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.:	**328-8422**
SRP Section:	**4.4 – Thermal and Hydraulic Design**
Application Section:	**4.4.6.1, also in 4.3 and 7.2**
Date of RAI Issue:	**12/07/2015**

Question No. 04.04-7

Title 10 of the Code of Federal Regulations, Part 52.47, “Contents of Applications; technical information” requires, in part, that the application must contain a level of design information sufficient to enable the Commission to judge the applicant's proposed means of assuring that construction conforms Title to the design and to reach a final conclusion on all safety questions associated with the design before the certification is granted. The information submitted for a design certification must include performance requirements and design information sufficiently detailed to permit the preparation of acceptance and inspection requirements by the NRC.

Technical Report APR1400-F-C-NR-14001-P, Rev. 0, “CPC Setpoint Analysis Methodology for APR1400” was submitted as Enclosure # 63 to letter MKD/NW-14-0037L, "Submittal of APR1400 Technical Reports," dated December 23, 2014. However, it is not referenced in the DCD, either in the relevant sections 4.3, 4.4, or 7.2, or in Table 1.6-2, “List of Technical Reports”. The staff considers this report to contain design information necessary for the Commission to reach a safety finding on the design. Staff seeks to clarify the regulatory standing of this document and ensure design basis commitments are clearly established. Please provide an explanation of the intended use of this document with respect to establishing the design basis of the plant and indicate where the relevant design information is contained in the DCD or reference the document appropriately to establish a clear design basis for the APR1400 Core Protection Calculator System.

Response – (Rev.1)

Technical Report APR1400-F-C-NR-14001-P, Rev. 0 has been prepared to provide the CPC setpoint analysis methodology for the APR1400. This methodology is applied by combining uncertainties involved in the determination of the Local Power Density and Departure from the Nucleate Boiling Ratio (DNBR) Limiting Safety System Settings (LSSS). This document will be referenced in DCD Tier 2, section 7.2 as well as added to Table 1.6-2 as shown in the

attachment. Technical Report APR1400-F-C-NR-14002 “Functional Design Requirements for a Core Operating Limit Supervisory System for APR1400” will also be added to Table 1.6-2.

Impact on DCD

DCD Tier 2 page 7.2-31, page 37 and Table 1.6-2 will be revised as shown in the attachment.

Impact on PRA

There is no impact on PRA.

Impact on Technical Specifications

There is no impact on Technical Specifications.

Impact on Technical/Topical/Environmental Reports

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

Input signals are injected from the MTP, and the results are verified with the expected contact status of the initiation circuit.

f. Manual trip test

The manual trip test is performed by using one of the two pairs of manual trip pushbuttons on the safety console or one pair of manual trip pushbuttons on the RSC, observing an RTSG trip, and closing the RTSG prior to the next manual trip test.

The RTSG can be closed from the MTP.

g. Response time test

Response time from sensor to the RTSG is tested during shutdown to verify that the measured system response time is less than or equal to the response time assumed in the Chapter 15 safety analysis.

7.2.2.6 Use of Digital Systems

All RPS functions are implemented by digital systems. Manual reactor trip pushbuttons from the MCR and RSR are hardwired directly to the RTSGs.

7.2.2.7 Setpoint Determination

The RPS nominal trip setpoints are determined based on the analysis setpoints in the Chapter 15 safety analysis, in which analysis setpoints exist for the parameters.

When determining uncertainties, the worst environment considering a reactor trip or ESF actuation is assumed based on the bounding initiating event. The methodology for calculating uncertainty is provided in the Uncertainty Methodology and Application for Instrumentation Technical Report (Reference 13).

The methodology for combining uncertainty in a channel and determining the final trip setpoint is provided in the Setpoint Methodology for Plant Protection System Technical Report ~~(Reference 14~~).

and CPC Setpoint Analysis Methodology Technical Report (References 14 and 29)

26. APR1400-Z-J-NR-14001-P, “Safety I&C System,” KHNP, November 2014.

27. IEEE Std. 352-1987, “IEEE Guide for General Principles of Reliability Analysis of Nuclear Power Generating Station Safety Systems,” Institute of Electrical and Electronics Engineers, 1987.

28. IEEE Std. 379-2000, “IEEE Standard Application of the Single-Failure Criterion to Nuclear Power Generating Station Safety Systems,” Institute of Electrical and Electronics Engineers, 2000.

29. APR1400-F-C-NR-14001-P, "CPC Setpoint Analysis Methodology for APR1400," KHNP, July 2014.

Table 1.6-2 (2 of 2)

Report Number (1)	Title	DCD Tier 2 Section
APR1400-F-A-NR-14002-P APR1400-F-A-NR-14002-NP	The Effect of Thermal Conductivity Degradation on APR1400 Design and Safety Analyses	15.4 15.6
APR1400-F-A-NR-14003-P APR1400-F-A-NR-14003-NP	Post-LOCA Long Term Cooling Evaluation Model	15.6
APR1400-H-N-NR-14012-P APR1400-H-N-NR-14012-NP	Mechanical Analysis for New and Spent Fuel Storage Racks	9.1.2
APR1400-K-I-NR-14005-P APR1400-K-I-NR-14005-NP	Staffing and Qualifications Implementation Plan	18.5
APR1400-K-I-NR-14009-P APR1400-K-I-NR-14009-NP	Design Implementation Plan	18.11
APR1400-Z-A-NR-14006-P APR1400-Z-A-NR-14006-NP	Non-LOCA Safety Analysis Methodology	15.0.2
APR1400-Z-A-NR-14007-P APR1400-Z-A-NR-14007-NP	LOCA Mass and Energy Release Methodology	6.2.1.3
APR1400-Z-J-NR-14001-P APR1400-Z-J-NR-14001-NP	Safety I&C System	7.1, 7.2, 7.3, 7.4, 7.5, 7.8, 7.9
APR1400-Z-J-NR-14003-P APR1400-Z-J-NR-14003-NP	Software Program Manual	7.1.4, 7.2.2.2, 7.3.1
APR1400-Z-J-NR-14004-P APR1400-Z-J-NR-14004-NP	Uncertainty Methodology and Application for Instrumentation	7.2.2.7, 7.3.2.7
APR1400-Z-J-NR-14005-P APR1400-Z-J-NR-14005-NP	Setpoint Methodology for Plant Protection System	7.2.2.7, 7.3.2.7
APR1400-Z-M-NR-14008-P APR1400-Z-M-NR-14008-NP	Pressure-Temperature Limits Methodology for RCS Heatup and Cooldown	5.2, 5.3

(1) P – denotes document is proprietary.

NP – denotes document is non-proprietary.

APR1400-F-C-NR-14001-P APR1400-F-C-NR-14001-NP	CPC Setpoint Analysis Methodology for APR1400	7.2.2.7
APR1400-F-C-NR-14002-P APR1400-F-C-NR-14002-NP	Functional Design Requirements for a Core Operating Limit Supervisory System for APR1400	7.7.1.4