
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.: 275-8294
SRP Section: 04.02 – Fuel System Design
Application Section: APR1400 Design Certification Review – 52-046
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Question No. 04.02-1

GDC 10 requires that the reactor core and associated coolant, control, and protection systems shall be designed with appropriate margin to assure that specified acceptable fuel design limits (SAFDLs) are not exceeded during any condition of normal operation, including the effects of anticipated operational occurrences (AOOs). SRP Section 4.2(II)(4) provides review guidance regarding postirradiation surveillance programs. In particular, it states that for fuel designs similar to that in other operating plants, a minimum acceptable program should include a qualitative visual examination of some discharged fuel assemblies from each refueling in order to identify gross problems of structural integrity, fuel rod failure, rod bowing, dimension changes, or crud deposition. It further states that a continuing fuel surveillance effort should exist for a given type, make, or class of fuel that can be suitably referenced by all plants using a similar fuel. In the absence of such a generic program, a more detailed plant-specific program is expected.

The APR1400 DCD section 4.2.4.7 discusses an in-service surveillance program, but it appears to be based solely on the results of a previously completed program for an operating plant in Korea.

Staff requests the applicant provide details of the planned cycle by cycle surveillance inspection program which will be used to confirm fuel performance within the bounds of the safety analysis.

Response

The first and second paragraphs of Section 4.2.4.7 describes the completed post-irradiation examinations conducted at Hanul Unit 3 during cycle 5 through 7 and at Hanbit Unit 5 during cycle 5 through 7.

In-service surveillance plan for operating plants is covered in the third paragraph, which describes the radioactivity monitoring systems, testing and cause analysis of the leaking fuel, and visual examination of the irradiated fuel assembly.

The cycle by cycle visual examination is performed for gross problems of structural integrity including rod bowing, fuel rod failure and any abnormal conditions, etc. Some of PLUS7 fuel loaded in the core are examined to confirm fuel performance within the bounds of the safety analysis through surveillance program as necessary. The surveillance program for PLUS7 fuel assembly contains visual examination and measuring of fuel assembly length, shoulder gap, fuel assembly bowing and twist, grid width, fuel rod OD, fuel rod length and cladding oxide.

The section 4.2.4.7 of the DCD Tier 2 will be revised as shown in Attachment 1.

Impact on DCD

DCD Subsection 4.2.4.7

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 Report

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

APR1400 DCD TIER 2**4.2.4.7 Inservice Surveillance**

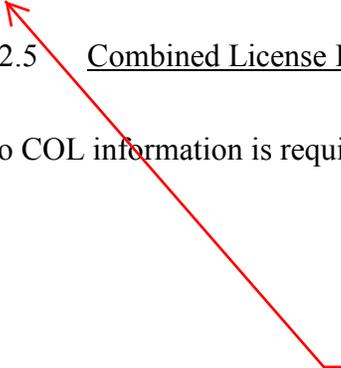
A surveillance program for the PLUS7 lead test assembly was conducted at Hanul Unit 3. Four PLUS7 lead test assemblies were loaded from cycle 5 through 7, and poolside examinations were conducted after each of the three operational cycles. The examinations included visual inspections and performance factor measurements for fuel assembly dimensions and fuel rod diameters. In addition, the fretting and corrosion performance of one thrice-burned PLUS7 lead test assembly was evaluated. Visual and destructive hot cell examinations of one thrice-burned PLUS7 lead test assembly were performed using the hot cell examination facility at Korea Atomic Energy Research Institute.

A poolside examination was conducted to verify the performance of the commercially supplied PLUS7 fuel loaded in Hanbit Unit 5 cycle 5 in 2006. Four fuel assemblies were examined after the first operational cycle, two discharged fuel assemblies after the second cycle, and the remaining two discharged fuel assemblies after the third cycle. Poolside examination program information for the PLUS7 fuel assembly is summarized in Table 4.2-3. Based on the surveillance program results, the performance of the PLUS7 fuel assembly was found to be satisfactory within all design criteria (Reference 5).

There are monitoring systems to check radioactivity during operation. Based on the information gathered from the monitoring systems, fuel assembly degradation is monitored and plant shutdown is decided depending on the degree of the radiation level. If the monitoring results indicate leakage in the loaded fuel, inspection techniques, such as ultrasonic test, are used to identify the leaking fuel rod(s). The cause of the leaking fuel rod(s) is identified and removed. ~~Visual examination is performed for the irradiated fuel assemblies from each refueling to confirm their integrity. If the fuel assembly fails in the visual examination, it is not inserted into the core until a more detailed inspection and/or evaluation can be performed.~~

4.2.5 Combined License Information

No COL information is required with regard to Section 4.2.



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