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.: **556-9154**

SRP Section: **04.02 – Fuel System Design**

Application Section: **4.2**

Date of RAI Issue: **10/18/2017**

Question No. 04.02-15

In Appendices A through D of 10 CFR Part 52, the Commission has approved a two-tiered structure to design certifications. Discussions regarding the two-tiered approach can be found in the final rulemaking and various SECY papers and Staff Requirement Memorandums (SRMs). In particular, in the Staff Request Memorandum (SRM) to SECY-94-084 (ML003708098), the Commission instructed the staff to implement the two-tiered design certification rule structure proposed by the staff. The latest guidance is found in SECY-17-0075 (ML16196A321). SRP Section 14.3.4 provides some general guidance regarding the contents of Tier 1 and specifically states that:

> Tier 1 should include those SSCs that could affect the operation of the reactor and core cooling systems [e.g., the following chapters of the Standard Review Plan (SRP): Chapter 4- Reactor, Chapter 5-Reactor Coolant Systems and Connected Systems, Chapter 6-Section 6.3 on Emergency Core Cooling Systems, Chapter 9-9.3.6 on the standby liquid control system, Chapter 15-Transients and Accidents Analyses].

The fuel assembly design is a safety significant structure due to (1) the fuel cladding acting as the first fission product barrier, and (2) the direct safety impacts that the fuel assembly design has on the analyses for normal operation, anticipated operational occurrences (AOOs), and postulated accidents (in particular, the Chapter 4 and Chapter 15). Additionally, the empirical nature of the fuel design analysis methods means that the approved safety codes and methods are closely tied to the fuel assembly designs upon which they were built. The safe operation of the reactor and core cooling systems can be directly impacted due to the fuel assembly design having direct impacts on thermal-hydraulic and transient performance. Similarly, the burnup limit is safety significant because it has direct implications on the fuel performance and is an important parameter in the design basis accident radiological consequences analyses.

The staff requests KHNP to provide the Tier 1 description for the fuel system design. For example, the Tier 1 description should include the following (or something equivalent):

Section 1.2.6 Fuel Assembly Design

The fuel assembly is designed to ensure that possible fuel damage would not result in the release of radioactive materials in excess of prescribed limits. The fuel assembly is comprised of fuel rods, grids, guide tubes, top and bottom nozzles, and spring. The fuel assembly design utilized in the APR1400 shall be approved by the NRC for the reactor design.

Response

The description for the fuel system design will be included in APR1400 DCD Tier 1.

The description for fuel system design is as below:

Section 1.2.6 Fuel Assembly Design

The fuel assembly is designed to ensure that possible fuel damage would not result in the release of radioactive materials in excess of prescribed limits. The fuel assembly is comprised of fuel rods, grids, guide tubes, top and bottom nozzles, and holddown springs. The fuel assembly design utilized in the APR1400 shall be approved by the NRC for the reactor design.

Impact on DCD

APR1400 DCD Tier 1 will be revised as indicated in the attached markup.

Impact on PRA

There is no impact on 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.

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Insert 1.2.6 Fuel Assembly Design

as-built attributes of structures, systems, and components may vary from the attributes depicted on the Figures, provided that those safety functions discussed in the Design Description pertaining to the Figure are not adversely affected.

1.2.5 Rated Reactor Core Thermal Power

The rated reactor core thermal power for the APR1400 certified design is 3,983 megawatts thermal (MWt).

1.2.6 Fuel Assembly Design
The fuel assembly is designed to ensure that possible fuel damage would not result in the release of radioactive materials in excess of prescribed limits. The fuel assembly is comprised of fuel rods, grids, guide tubes, top and bottom nozzles, and holddown springs. The fuel assembly design utilized in the APR1400 shall be approved by the NRC for the reactor design.