
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: 12.03 – 12.04
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Question No. 12.03-46

10 CFR 50.48 requires that the risk of fire-induced radiological hazards to the public, environment, and personnel are minimized and Regulatory Guide 1.189 states that the plant should maintain the ability to minimize the potential for radioactive releases to the

environment in the event of a fire and that radioactive waste buildings, storage areas, and decontamination areas should be separated from other areas of the plant by fire barriers having at least 3-hour ratings.

FSAR Section 9.5.1.2.1 indicates that radioactive waste areas, storage areas, and decontamination areas are separated from other areas of the plant by fire barriers having at least a 3-hour rating. However, the identification of radiological areas and analysis to

ensure that the radiological risk to the public, environment, and personnel are minimized appears to be incomplete and inaccurate. For one example, FSAR Section 9.5A.3.6.4, discusses the fire area F000-RW, which encompasses several fire zones and includes significant radiation sources in the Compound Building such as the charcoal delay beds and spent resin long-term storage tank. However, the radioactive release analysis for this area indicates that it is not a radiological area and does not even discuss significant radiation sources like the charcoal delay beds or spent resin long-term storage tank.

Please provide a fire hazard analysis and plant design appropriate to ensure that the risk of fire-induced radiological hazards to the public, environment, and personnel are minimized in accordance with 10 CFR 50.48 and Regulatory Guide 1.189, for radiological hazards other than the reactor, and update the FSAR, as appropriate.

Response

The fire area F000-RW in the Compound Building includes several rooms such as spent resin long-term storage tank room and charcoal delay bed rooms. The spent resin and the charcoal

delay bed include radioactive materials that need to be prevented from releasing to environment.

Therefore, FSAR Section 9.5A.3.6.4, the item “radioactive release analysis” of this fire area will be revised as shown in the Attachment 1.

The spent resin is stored in the spent resin long-term storage tank in the wet condition, which is composed of spent resin and water. These spent resin tanks are located at the enclosed, controlled-access storage area. Also, there is no ignition source in the spent resin long-term storage tank room. Thus it can be credited the radioactive materials contained in the spent resin are not released to the environment since the possibility of fire occurrence is eliminated by the fire hazard analysis.

For the charcoal delay bed rooms of the GWMS(Gaseous Waste Management System), it is not realistic to assume the fire damage of the charcoal due to exposed fire outside the charcoal delay bed rooms. There is no combustible material inside the charcoal delay bed rooms except for charcoal in the delay beds. As shown in the Figure 9.5A-21, which is provided in attachment 2, there is no large opening to allow propagation of fire from outside the room into these rooms. The access openings to the charcoal delay bed rooms for maintenance are normally closed by removable slabs, which do not allow propagation of fire. Thus, the possibility of exposure to direct flame by a postulated fire outside of the charcoal delay bed rooms is eliminated in the fire hazard analysis. Furthermore, potential fire in the charcoal delay beds can be eliminated by the fire prevention design of GWMS as is described in response No.1 to RAI 205-8230, Question No. 11.03-5.

Impact on DCD

FSAR Section 9.5A.3.6.4 will be revised as indicated in Attachment.

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 Environmental Report.

APR1400 DCD TIER 2Fire Protection Adequacy Evaluation

The fire area is enclosed with 3-hour-rated concrete walls except for the exterior walls. Penetrations and openings are sealed for fire confinement. HVAC ductwork passing into the barrier is equipped with a fire damper.

A fire in this area is detected by smoke and temperature detectors and is extinguished manually using water hose or portable extinguishers in accordance with NFPA 72, 14, and 10. The fire area has an automatic wet pipe sprinkler system in accordance with NFPA 13 and regulatory guidance. Based on the expected fire hazards in this area, the 3-hour-rated boundaries of this area provide sufficient containment of any unsuppressed fire that can be expected. On this basis, there is adequate fire protection provided for this fire area.

This fire area is served by the CPB HVAC system. Any HVAC ductwork passing into the area is provided with automatically closing fire dampers at the fire area boundaries. Smoke migration into the area is mitigated by sealed penetrations and openings of the fire area boundaries. After the fire, smoke is removed from the fire area by the exhaust ACU.

