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## 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.: 300-8297  
SRP Section: 7.3  
Application Section: 07.03 – Engineered Safety Features Systems  
Date of RAI Issue: 11/10/2015

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### **Question No. 07.03-5**

Demonstrate how the ESF-2 initiation signals from the PPS will not be overridden or prevented from the completion of the protection action by any erroneous commands from the ESCM on the operator console. Also, clarify where the manual reset will be conducted for the ESF control commands.

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.” IEEE Std. 603-1991, Clause 5.2 requires that the safety system be designed so that once initiated automatically or manually, the intended sequence of protective actions of the execute features shall continue until completion.

Based on the logic of Figure 4-15, "Simplified Component Control Logic," in Technical Report APR1400-Z-J-NR-14001, Rev. 0, "Safety I&C System," ESF-2 commands could be overridden by erroneous commands from ESCM on the operator console. Describe why ESF-2 initiation signals from PPS are overridden by commands from the ESCM, including spurious commands from ESCM. In addition, clarify where the ESF signals are manually reset after steady state conditions are reached.

### **Response**

ESF-2 initiation signals from the PPS can be overridden by commands from the engineered safety features-component control system (ESF-CCS) soft control module (ESCM) due to the existence of certain plant conditions where manual override is necessary. Examples of such cases are the following.

Once a safety injection actuation signal (SIAS) has been initiated, the SIAS persists even when the plant has reached a safe condition. At that time, an operator will need to manually control

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the safety injection (SI) pumps which were required to restore the plant to a safe condition. To take control of the SI pumps, the operator must manually override the ESF-2 signal using the ESCM.

During transients which include relatively small losses in reactor coolant system (RCS) inventory (e.g., small LOCA, SGTR), continuous operation of SI pumps which have been actuated by a SIAS may make the RCS solid (no void remaining in the pressurizer). In this state, it is difficult to control the pressure of the RCS, and there is the possibility of a low temperature over-pressurization event occurring. Therefore, in order to ensure reliable pressure control, to protect the SI pump, and prevent an RCS over-pressurization event, manual override of the ESF-2 function is provided so that the SI pump can be manually operated.

The ESCM sends the component level command to the ESF-CCS Loop Controller (LC). Divisional redundancy of the ESF-CCS ensures that if there are spurious commands from the ESCM on the operator console, the same component in other safety divisions will remain in service to perform the required safety function.

There is very low potential of spurious commands from the ESCM on the operator console causing a single failure of an ESF-CCS division because a spurious signal alone cannot cause the ESF-2 signal to be overridden. Two distinct manual actions (component selection and command selection) are required to override an ESF-2 signal.

An ESF signal is reset by either a remote manual reset or a local manual reset. The remote manual reset is performed on the operator module (OM) in the safety console. The local manual reset is performed on the maintenance and test panel (MTP) cabinet in the I&C equipment room. The remote and local manual resets are shown in APR1400 DCD Tier 2, Figure 7.3-3.

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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.**

There is no impact on any Technical, Topical, or Environmental Report.