

SUPPLEMENTAL 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.: 12-7902
SRP Section: 06.02.02 - Containment Heat Removal Systems
Application Section: 6.2.2
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Question No. 06.02.02-2

10 CFR 50.46(b)(5) requires, in part, that after successful operation of the ECCS systems, that decay heat shall be removed for the extended period of time required by the long lived radionuclides. Inherent in this requirement is that ECCS systems have adequate net positive suction head (NPSH) margin in the presence of LOCA generated debris.

The APR1400 design follows the guidance offered in NEI 04-07 and the associated staff safety evaluation in determining the debris loading. Although APR1400 uses 200 lbm of latent debris as suggested by NEI 04-07, only 7.5% of this debris is considered fiber (rather than the 15% recommended by the guidance). Provide a justification for the reduction in fiber loading in technical report AP1400-E-N-NR-14001-P, "Design Features to Address GSI-191."

Response

The APR1400 design considers only 7.5% of latent debris to be fiber. The fiber of 15% suggested by NEI 04-07 is not applied; however, the APR1400 ensures successful operation of the ECCS by administrative controls that the COL applicant implements such as containment cleanliness, housekeeping, and the foreign materials exclusion program as described in DCD Section 6.8.4.5.10.

Supplemental Response

As discussed during the August 26th teleconference between the NRC staff and KHNP, an additional acceptance criterion for the containment cleanliness program, to limit the amount of fibrous debris to 15 lbm, will be added to DCD Section 6.8.4.5.10.a. DCD Tier 2, Section 6.8.4.5.10 will be revised to include the limit.

Impact on DCD

DCD Tier 2, Section 6.8.4.5.10 will be revised as indicated in the attachment associated with this response.

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.

APR1400 DCD TIER 2

This result also verifies that inadequate core or containment cooling does not occur because of debris blockage at flow restrictions, plugging or excessive wear of close-tolerance component (e.g., pumps, heat exchangers, piping, valves, spray nozzles) in the flow path. The component design parameter used in the evaluation of ex-vessel downstream effect is listed in Table 6.2.2-2, 6.3.2-1, and 6.8-4.

As a result of strainer bypass test, the amount of bypass fiber per fuel assembly (FA) is less than the 15 gram limit. Based on this information, the evaluation result of in-vessel downstream effect is that the maximum total deposit thickness and the peak cladding temperature are maintained within the WCAP-16793-NP (Reference 10) LTCC criteria with enough margin, and the LTCC can be maintained.

6.8.4.5.10 Potential Debris Source Control

Programmatic controls are established to ensure that potential sources of debris introduced into containment (e.g., insulation, coatings, foreign material, aluminum), and plant modifications do not adversely impact the SI and CS/SC recirculation function.

Programmatic controls are established consistent with the guidance in NRC RG 1.82, Rev. 4 (Reference 3), which provides reasonable assurance that (1) potential quantities of post-accident debris are maintained within the bounds of the analyses and design bases that support the safety injection (SI), containment spray (CS), and shutdown cooling (SC) recirculation functions and (2) the long-term core cooling requirements of 10 CFR 50.46 (Reference 11) are met.

The following is a summary of the programmatic controls that are implemented to provide reasonable assurance of the proper operation of IRWST sump strainer and limits the quantities of latent debris (e.g., unintended dirt, dust, paint chips, fibers) and miscellaneous debris (e.g., tape, tags, stickers) are limited inside containment:

- a. Preparation of a cleanliness, housekeeping, and foreign materials exclusion program. This program addresses latent and miscellaneous debris inside containment. An acceptance criterion below the conservative assumption of 90.72 kg (200 lb) for latent debris inside containment is consistent with Reference 4. The programs also ensure that the quantity of miscellaneous debris, such as signs, placards, tags or stickers in the containment is limited so that the 9.29 m³ , which includes 6.8 kg (15 lb) of fibrous debris,