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## REVISED RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

### APR1400 Design Certification

Korea Electric Power Corporation / Korea Hydro & Nuclear Power Co., LTD

Docket No. 52-046

RAI No.: 235-8275  
SRP Section: 12.03 – 12.04 Radiation Protection Design Features  
Application Section: 12.3 – 12.4  
Date of RAI Issue: 10/07/2015

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### **Question No. 12.03-41**

#### REQUIREMENTS

10 CFR 52.47(a)(5) requires that the FSAR contain the kinds and quantities of radioactive materials expected to be produced in the operation and the means for controlling and limiting radioactive effluents and radiation exposures within the limits set forth in 10 CFR 20.

10 CFR 50, Appendix A, Criterion 61, requires that the fuel storage and handling, radioactive waste, and other systems which may contain radioactivity be designed to assure adequate safety under normal and postulated accident conditions, with suitable shielding for radiation protection, and with appropriate containment, confinement, and filtering systems.

SRP Section 12.3-12.4 indicates that the plant shielding design and normal operation radiation zoning should consider conditions of normal operation, refueling, and anticipated operational occurrences (AOOs), including fuel handling and storage and radioactive material handling, processing, use, storage, and disposal.

#### ISSUE

FSAR Table 12.3-4 provides design basis minimum radiation shield thicknesses for the plant. However, while in the response to RAI 7930, Question 12.03-6, the applicant provided shielding information for the refueling canal (room 119-A01B), the applicant does not provide clear shielding information for the fuel transfer tube. In addition, it is unclear if the radiation zones account for radiation dose rates during fuel transfer.

#### Information Needed

1. Please update FSAR Table 12.3-4 to provide the minimum radiation shield thicknesses for the fuel transfer tube based on transferring of the maximum source term (maximum two fuel assemblies at the earliest time transfer would be allowed by technical specifications) that could be contained within the tube.

2. Please ensure that zoning for the areas surrounding the fuel transfer tube in FSAR Figures 12.3-4 through 12.3-8 include dose contributions from the maximum source term that would be expected within the fuel transfer tube during fuel transfer operations (considering the required minimum shielding to be provided in FSAR Table 12.3-4).

**Response – Rev. 1**

1. The fuel transfer tube inspection area is surrounded by the plant north and south walls, while the west side is adjoining to the containment, and the east side is connected to the refueling canal. The ceiling above is a controlled access area leading to a pipe chase. The floor below the transfer tube inspection area contains another pipe chase. Please refer to Figures 1 and 2 for locations of these cubicles. The radiation zonings during normal power operation are as follows;
  - Cubicle beyond north wall is the mechanical penetration room (cubicle 120-A16B): Zone 6
  - Cubicle beyond south wall is another mechanical penetration room (cubicle 120-A16A): Zone 6
  - West end is connected to the refueling pool area (cubicle 130-C01) inside containment building: Zone 8 during power and refueling operations
  - East end is connected to the refueling canal (cubicle 119-A01B) Zone 2 during power operation and Zone 8 during refueling operations
  - Cubicle immediately above the ceiling is the fuel transfer tube inspection area at 113'-10" elevation (cubicle 113-A01B) are Zone 2 during power operation and Zone 3 during refueling operation
  - Cubicle below the transfer tube inspection area is a pipe chase (078-A21B): Zone 6

The minimum radiation shield wall thicknesses for the transfer tube inspection area are determined based on the maximum source terms of two spent fuel assemblies at the earliest time during transfer. The wall thicknesses are summarized as follows and will be added into Table 12.3-4 accordingly.

**Table 1 Minimum Required Shield Thickness for Fuel Transfer Tube Area**

Room Number	Room Name	Minimum Required Shield Thickness (inches)					
		North	South	East	West	Floor	Ceiling
113-A01B	Transfer Tube Inspection Area	44	44	No walls		62	60

It is noted that the transfer tube inspection area at Elevation 113'-10" is not to be accessed during refueling operations. This area can only be accessed through a hatch from cubicle 137-A40B. Cubicle 137-A40B is equipped with administratively locked doors and will have radiation signage posted to prevent inadvertent entry.

