

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: 07.03 – Engineered Safety Features Systems

Application Section: 7.3

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Question No. 07.03-3

Describe how the response time for an integrated safety I&C system is ensured to meet the response time requirements in the safety analyses.

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 6.1, "Automatic Control," requires timely automatic control action when events occur too quickly for operators to intervene.

10 CFR 52.47(b)(1), which requires that a design certification application contain the proposed inspections, tests, analyses, and acceptance criteria (ITAAC) that are necessary and sufficient to provide reasonable assurance that, if the inspections, tests, and analyses are performed and the acceptance criteria met, a plant that incorporates the design certification is built and will operate in accordance with the design certification, the provisions of the Atomic Energy Act, and the NRC's regulations.

ITAAC Item 16 in Table 2.5.1-5, "Reactor Trip System and Engineered Safety Features Initiation ITAAC," of APR1400 FSAR Tier 1 includes one design commitment and associated inspection, tests, and analyses which ensure that the plant protection system (PPS) provide reactor trip (RT) and engineered safety features (ESF) initiation signals to meet the required response time for trip and initiation conditions. ITAAC Item 20 in Table 2.5.4-4, "Engineered Safety Features-Component Control System ITAAC," of APR1400 FSAR Tier 1 also includes one design commitment and associated inspection, tests, and analyses which ensure the ESF-Component Control System (ESF-CCS) to provide ESF actuation within required response time for ESF functions. Technical Report, APR1400-Z-J-NR-14013, Rev. 0, "Response Time Analysis of Safety I&C System" includes estimated response times for an integrated safety I&C system, which include sensors, auxiliary process cabinet-safety (APC-

S), PPS, ESF-CCS, and field actuated components for the ESF systems. However, there is lack of design commitment and associated inspection, tests, and analyses in the APR1400 application to ensure that the integrated safety I&C system can meet the response times required in the safety analyses and also proposed in Technical Report, APR1400-Z-J-NR-14013, Rev. 0, "Response Time Analysis of Safety I&C System."

Response

DCD Tier 1, Table 2.5.1-5, "Reactor Trip System and Engineered Safety Features Initiation ITAAC," Item 16 addresses reactor trip (RT) and engineered safety features (ESF) initiation signals identified in Tables 2.5.1-2 and 2.5.1-3, which include all reactor trip system variables and engineered safety features initiation variables, respectively. Table 2.5.1-2 covers sensors, auxiliary process cabinet-safety (APC-S) cabinets, ex-core neutron flux monitoring system (ENFMS) cabinets, and four divisions of core protection calculator system (CPCS) cabinets, the reactor protection system (RPS) portion of plant protection system (PPS) cabinets, and reactor trip switchgear system (RTSS) cabinets. Table 2.5.1-3 covers sensors, APC-S cabinets, and the engineered safety features actuation system (ESFAS) portion of the PPS cabinet.

DCD Tier 1, Table 2.5.4-4, "Engineered Safety Features-Component Control System ITAAC," Item 20 addresses ESF functions identified in Table 2.5.4-2 which includes all nuclear steam supply system (NSSS) and balance of plant (BOP) engineered safety features actuation system (ESFAS) functions which are automatically actuated by the engineered safety features-component control system (ESF-CCS). Table 2.5.4-4 covers ESF-CCS cabinets and associated systems actuated by the ESF-CCS.

All RT functions of the safety I&C systems stated in Table 7.2-5 of DCD Tier 2, which includes the RT response time requirements assumed in the safety analysis, are addressed in Table 2.5.1-2. This is identified in DCD Tier 1, Section 2.5.1.1, "Design Description," which states that the Subsection 2.5.1 describes the reactor trip system (RTS) and ESF initiation, and the RTS consists of sensors, APC-S cabinets, ENFMS cabinets, CPCS cabinets, the RPS portion of the PPS cabinets, and RTSS cabinets.

All ESF actuation functions of the safety I&C systems stated in Table 7.3-7 of DCD Tier 2, which includes the ESF response time requirements assumed in the safety analysis, are separately addressed in Tables 2.5.1-3 and 2.5.4-4. This is identified in DCD Tier 1, Section 2.5.4.1, "Design Description," which states that the sensors, APC-S and the ESFAS portion of the PPS are described in Subsection 2.5.1, and Subsection 2.5.4 describes the ESF-CCS." In addition, DCD Tier 1, Table 2.5.4-4, Item 20 states that the ESF-CCS provides ESF actuation within required response time for ESF function identified in Table 2.5.4.2, which includes all ESF systems actuated. For the same ESF actuation function, the sum of each response time requirement stated in Tables 2.5.1-3 and 2.5.4-4 does not exceed the corresponding function's requirement in Table 7.3-7. Technical report APR1400-Z-J-NR-14013, Rev. 0 provides all response time requirements for RT functions and ESF actuation functions based on Tables 7.2-5 and 7.3-7 of DCD Tier 2.

Therefore, the design commitment and associated inspection, tests, and analyses in the APR1400 application is able to ensure that the integrated safety I&C system can meet the

response times required in the safety analyses and also proposed in technical report, APR1400-Z-J-NR-14013, Rev. 0, "Response Time Analysis of Safety I&C System."

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.