuel Building room where the highly diluted samples are located, and as a precautionary measure, the operator has a portable radiation meter. The operator draws each sample using a syringe and transports the samples to the laboratory. The samples are handled and analyzed with equipment available in the plant laboratory. Exposure is reduced by shielding, dilution of samples, and re-injection of sample to containment.

The sampling modules are designed to dilute highly active samples. The IRWST sample is diluted by a factor of 1:1000 (or 1:100) with water. The scrubbing liquid from the containment atmosphere is diluted by a factor of 1:1000 with water. The gas sampling from the containment is diluted by a factor of 1:1000 (or 1:1000 or 1:10) with nitrogen. The default position is the highest dilution factor, which is controlled by startup procedures.

Regarding GDC 64, the containment and IRWST samples are highly diluted in SB 4. The highly diluted sample is pumped to the Fuel Building and sampled. The samples are purged and flushed back to the containment/sump to avoid cross contamination with the next sample and reduce the radiological impact on the system. An operator accesses the Fuel Building only to

obtain a diluted sample. There is no provision for an operator to manually take samples from the recirculation and dilution modules in SB 4.

The areas of concern in the Fuel Building are not affected by beyond design basis event (BDBE) accidents. The double-shell containment provides sufficient shielding. Even if only the containment wall is considered, the BDBE event will not significantly affect the installation room of the sample box and control cabinet.

The backfeed module is installed in the residual heat removal system (RHRS) heat exchanger room. For this room, it is assumed that the radiological conditions after a BDBE event do not significantly differ from those of normal operation because the samples are highly diluted. As long as the RHRS is in operation, core damage resulting in a large release of the activity inventory will not occur.

U.S. EPR FSAR Tier 2, Section 9.3.2.3 will be revised to reflect the information in this response. Because installation of additional radiation monitors is not necessary, U.S. EPR FSAR Tier 2, Section 12.3 will not be revised.

FSAR Impact:

U.S. EPR FSAR Tier 2, Section 9.3.2.3 will be revised as described in the response and indicated on the enclosed markup.

U.S. EPR Final Safety Analysis Report Markups

- The SASS obtains and analyzes gaseous and liquid samples from the containment atmosphere and IRWST following a severe accident.

- The only safety-related function of the SECSS is containment isolation. Refer to Section 6.2.4.

The design of the process sampling systems satisfies GDC 14 regarding maintaining the integrity of the RCPB by sampling for chemical species that can affect the RCPB.

- The NSS collects primary water chemistry data. Verification that key chemical parameters are within prescribed limits provides assurance that the RCPB and fuel cladding are not adversely affected by chemical attack.

- The portion of the NSS that includes the RCPB is designed, fabricated, erected and tested so as to have a low probability of abnormal leakage, rapidly propagating failure and gross rupture. Sampling for corrosion products is used to verify key chemistry parameters.

- The only safety-related function of the SECSS is containment isolation. Refer to Section 6.2.4.

- The U.S. EPR steam generator water and feedwater quality requirements are based on the EPRI Secondary Water Chemistry Guidelines (Reference 1). Refer to Section 10.3. Meeting these EPRI guidelines is consistent with satisfying the guidelines in RG 1.21, Position C.2.

- The SASS does not serve as part of the RCPB. Therefore, GDC 14 is not applicable to the SASS.

The design of the process sampling systems satisfies GDC 26 regarding reliably controlling the of reactivity changes by sampling the boron concentration.

- To verify the boron concentration, the NSS samples boron concentration by obtaining samples from the RCS and boric acid storage tanks downstream of the RBWMS pumps.

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- The SASS obtains and analyzes liquid samples from the IRWST following a severe accident. The containment atmosphere, containment scrubbing liquid, and IRWST sample can be diluted by a factor of up to 1:1000.

- The only safety-related function of the SECSS is containment isolation. Refer to Section 6.2.4. Therefore, GDC 26 is not applicable to the SECSS.

The design of the process sampling systems satisfies GDC 41 regarding controlling fission products by reducing the concentration and quality of fission products released to the environment following postulated accidents.

- The NSS obtains and analyzes liquid samples from the RCS after an accident.

- The NSS measures chemistry parameters in the LHSI system and SIS accumulators. These measurements confirm the chemical additive concentration is within prescribed limits and that a sufficient chemical supply is available during postulated accidents.

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- The SASS obtains and analyzes gaseous samples from the containment atmosphere following a severe accident. The containment and IRWST samples are highly diluted in Safeguard Building (SB) 4. The highly diluted sample is pumped to the Fuel Building where a manual sample is taken. The samples are then purged and flushed back to the containment/IRWST to avoid cross contamination with the next sample and reduce the radiological impact on the system.

- The only safety-related function of the SECSS is containment isolation. Refer to Section 6.2.4. Therefore, GDC 41 is not applicable to the SECSS.

The design of the process sampling systems satisfies GDC 60 regarding suitably controlling the release of radioactive materials in gaseous and liquid effluents and handling radioactive solid wastes produced during normal reactor operation, including AOOs.

- The design of the NSS prevents the inadvertent transfer of contaminated fluids to non-contaminated drainage systems.

- The design of the NSS and SASS purges and drains the sample stream back to the system being sampled, if possible, or to an appropriate radwaste system. This is consistent with the guidelines in RG 8.8, Positions 2.d.(2), 2.f.(3) and 2.f.(8).

- The NSS and SASS sample lines contain passive flow restrictions (equivalent to line size) to limit loss of coolant following a rupture of a sample line. This is consistent with the guidelines in RG 8.8, Position 2.i.(6).

- Safety-related CIVs close on receipt of a CIS and contain radioactive material inside the RB. Refer to Section 6.2.4.

The design of the process sampling systems satisfies GDC 63 regarding monitoring fuel storage and radioactive waste systems and detecting conditions that may result in excessive radiation levels.

- NSS analysis capabilities provide assurance that the release of radioactive materials to the environment is controlled through the use of sampling boxes.

- The SASS does not interface with plant systems that monitor fuel storage and radioactive waste systems. Therefore, GDC 63 is not applicable to the SASS.

- The only safety-related function of the SECSS is containment isolation. Refer to Section 6.2.4. Therefore, GDC 63 is not applicable to the SECSS.

The design of the process sampling systems satisfies GDC 64 regarding monitoring the containment atmosphere, spaces containing components for recirculation after a