

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.: 411-8505

SRP Section: 15.00.02 – Review of Transient and Accident Analysis Methods

Application Section: 15.00.02

Date of RAI Issue: 02/22/2016

Question No. 15.00.02-9

Thermal Conductivity Degradation Effects

Regulatory Basis

10 CFR 52.47(a)(4) requires that applications for standard design certifications include an analysis and evaluation of the design and performance of structures, systems, and components (SSCs) with the objective of assessing the adequacy of SSCs provided for the prevention of accidents and the mitigation of the consequences of accidents. Additionally, NUREG-0800, Standard Review Plan (SRP) Section 15.0.2, "Review of Transient and Accident Analysis Methods," requires a verification that parameters used in the analyses are suitably conservative. Section 15.0 analysis acceptance criteria specifies that fuel cladding integrity must be maintained by ensuring that the minimum departure from nucleate boiling ratio (DNBR) remains above the 95/95 DNBR limit for PWRs. This is necessary to ensure that specified acceptable fuel design limits (SAFDLs) are met (as required by GDC 10). Additionally, the release of radioactive material shall not result in offsite doses in excess of the guidelines of 10 CFR Part 100.

Question

The LBLOCA evaluation was performed considering the thermal conductivity degradation effects. It is not clear that other events evaluated in Chapter 15 have also accounted for this effect.

The applicant is requested to provide evidence that the effect of thermal conductivity degradation has been included for all Chapter 15 events or to justify why the effect need not be considered.

Response

The effect of thermal conductivity degradation (TCD) for all DCD chapter 15 events is summarized in Technical Report APR1400-F-A-NR-14002-P, "The Effect of Thermal Conductivity Degradation on APR1400 Design and Safety Analysis", which has been already submitted to the NRC. As stated in Section 5.3 "Conclusions" of the technical report, the impacts of TCD are negligible on DCD chapter 15 events except for CEA ejection. For the CEA ejection, a detailed evaluation was performed in the technical report for the TCD impacts on the enthalpy. Even though the maximum radial average enthalpy increases about $\left[\quad \right]^{TS}$ and the hot spot peak fuel centerline temperature also increases about $\left[\quad \right]^{TS}$, peak radial average fuel enthalpy remains below 230 cal/g and the hot spot peak fuel centerline temperature is below the melting temperature limit.

Impact on DCD

There is no impact on DCD.

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 Report

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