ArevaEPRDCPEm Resource

From: Wunder, George
Sent: Tuesday, February 11, 2014 9:48 AM
To: ArevaEPRDCPEm Resource
Subject: FW: US EPR DC DRAFT RAI 622, Section: 09.01.04 - Light Load Handling System (Related to Refueling)
Attachments: draftRAI_622RPB.docx

From: Miernicki, Michael **On Behalf Of** Wunder, George
Sent: Thursday, December 19, 2013 1:45 PM
To: 'usepr@areva.com' (usepr@areva.com)
Cc: Hearn, Peter; Segala, John; Wunder, George; McCoppin, Michael; Stutzcage, Edward; Flanders, Scott
Subject: US EPR DC DRAFT RAI 622, Section: 09.01.04 - Light Load Handling System (Related to Refueling)

Attached please find Draft RAI No. 622 regarding your application for standard design certification of the U.S. EPR. If you have any questions or need clarification regarding this Draft RAI, please let us know as soon as possible, I will have our technical Staff available to discuss them with you.

Please also review the Draft RAI to ensure that we have not inadvertently included proprietary information. If there is any proprietary information, please let us know within the next ten days. If I do not hear from you within the next ten days, I will make the Draft RAI publicly available.

Thanks,

George

Hearing Identifier: AREVA_EPR_DC_RAIs
Email Number: 4801

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Draft Request for Additional Information 622

Issue Date: 12/19/2013
Application Title: U. S. EPR Standard Design Certification - Docket Number 52-020
Operating Company: AREVA NP Inc.
Docket No. 52-020
Review Section: 09.01.04 - Light Load Handling System (Related to Refueling)
Application Section: 9.1.4 and 12.3

QUESTIONS

09.01.04-43

This is a follow-up to RAI 525, Supplement 12, Question 09.01.04-23.

GDC 61 requires that fuel storage, handling, radioactive waste, and other systems that may contain radioactivity are designed to ensure adequate safety during normal and postulated accident conditions, with suitable shielding and appropriate containment, confinement, and filtering systems.

a) In the text of the response to Question 09.01.04-23, the applicant indicated that the radiation zone designation for Room UFA19 021 (the loading pit) was being revised from Zone 8 to Zone 7. However, the applicant did not provide any basis for this change.

   SRP Section 12.3-12.4 states that the maximum design dose rate zones and the criteria used in selecting maximum dose rates should be identified. SRP Section 12.3-12.4 also states that, "The health physics staff will evaluate the adequacy of the applicant's shielding design on the basis of acceptable radiation shielding practices and calculation methods. Based on its review of the plant layout drawings and radiation zoning, the health physics staff may verify, by independent calculations, the adequacy of the shielding design for selected areas of the plant."

   Therefore, the applicant is requested to provide the methods, models, and assumptions used in revising the maximum zoning for the loading pit. The information provided should be sufficient for staff to verify the adequacy of the zoning and the shielding of the loading pit during fuel transfer operations. If the zoning of the loading pit is different when fuel is not being transferred and the loading pit is dewatered, the applicant may elect to provide a note on the radiation zone maps to indicate the zoning of the loading pit when it is not being used for fuel transfer.

b) When the loading pit is not being used for fuel transfer, it may be drained and work may need to be performed within the loading pit (for example, to perform maintenance on the swivel gate or swivel gate seals). It is unclear what the dose rate in the loading pit will be when fuel is not being transferred. FSAR Chapter 9 indicates that there is only an elevation difference of approximately two and a half feet from the bottom of the weir gates and the top of fuel in the spent fuel pool (SFP).

   In order to ensure that any maintenance can be performed without exceeding the limits in 10 CFR 20, please provide the maximum dose rate that would be expected in the loading pit (at the location closest to the SFP, such as if work had to be performed on the swivel gate or swivel gate seals) when the pit is drained and the SFP is filled to licensed capacity. The methods, models, and assumptions used in determining the dose rate should also be provided. The information provided should be sufficient to provide reasonable assurance that any worker entry that may need to be made into the loading pit can be made in compliance with 10 CFR 20.

c) RG 8.38 Appendix B notes that fuel handling must be controlled to prevent potentially fatal exposure to workers from mishaps with irradiated fuel. As stated in RG 8.38, unshielded irradiated fuel can create radiation fields of 1E4 to 1E6 rads per hour (1E2 to 1E4 Gy per hour) at a distance of 30.5 cm (1 ft).

