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.: **323-8281**

SRP Section: **07.03 – Engineered Safety Features Systems**

Application Section:

Date of RAI Issue: **11/30/2015**

Question No. 07.03-13

Provide design information on how the signals from the non-safety-related diagnostic section of the component interface module (CIM) will not interfere with the safety functions of the ESF-CCS loop controllers.

10 CFR 50.55a(h)(3) states “Applications filed on or after May 13, 1999, for construction permits and operating licenses under this part, and for design approvals, design certifications, and combined licenses under Part 52 of this chapter, must meet the requirements for safety systems in IEEE Std. 603-1991 and the correction sheet dated January 30, 1995.” Clause 5.6.3, "[Independence] Between Safety Systems and Effects of Design Basis Event," of IEEE Std. 603-1991 requires the safety system design be such that credible failures in and consequential actions by other systems shall not prevent the safety systems from meeting the requirements of this standard.

Figure 4.2-1, “ Overview Diagram of CIM,” of Technical Report APR1400-E-J-NR-14001-P, Rev.0, “Component Interface Module,” identifies that signals from the diagnostic section of the CIM are inputs to the safety-related ESF-CCS loop controller. These diagnostic functions are non-safety related. Describe the measures taken to prevent those non-safety diagnostic signals from interfering with the safety functions of the ESF-CCS loop controllers.

Response – (Rev. 1)

The diagnostic section of the component interface module (CIM) and the signals generated by that section are classified as safety grade, as stated in the third bullet of Section 4.2. That paragraph incorrectly states that the diagnosis section is software integrity level 3 (important to safety); but since the hardware of FPGA-based diagnosis section is designed as Class 1E, the application program of diagnostic function is qualified as software integrity level 3 grade (important to safety, ITS) of the software quality, and the engineering tool to configure the diagnostic logic in the FPGA is commercial grade software.

The diagnosis section generates signals that are transmitted to the Information Processing System (IPS) through the engineered safety features-component control system (ESF-CCS) loop controller (LC) and the maintenance and test panel (MTP) for the purpose of monitoring. These signals are used only for monitoring by the IPS; they do not perform any safety function within the ESF-CCS LC. Therefore, these signals completely bypass all component control logic functions within the ESF-CCS LC. This means there is no interface between these monitoring signals and any ESF-CCS LC logic functions

The signals that are used in the component control logic of the ESF-CCS LC (e.g., energized/de-energized, motor control center power fail, coil circuit open) are input to the ESF-CCS LC through the relays on the CIM module in Figure 4.2-1.

The third bullet of Section 4.2 will be revised as indicated in the attachment associated with this response.

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Notes are added to Figure 7.3-1 to show that for some components the DPS is not an input to the CIM.

Impact on DCD

Figure 7.3-1 of DCD Tier 2 will be revised as indicated in the attachment associated with this response.

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

Section 4.2 of Component Interface Module Technical Report, APR1400-E-J-NR-14001-NP, Rev.0 will be revised as indicated in the attachment associated with this response.

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Figure 4.1-1 Block Diagram of the CIM Interface

4.2. CIM Configuration

The overview diagram of the CIM is shown in Figure 4.2-1. As discussed earlier, the CIM consists of the priority logic section, base section, and diagnosis section. The purpose of each section is as follows:

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Figure 4.2-1 Overview Diagram of the CIM

