

Influence of B₄C oxidation on transient behaviour at ACRR DF-4

Abstract

MELCOR is the main tool for whole plant severe nuclear accident investigations in Switzerland. For this reason code assessment and validation is an important part in the Laboratory for Thermal Hydraulics (LTH) at PSI. In the present work one of the first experiments using original BWR core materials for the investigation of a core damage process was used to gain experience on sensitivity of MELCOR predictions regarding the influence of boron carbide oxidation. An experimental program (Damaged Fuel Experiments) on core damage behaviour was executed in 1986 at Sandia National Laboratories in New Mexico, USA. The core damage experiment number 4 (DF-4) was conducted in the Annular Core Research Reactor (ACRR). It contained 14 fresh UO₂ fuel rods surrounding a typical BWR control blade sheath. Different sensitivity studies (availability of B₄C for oxidation, reaction threshold temperature, reaction rate, start temperature for steel-B₄C eutectic reaction and finer meshing of CV's) were executed with the MELCOR code versions 1.8.5 RD, 1.8.6 YT, 1.8.6 YV, 2.1_668 and 2.1_1576.