

REVISED RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

APR1400 Design Certification

Korea Electric Power Corporation / Korea Hydro & Nuclear Power Co., LTD

Docket No. 52-046

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Question No. 14.02-42

Preoperational Test 14.2.12.1.1, Reactor Coolant Pump Motor Initial Operation Test”

General Design Criterion (GDC) 1, “Quality standards and records,” of Appendix A, “General Design Criteria for Nuclear Power Plants,” to 10 CFR Part 50 states, in part, that structures, systems, and components (SSCs) important to safety shall be tested to quality standards commensurate with the importance of the safety functions to be performed.

NRC Regulatory Guide (RG) 1.68, “Initial Test Programs for Nuclear Power Plants,” Appendix A, “Initial Test Program,” Section A-1.a, Reactor Coolant System, states, in Subsection A 1.a.2, Component Tests, that the following reactor coolant system (RCS) components should undergo appropriate tests and measurements:

b. pumps, motors, and associated power sources.

For consistency with RG 1.68, Regulatory Guide C.3, the NRC staff considers the RCP motor preoperational tests noted above should be included in DCD Section 14.2.12.1.1 because they can detect early burn-in failures where SSCs exhibit high failure rates when first introduced or operated due to defects, design errors, and other early sources of potential failures, such as handling and installation errors. Preoperational testing as part of the initial test program (ITP) can significantly reduce the possibility of SSCs failing early in plant operational service by identifying and correcting these early sources of failures. In particular, failures of the RCP motors can result in unexpected plant transients that challenge plant safety systems.

In accordance with RG 1.26, Quality Group Classification and Standards For Water-, Steam, and Radioactive-Waste-Containing Components of Nuclear Power Plants, Revision 4, the NRC staff found that the RCP motors are typically classified as non-safety related Class D components for other nuclear power plants. However, the APR1400 design control document

(DCD) does not identify the RCP motors as Class D components. Since the APR1400 design certification (DC) applicant is committed to RG 1.26 and RG 1.68, Revision 4, the NRC staff requests that the DC applicant discuss the performance of the following pump motor preoperational tests (or similar tests) and their acceptance criteria as part of the ITP for the APR1400 RCPs:

- Motor Current
- Motor Power
- Pump Motor Vibration
- Motor Stator temperature
- Proper transfer from variable speed startup operation

This may also include verification that the motor over-speed trip function operates to protect the RCP motor and impeller.

Response

KHNP has reviewed the subject question and understands the staff's request. KHNP is in the process of upgrading the test plans presented in Section 14.2 of the DCD. This effort is focused on adding additional SSCs that are important to safety and risk significant as well as increasing the level of detail described in the DCD for test prerequisites, test methods and acceptance criteria for the various tests. It has been determined that the actions to be taken as a result of this question is within the scope of the upgrade effort. Therefore, KHNP will address the noted items in the upgrade effort, which is scheduled to be completed by February 1, 2016. A revised response to this question that incorporates the results of the upgrade effort will be submitted to the NRC after completion.

Response – (Rev. 1)

The results to provide more detailed content of the individual test plan including, test objectives, prerequisites, test methods, data required and acceptance criteria were included in a draft revision of the APR1400 DCD Tier 2 Section 14.2 which was previously submitted to the NRC (ref. KHNP submittal MKD/NW-16-0156L "Submittal of Revised DCD Section 14.2 Initial Plant Test Program" dated February 24, 2016; ML16056A003).

The acceptance criteria for RCP and motor operation for motor current and stator temperature to be within design limits and normal operating ranges are included in the Reactor Coolant System Test (14.2.12.1.2). Specifically, acceptance criteria 5.11 of DCD Subsection 14.2.12.1.2 specifies that the RCPs operate as required with all operating parameters within design limits and normal operating ranges.

Acceptance criteria for RCP motor power are not specified in the Reactor Coolant Pump Motor Initial Operation Test (14.2.12.1.1) nor the Reactor Coolant System Test (14.2.12.1.2); but rather, RCP power is measured to determine the RCS heat loss using the steam-down method specified in DCD Subsection 14.2.12.1.56, Pre-Core Reactor Coolant System Heat Loss Measurement.

The operational check of the RCP Vibration Monitoring System (VMS) using simulated signals is performed in accordance with DCD Subsection 14.2.12.1.136, RCP Vibration Monitoring System. Collecting baseline RCP vibration data is performed during pre/post-core HFT and at the applicable power levels in accordance with DCD Subsections 14.2.12.1.137, NSSS Integrity Monitoring System (Pre-core), 14.2.12.2.2, NSSS Integrity Monitoring System (Post-core), and 14.2.12.4.18, NSSS Integrity Monitoring System.

The variable speed startup operation and the over-speed trip function of the RCP motor are not applicable to the ARP1400 design.

Impact on DCD

The ITPs in Section 14.2 will be changed as shown in the enclosure to KHNP letter, MKD/NW-16-0156L "Submittal of Revised DCD Section 14.2 Initial Plant Test Program."

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 Environment Report.