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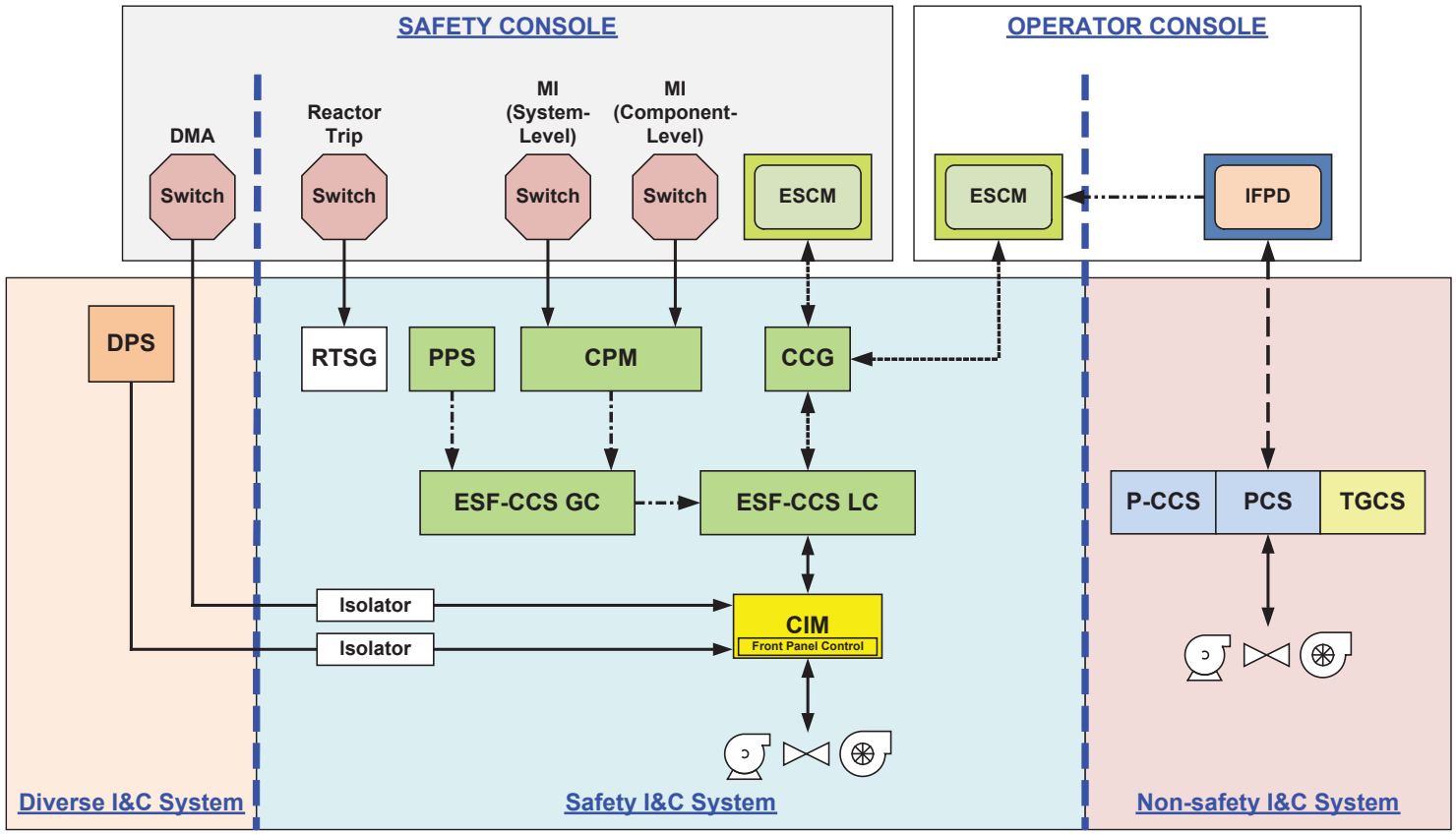

ABBREVIATIONS AND LEGENDS

CCG: Control Channel Gateway
CIM: Component Interface Module
CPM: Control Panel Multiplexer
DMA: Diverse Manual ESF Actuation
DPS: Diverse Protection System
ESCM: ESF-CCS Soft Control Module
ESF-CCS: Engineered Safety Features-Component Control System
FLC : Field Programmable Gate Array (FPGA)-based Logic Controller
IFPD: Information Flat Panel Display
MI: Minimum Inventory
P-CCS: Process-Component Control System
PCS: Power Control System
PPS: Plant Protection System
RTSG: Reactor Trip Switchgear
TGCS: Turbine/Generator Control System

PLC Platform
Hardware Platform
DCS Platform
FLC Platform
Self-standing Platform

Hardwired
Safety system Data Network (SDN)
Serial Data Link (SDL)
Data Communication Network - Information (DCN-I)
Ethernet

Figure 7.3-1 Simplified Functional Diagram of the ESF-CCS

NOTE
The DPS outputs that are to execute safety injection actuation function and auxiliary feedwater actuation function are hardwired to the CIMs.
The DMA switches that are related to the components for safe shutdown are hardwired to the CIMs.