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.:	**68-7892**
SRP Section:	**07.07 - Control Systems Not Required for Safety**
Application Section:	**Section 7.7**
Date of RAI Issue:	**07/10/2015**

Question No. 07.07-8

Clarify the design information regarding the non-safety control system control capabilities of safety I&C functions or components in Technical Report APR1400-Z-J-NR-14012-P, Rev. 0, “Control System CCF Analysis.”

IEEE Std. 603-1991, Clause 5.6.3, as incorporated by reference in 10 CFR 50.55a(a)(2), states, in part, that the safety system design shall be such that credible failures in and consequential actions by other systems, as documented in the design basis per Clause 4.8, shall not prevent the safety systems from meeting the requirements of this standard. Technical Report APR1400-Z-J-NR-14012-P, Section 4.4.4.1 Rev. 0, last paragraph provides additional important information concerning this issue.

Figure 4.1-1 of Technical Report APR1400-Z-J-NR-14012-P shows network connectivity that potentially leads from the non-isolated information flat panel displays (IFPDs) to their associated ESF-CCS soft control module (ESCM), through the gateways and down to the safety I&C. The networked IFPDs are within the boundary of the CCF analysis. This figure does not appear to imply a limitation on the safety I&C that can be controlled from the IFPDs. Also, DI&C-ISG-04, Section 3.1.5, "Malfunctions and Spurious Actuations," states that, "Multidivisional control and display stations should be qualified to withstand the effects of adverse environments, seismic conditions, EMI/RFI, power surges, and all other design basis conditions applicable to safety-related equipment at the same plant location." Figure 4.1-1 shows the IFPDs are located in the main control room (MCR) and the applicant states that control of safety components from non-safety devices exist within this design.

1. Are the safety I&C systems identified in Section 4.9 of Technical Report APR1400-Z-J-NR-14012-P the only safety I&C systems and/or components that can be controlled from non-safety devices (IFPDs and DCS Controllers)? If not, provide a complete list and summary for all safety functions and safety-related devices safety that can be controlled from non-safety components and workstations (e.g. IFPDs).

2. In Figure 4.9-2, "ESF-CCS Control Logic against Non-Safety Signal Failure," are all of the signals shown hardwired signals? What type of isolation is depicted in this figure?

3. Considering that the IFPDs/DCS controllers control safety-related components/functions according to Section 4.9 of the Control System CCF Analysis Technical Report, provide an explanation for why the IFPDs and DCS controllers do not need to address environmental qualification, as stated in Section 3 of DI&C-ISG-04, “Multidivisional Control and Display Stations”, for such things as seismic conditions, EMI/RFI, etc.

4. Provide an explanation on what the applicant means when it states IFPDs and DCS controllers do not "directly" control safety-related components/functions, except those defined in Section 4.9 of the Control System CCF Analysis Technical Report. Is there an indirect means by which other safety functions and components are controlled that are not stated in Section 4.9?

Response – (Rev. 1)

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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

Technical Report APR1400-Z-J-NR-14012-NP, Rev. 0, “Control System CCF Analysis” will be revised as indicated in Attachment 1 and Attachment 2.

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Configuration of Class 1E 4.16kV Bus

for ESF Valves

4.9-4

4.9-5

Simplified Signal Flow for UAT-PCB and SAT-PCB

Figure 4.9-6 Simplified ESF-CCS Control Logic for Case A
Figure 4.9-7 Simplified ESF-CCS Control Logic for Case B

4.9. Non-safety Control Signals Sent to ESF-CCS

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4.9.1. Evaluation of the Non-safety Control Signal for CVCS

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for ESF Valves

Figure 4.9-1 Non-safety Control Signals Sent from P-CCS to ESF-CCS (Typical)

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Figure 4.9-2 ESF-CCS Control Logic against Non-Safety Signal Failure

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~~4.9.2. Evaluation of the Non-safety Control Signal for Safety Smoke Damper Control~~

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~~Figure 4.9-3 Signal Flow from Non-safety Smoke Detector to Safety Smoke Damper~~

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Figure 4.9-4 Configuration of Control Room HVAC System

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Table 4.9-1 Non-safety Control Signals sent from P-CCS to ESF-CCS

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~~Table 4.9-1 Non-safety Control Signals sent from P-CCS to ESF-CCS (cont'd)~~

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7. REFERENCES

1. NUREG-0800, USNRC Standard Review Plan, Revision 3, 15.0 Introduction - Transient and Accident Analyses, March 2007.

2. DI&C-ISG-04, "Highly Integrated Control Rooms – Communications Issues," Rev. 1, 2009

3. IEEE Std. 603-1991, "IEEE Standard Criteria for Safety Systems for Nuclear Power Generating Stations."

4. APR1400-Z-J-NR-14013-P, "Response Time Analysis of Safety I&C System," November 2014.

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4.4.5. Design Features to Prevent CCF Due to Broadcast Storms on the DCN-I Network

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