Fire Protection System Integrity

Inadvertent actuation of the automatic wet pipe sprinklers installed in this area would not affect the capability to safely shut down the plant since there is no safety-related equipment in this area.

Safe Shutdown Analysis

The design basis fire would occur if all combustibles in this fire area burned, but the design basis fire would not affect the ability to safely shut down the plant since this fire area is completely separated from the adjacent fire areas by 3-hour-rated fire barriers and equipment located in this fire area is non-safety related.

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Radioactive Release Analysis

~~This fire area is not a radiological area. The piping systems in the fire area do not contain fluids with radiological content. Therefore, a radioactive release due to a fire in this area is not expected.~~

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This fire area is a radiological area, due to the charcoal delay beds and spent resin long-term storage tank containing radiological material. But the spent resin is stored in the spent resin long-term storage tank in the wet condition, which is composed of spent resin and water. These spent resin tanks are located at the enclosed, controlled-access storage area. Also, there is no ignition source in the spent resin long-term storage tank room. Thus it can be credited the radioactive materials contained in the spent resin are not released to the environment since the possibility of fire occurrence is eliminated by the fire hazard analysis.

For the charcoal delay bed rooms of the GWMS(Gaseous Waste Management System), it is not realistic to assume the fire damage of the charcoal due to exposed fire outside the charcoal delay bed rooms. There is no combustible material inside the charcoal delay bed rooms except for the charcoal in the delay beds. As shown in Figure 9.5A-21, there is no large opening to allow propagation of fire from outside the room into these rooms. The access openings to the charcoal delay bed rooms for maintenance are normally closed by removable slabs, which do not allow propagation of fire. Thus, the possibility of exposure to direct flame by a postulated fire outside of the charcoal delay bed rooms is eliminated in the fire hazard analysis.

APR1400 DCD TIER 2

Table 9.5A-2 (315 of 319)

F000-RW: Compound Building – Radwaste Area			
Fire Area or Fire Zone Description		Protective Measures	
Z063-RW: Compound Building – Radwaste Area El. 63'		Detection	<ul style="list-style-type: none"> • Explosion-proof type fixed temperature detector • Analog-type photoelectric smoke detector
Wall	<ul style="list-style-type: none"> • F000-AC • Exterior wall • Aux. building 	Fire Extinguisher	<ul style="list-style-type: none"> • Water hose • Dry chemical
Floor	Basemat	Suppression System	Automatic wet pipe sprinkler system
Ceiling	F000-AC (Z077-AC)	Access/Egress	Doors
Major Equipment		Combustible & Fire Loading	
<ul style="list-style-type: none"> • RLS Drain Tanks • RLS Drain Tank Pumps • Filters • Chemical Waste Tanks • Chemical Waste Pumps 		Major Combustible (kJ (Btu))	<ul style="list-style-type: none"> • Lube oil 1.37×10^6 (1.30×10^6) • Grease 4.43×10^6 (4.20×10^6) • Cable insulation 2.57×10^7 (2.43×10^7)
<ul style="list-style-type: none"> • Spent Resin Long-term Storage Tank 		Floor Area (m ² (ft ²))	1,978 (21,287)
		Fire Load (kJ/m ² (Btu/ft ²))	1.72×10^4 (1.52×10^3)
		Fire Severity (min)	1
Fire Impact Analysis			
Suppression System Operates		Suppression System Operates	
A rapid detection and suppression of fire in this area/zone will minimize fire damage to the safe shutdown equipment.		No safe shutdown equipment in this zone/area to be damaged.	

APR1400 DCD TIER 2

Security-Related Information – Withhold Under 10 CFR 2.390

Figure 9.5A-21 Fire Barrier DBD – CPB El. 100'-0"

APR1400 DCD TIER 2

Security-Related Information – Withhold Under 10 CFR 2.390

Figure 9.5A-22 Fire Barrier DBD – CPB El. 120'-0"