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Figure 1 The Location of the Fuel Transfer Tube Area (El. 120')

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**Figure 2 The Location of the Transfer Tube Inspection Area (El. 137'-6")**

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2. As discussed in item #1 above, the transfer tube inspection area at Elevation 137'-6" will be increased to zone 3 during refueling operations. A note to restrict entrance to this area will be added in Figure 12.3-6. For clarity the room names were revised in Figures 12.3-5 and 6 to be consistent with those indicated in Figures 1 and 2.
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#### **Impact on DCD**

Table 12.3-4, Figure 12.3-5 and 12.3-6 will be updated as indicated in Attachment 1 and 2.

#### **Impact on PRA**

There is no impact on the PRA.

#### **Impact on Technical Specifications**

There is no impact on the Technical Specifications.

#### **Impact on Technical/Topical/Environmental Reports**

There is no impact on any Technical, Topical, or Environment Report.

Table 12.3-4 (4 of 7)

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"A"

Room Number	Room Name	Minimum Required Shield Thickness (inches)					
		North	South	East	West	Floor	Ceiling
<u>Auxiliary Building (cont.)</u>							
078-A37A	Deborating IX Room	15	12	10	24	24	24
078-A38A	SFP Cleanup Pump Room	23	23	23	10	23	32
078-A39A	Gas Stripper Effluent Radiation Monitor Room	23	23	23	10	16	35
078-A40B	Boric Acid Concentrator Room	16	23	23	14	16	16
086-A01A	Filter Area	-	-	18	21	13	10
100-A32B	SFP Cooling HX Room	10	10	10	10	10	10
100-A29B	Pipe and HVAC Chase	10	12	10	66	10	10
100-A13A	Mechanical Penetration Room	48	48	48	48	34	13
100-A13B	Mechanical Penetration Room	48	10	48	48	36	10
100-A16D	Pipe Chase	48	48	48	48	10	23
100-A16C	Pipe Chase	48	48	48	48	13	10
100-A24A	SFP Cooling HX Room	12	10	12	40	24	10
100-A26A	Valve Room	28	41	21	28	32	10
100-A25A	Volume Control Tank Room	42	42	42	47	48	53
111-A01B	Cask Loading Pit	48	14	48	48	42	-
114-A01B	Spent Fuel Pool	62	60	59	68	71	-
119-A01B	Refueling Canal	60	59	62	48	62	-
120-A16B	Mechanical Penetration Room	29	27	33	48	18	29
120-A16A	Mechanical Penetration Room	20	24	20	48	17	19
120-A23A	Valve Room	18	25	18	18	10	18
120-A14A	SG Blowdown Regen. HX Room	12	10	10	21	14	21
137-A19A	SG Blowdown Flash Tank Room	18	18	18	21	18	18
156-A14A	Aux. Bldg Controlled Area (I) Normal Exhaust ACU Room	18	18	18	18	18	18
174-A15B	Containment High- and Low-volume Purge ACU Room	21	21	21	21	15	10
195-A08B	Aux. Bldg. Controlled Area (II) Normal Exhaust ACU Room	18	18	18	18	18	18

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<del>Fuel Transfer Tube Area</del>	44	44	No walls	62	60
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113-A01B Fuel Transfer Tube Inspection Area

Non-Security-Related  
Information  
Non-Proprietary

APR1400 DCD TIER 2

**Security-Related Information – Withhold Under 10 CFR 2.390**

**Figure 12.3-5 Radiation Zones(Normal) Auxiliary/Containment Building El.120'-0"**

Non-Security-Related  
Information  
Non-Proprietary

APR1400 DCD TIER 2

**Security-Related Information – Withhold Under 10 CFR 2.390**

**Figure 12.3-6 Radiation Zones(Normal) Auxiliary/Containment Building El.137'-6"**