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.:	**432-8377**
SRP Section:	**SRP 19**
Application Section:	**19.1**
Date of RAI Issue:	**03/08/2016**

Question No. 19-59

10 CFR 52.47(a)(2) states that it is expected that the standard plant will reflect through its design, construction, and operation an extremely low probability for accidents that could result in the release of radioactive fission products.

The source term evaluation results listed in APR1400 DCD Rev. 0, Table 19.1-29, show that the cesium iodide release fraction for source term category (STC)-21 is 357 times higher than that for STC-17 (5.0 versus 0.014 percent of total core inventory). However, MAAP calculations documented in APR1400-K-P-NR-013603-P show that STC-21 has only a 10 times larger release opening area than STC-17 (1.0 ft2 versus 0.1 ft2). Explain the significant variation in releases in two cases compared to the area assumed.

Response – (Rev. 1)

Figure 1 shows the release fraction of CsI for STC-17 and STC-21. The release fraction of CsI for STC-21 at the end of MAAP run (approximately 5%) is much higher than that for STC-17 (i.e., approximately 0.014%). As shown in Figure 1, there is a big difference in the shape of release fraction for STC-17 and STC-21 after the containment failure (i.e., approximately 62 hours after the accident initiation).

TS

Figure 1. Release fraction of CsI for STC-17 and STC-21

Following the source term grouping, the representative sequences for STC-17 and STC 21 are the same, except for the containment failure size. Hence, the only difference of accident progression between STC-17 and STC-21 is the containment failure size, so that the difference of the amount of source term releases as shown in Figure 1 results from different containment failure sizes.

Even though the containment failure size of STC-21 (i.e., 1.0 ft^2) is 10 times larger than that of STC-17 (i.e., 0.1 ft^2), it does not mean that the source term release of STC-21 would be 10 times larger than that of STC-17. In general, the release rate and the release amount (especially for airborne fission products) heavily depend on the containment failure area, the containment depressurization rate and/or the gas flow rate out of containment through the containment failure junction. Per the definition of the containment rupture and the containment leak as below, the containment rupture could result in a more rapid containment depressurization than the containment leak.

- A leak is defined as a containment breach that would arrest a gradual pressure buildup, but would not result in containment depressurization in less than 2 hours. The typical leak size is evaluated to be on the order of 9.29×10^{-3} m^2 (0.1 ft^2).
- A rupture is defined as a containment breach that would arrest a gradual pressure buildup and would depressurize the containment within 2 hours. The typical rupture size is evaluated to be on the order of approximately 9.29×10^{-2} m^2 (1.0 ft^2).

Figure 2 and Figure 3 show the containment pressure and the gas volumetric flow rate through the containment failure junction, respectively. In the STC-21, the containment is much more rapidly depressurized and gaseous materials accompanying the fission products such as CsI are much more rapidly released after the containment failure.

Therefore, the releases for STC-21 is much higher than STC-17 because of the containment failure area, the containment depressurization rate and/or the gas flow rate out of containment through the containment failure junction.

TS

Figure 2. Containment Pressure for STC-17 and STC-21

TS

Figure 3. Gas flow rate out of containment for STC-17 and STC-21

Impact on DCD

There is no impact on the DCD.

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.