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Request for Additional Information No. 28, Revision 0

7/11/2008

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 04.03 - Nuclear Design
Application Section: FSAR Ch 4
SRSB Branch

QUESTIONS

04.03-3

FSAR Section 4.3.2.2.5 Local Power Peaking states that Fuel densification, which has been observed to occur under irradiation in several operating reactors, causes the fuel pellets to shrink both axially and radially. As a result, gaps can occur in the fuel column if a pellet becomes wedged against the cladding and the pellets below settle in the fuel rod. The gaps, which are random and vary in length and location, result in decreased neutron absorption in the vicinity of the gap. This produces power peaking in the adjacent fuel rods, resulting in an increased power peaking factor for the core. A quantitative measure of this local power peaking is given by the power spike factor, S(Z), where Z is the axial location in the core.

Fuel manufacturing practices for modern nuclear fuel designs have largely eliminated the potential for significant fuel densification and gap formation during reactor operation. Therefore, it is appropriate to use a power spike factor of 1.0 for the U.S. EPR fuel. Justification for a spike factor of 1.0 is contained in Core Operating Limit Methods for Westinghouse-Designed PWRs (Reference 4, BAW-10163P-A Core Operating limit methodology for Westinghouse designed PWRs," B&W Fuel Company, June 1989).

Justify the applicability of Reference 4 to the EPR fuel, fuel manufacturing and core design parameters.

04.03-4

FSAR Section 4.3.2.2.6 Limiting Power Distributions states that in determining the power distributions, it is further assumed that the total core power level would be limited by a reactor trip to below 116.7 percent of rated thermal power (see Table 15.0-7).

Justify the assumption that a reactor trip will occur before 116.7 percent of rated thermal power.

04.03-5

FSAR Section 4.3.3.1.3 Treatment of U. S. EPR Heavy Radial Reflector states that "Since no measured data exist for a core with a heavy reflector, the reflector cross sections generated as described above were qualified by comparing two-dimensional fresh core MCNP calculations to equivalent two-dimensional, two-group PRISM calculations. These comparisons include two first core loadings with moderator temperature variations from 68°F-644°F and boron concentrations variations from 0 ppm-1500 ppm. Details are provided in Reference 3."

Since no measured data exist for a core with a heavy reflector justify its use and expected benefits in the EPR design.