U.S. DEPARTMENT OF ENERGY
INTERNATIONAL NUCLEAR ENERGY RESEARCH INITIATIVE
DOE/Other Collaborations

ABSTRACT

Melt Coolability and Concrete Interaction (MCCI)

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International Organization: Organization for Economic Cooperation and Development (OECD)/ Nuclear Energy Agency (NEA)

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The MCCI program is a collaborative project between the Reactor Analysis and Engineering (RAE) Division of Argonne National Laboratory, the U.S. Nuclear Regulatory Commission, and a consortium of ten international participants represented by the Nuclear Energy Agency (NEA) of the Organization for Economic Cooperation and Development. U.S. NRC is the Operating Agent for the program.

Although extensive research has been conducted over the last several years in the areas of melt coolability and core-concrete interaction, two important issues warrant further investigation. The first issue concerns the effectiveness of water in terminating a core-concrete interaction by flooding the interacting masses from above, thereby affecting a quench of the molten core debris and rendering it permanently coolable. The second issue concerns long-term two-dimensional ablation by a prototypic core oxide melt. The goal of the MCCI research program is to conduct reactor material experiments and associated analysis to achieve the following two technical objectives:

1. Resolution of the ex-vessel debris coolability issue through a program which focuses on providing both confirmatory evidence and test data for the coolability mechanisms identified in MACE integral effects tests.

2. Address remaining uncertainties related to long-term two-dimensional core-concrete interaction under both wet and dry cavity conditions.

Achievement of these two main objectives will lead to improved accident management guidelines for existing plants and also better containment designs for future plants.