

Discussion on the In-Vessel Retention Feasibility with respect to Reactor
Internal Design
in a Large Evolutionary Advanced Light Water Reactor

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Abstract

Feasibility of In-vessel retention (IVR) of molten core through external reactor vessel cooling (ERVC) of a two-loop 1300 MWe evolutionary advanced light water reactor (ALWR) design is discussed with respect to focusing effect due to thin metallic debris layer in the reactor vessel lower plenum. Core melt progression of 1300 MWe ALWR suggests that parameters such as shutdown time and steel mass molten from the reactor internal structures are crucial for the feasibility of IVR in this type of reactors. In this paper, with the objective of giving insights on the feasibility of IVR for the Korea Next Generation Reactor (KNGR) design, the steel mass required to demonstrate, using ROAAM (Risk-Oriented Accident Analysis Methodology) approach, that reactor vessel thermal failure is physically unreasonable for the typical two-loop 1300 MWe ALWR is calculated using appropriate lower plenum debris heat transfer model.