   If a fuel assembly in the SFP were to pass by the loading pit weir gates while the loading pit is drained, workers in the pit could be exposed to very high levels of radiation. Therefore, in accordance with 10 CFR 20.1601 and 10 CFR 20.1602, the applicant should describe in the FSAR any interlocks or physical controls that may be present to preclude the movement of fuel in the SFP when the loading pit is drained in order to ensure that a worker will not be in the loading pit while fuel is being moved in the SFP. Similar controls should be provided in the FSAR for when the transfer pit is drained, as the physical setup and shielding for the transfer pit appears to be very similar to that of the loading pit.

d) SRP Section 12.3-12.4 states that, "The reviewer will evaluate all relevant aspects of the initial design plans, particularly to identify new arrangements, improved designs, unusual shield thicknesses, a new or modified shield thickness calculational procedure, unusual assumptions in the calculation, and placement of radiation monitors." SRP 12.3-12.4 also states that, "The staff will evaluate the shielding design in terms of the assumptions used to calculate shield thickness, the calculational methods used, and the parameters chosen."

   In a teleconference, staff asked the applicant to verify the adequacy of the radiation shield walls around the SFP. Staff asked this question because in supplement 9 of the response to RAI 525, the applicant had decreased the wall thickness

of two walls near the SFP. In addition, the staff expressed concern that other minimum wall thicknesses, provided in the EPR FSAR Chapter 12 figures, for walls surrounding the SFP seemed unusually thin compared to other designs. While the applicant corrected the two erroneous wall thickness provided in the previous response, the supplemental response to Question 09.01.04-23 was unresponsive to the staff's overall concerns regarding shielding around the SFP.

Typically, shield walls around a SFP are thicker than many of the minimum wall thicknesses provided around the EPR SFP. In addition, in the response to RAI 150, Supplement 1, Question 12.03-12.04-6, the applicant specified that, "the minimum wall thickness required to maintain dose rates in occupied areas adjacent to the fuel transfer tube less than 100 rads per hour is 2.33 ft." Using a model of a fuel assembly comparable to the U.S.EPR fuel assembly (with dose rates comparable to 100 rads per hour through a 2.33 ft wall), staff calculated the dose rate through various wall thicknesses, consistent with wall thicknesses around the EPR SFP. Using this fuel assembly model, staff calculated the dose rates of approximately 25 rem/hr through a 2.7 foot wall, 2 rem/hr through a 3.4 foot wall, and 200 mrem/hr through a 4.1 foot wall (all dose rates were calculated approximately 30 centimeters from the surface of the wall). These values are all significantly greater than the dose rates provided on the other side of walls with these thicknesses in the EPR design. Adding a foot of water between the fuel assembly and the wall dose rates were still right at or exceed the zoning of the adjacent rooms in the U.S. EPR FSAR (staff calculated doses of approximately 5 rem/hour through a 2.7 foot wall, 500 mrem/hour through a 3.4 foot wall, and 50 mrem/hour through a 4.1 foot wall).

While the above dose rates would represent an estimate of doses from a single maximum fuel assembly, dose rates should be calculated assuming the contribution from all fuel that may be present in the SFP.

Based on the above information, please justify why the minimum shield wall thicknesses and zoning around the SFP (both upper and lower portions of the pool) are adequate or revise the shield wall thicknesses around the SFP to ensure adequate shielding from all sources that may be present in the SFP.

e) In this response to Question 09.01.04-23 AREVA indicated that the radiation shielding information provided in Tier 1, Section 2.1 was consistent with the criteria in the response to Question 14.03.08-1, and that only wall thicknesses for walls that provide post-accident shielding and walls that separate a Zone 7 or 8 from a Zone 3 were included in Tier 1. However, other new reactor designs have included all walls relied on for radiation shielding in Tier 1. Therefore, in addition to the radiation barriers already provided in Tier 1, Section 2.1, the staff is suggesting AREVA (at a minimum) include all walls that are credited in shielding plant areas from fuel (walls that provide shielding to accessible areas around the core, the SFP, fuel transfer tube, and the loading hall) and other very high radiation areas (areas with dose rates of 500 rad/hour at 1 meter from the radiation source) in Tier 1 to be more consistent with other designs.