

An Application of Realistic Evaluation Methodology for Large Break LOCA of KSNP 2 loop Plant

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Abstract

This report presents a demonstration of application of realistic evaluation methodology to a postulated cold leg large break LOCA in a KSNP two-loop pressurized water reactor with 16x16 fuel. This analysis can be divided into three distinct steps : 1) Best Estimate Code Validation and Uncertainty Quantification 2) Realistic LOCA calculation 3) Limiting Value LOCA Calculation and Uncertainty Combination. RELAP5/MOD3.1/K[1], which was improved from RELAP5/MOD3.1, and CONTEMPT4/MOD5 code were used as a best estimate thermal-hydraulic model for realistic LOCA calculation. The code uncertainties which will be determined in step 1) were quantified already in the previous study[2], and thus steps 2) and 3) for plant application were presented in this paper. The application uncertainty parameters are divided into two categories, i.e. plant system parameters and fuel statistical parameters. Single parameters sensitivity calculations were performed to select system parameters which would be set at their limiting value in Limiting Value Approach(LVA) calculation. LVA calculation generated 81 PCT data according to the various combinations of fuel parameters and the critical flow. These data provided input to response surface generation. The probability distribution function was generated from Monte Carlo sampling of a response surface and the upper 95th percentile PCT was determined.