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.:	**357-8344**
SRP Section:	**06.02.04 – Containment Isolation System**
Application Section:	**6.2.4**
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Question No. 06.02.04-5

Justify containment isolation valve fail-as-is (open position) upon loss of power.

General Design Criteria (GDC) 56 requires in part that upon the loss of actuating power the automatic containment isolation valves (CIVs) should take the position of greater safety.

1. Item No. 31 and No. 32, component cooling water (CCW) supply to and return from letdown heat exchanger isolation valves

   As described in Table 6.2.4-1 Sheet 6, the two motor operated CIVs, CC-0296 and CC-0297 associated with CCW supply to letdown heat exchanger, and two motor operated containment isolation valves, CC-031 and CC-302 associated with CCW return from letdown heat exchanger fails-as-is (open position), upon loss of power, however, their post-accident position is closed. Pursuant to the requirement of GDC 56, explain how a failed-open position of MOVs, as shown in Figure 6.2.4-1 Sheet 5, is the position of greater safety upon loss of power.

2. Item No. 33 and No 34, CCW supply to and return from RCP coolers isolation valves

   As described in Table 6.2.4-1 Sheet 6, the motor operated CIV, CC- 231 associated with CCW supply to RCP coolers, and two motor operated containment isolation valves CC-025 and CC-0249 associated with CCW return from RCP coolers fails-as-is (open position), upon loss of power, however, their post-accident position is closed. Pursuant to the requirement of GDC 56, explain how a failed open position of MOVs, as shown in Figure 6.2.4-1 Sheet 2 and 5, is the position of greater safety upon loss of power.

3. Item No. 69 and No. 70, containment radiation monitor inlet and out let isolation valves

   As described in Table 6.2.4-1 Sheet 10, the two motor operated CIVs, PR-432 and PR-431 associated with containment radiation monitor (inlet) and the motor operated containment isolation valve, PR-434 associated with Containment radiation outlet ,

fails-as-is (open position), upon loss of power, however, their post-accident position is closed. Pursuant to the requirement of GDC 56, explain how a failed-open position of MOVs, as shown in Figure 6.2.4-1 Sheet 7 and 2 is the position of greater safety upon loss of power.

Response

1. The two motor operated containment isolation valves (CIVs #296 and #297) for CCW supply to the letdown heat exchanger are powered from two separate Class 1E trains to ensure continuous and uninterrupted letdown cooling in the event of a single active failure in the electrical system. The Class 1E power train designation for the CIVs is summarized in Table 9.2.2-6. The backup power for these CIVs is the EDGs, which is to restart in accordance with the EDG load sequencing. Hence the current valve arrangement (i.e., fail-as-is position) is the position of greater safety upon loss of power only. If and when a loss of power is concurrent with a DBA, the CIVs are designed to close upon a CIAS.

   The two motored operated CIVs (#301 and #302) for CCW, which return from the letdown heat exchanger, follow the same design approach and are consistent with the operation of the CCW supply valves.

2. The motor operated containment isolation valve (#231) provides CCW supply to the RCP motor air cooler, RCP motor oil cooler, RCP oil cooler, and RCP high pressure cooler for RCP 1A, 1B, 2A and 2B. The two motor operated CIVs (#249 and #250) provide CCW return back to the CCW Quadrant A header, and are powered from two separate Class 1E trains to ensure continuous and uninterrupted RCP cooling in the event of a single active failure in the electrical system. The backup power for these CIVs is the EDGs, which is to restart in accordance with the EDG load sequencing. Hence the current valve arrangement (i.e., fail-as-is position) is the position of greater safety upon loss of power only. If and when a loss of power is concurrent with a DBA, the CIVs are designed to close upon an ESF-CSAS.

3. The two motor operated CIVs (#431 and #432) are each designed to isolate the containment air sample line to one of two containment air radiation monitors. The radiation monitors detect the radioactivity of air particulate, gas, and iodine of the containment atmosphere. The particulate detector channel serves as the reactor coolant pressure boundary leak detection in accordance with NRC RG 1.45. The monitors continuously draw containment air in a closed piping system. The containment air passes through a separate sample line and is returned to the containment atmosphere.

   These CIVs are designed to fail-as-is (open position) in order to ensure that the continuous monitoring function is not interrupted due to power failure. Hence the current valve arrangement (i.e., fail-as-is position) is the position of greater safety upon loss of power only.

   However, these valves are actuated to close upon a containment isolation actuation signal (CIAS) to ensure containment isolation. Containment isolation is confirmed and monitored after the CIAS occurs.

These CIVs can be closed even if the normal power supplies fail because the valves are powered from 480Vac which is backed up by emergency power supplies and AAC power supplies.

Based on the above discussion, the applicant believes no DCD change is needed.

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.