

# An Estimation of ECC Heat-up during the Reflood Phase of a Cold Leg Break LOCA in KNGR

Sang Yong Lee, Chan Eok Park, Sang Il Lee, Han Rim Choi, and Chul Jin Choi  
Korea Power Engineering Company, Inc.

## Abstract

During the reflood phase of a cold leg break Loss-of-Coolant Accident (LOCA) in the Korean Next Generation Reactor (KNGR), the Safety Injection (SI) water, which is directly injected to the downcomer, falls in the form of a thin film along the surface of the core barrel to the Emergency Core Cooling (ECC) water level in the downcomer. The falling SI water film, which is initially at subcooled condition, can be heated up in the upper downcomer by the direct steam-condensation on the film surface as well as by the direct contact heat transfer from the core barrel. In the present study, a simplified model is developed to evaluate the ECC water heat-up. The present model calculates both the wall heat transfer from the core barrel and the condensation heat transfer at the water-vapor interface to the SI water film. With the present model, the ECC water heat-up in the upper downcomer annulus is evaluated to be about 15 °C. Also, the possibility of heat transfer enhancement due to turbulence is discussed with the quick review of the previous theoretical and experimental studies concerning the turbulent condensation.