

Safety Assessment of Generic Safety Issues for CANDU-6 Reactors: Analyses of Moderator Heat Sink Integrity

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Abstract

During the loss of coolant accident (LOCA) in CANDU reactors, the pressure tube could contact its surrounding Calandriatube due to the increase of temperature, which leads to sustained Calandria tube dryout. In terms of safety analyses of CANDU reactors, it is concerned as one of major safety issues to maintain moderator subcoolability in the Calandria vessel against the postulated accidents. The Canadian Nuclear Safety Commission (CNSC), a regulatory body in Canada, categorized this issue as a general action item *95GAI05, the temperature prediction for moderator integrity*, and recommended that a series of experimental works should be performed to verify the evaluation codes used for the design with the results of three-dimensional experimental data. In the present study, a simulation using a computational fluid dynamics (CFD) code has been conducted to predict the temperature distribution of the moderator in the Calandria vessel under a steady-state condition. In the simulation, the field data of Wolsong nuclear power plant were used with adequate recompilation for the study. It is found that the proposed analyses models can predict the moderator temperatures reasonably to the Calandria vessel. As a result of the CFD simulation, the moderator has the enough subcoolability to ensure the integrity of pressure tube.