

Magma in nuclear cavities and their potential effects on the source term and its migration

Underground nuclear explosions lead to the formation of cavities partly filled with magma contributed by the surrounding volatilized rocks during cooling. The distribution of magma inside a given cavity depends on its viscosity, on the relative density of the rocks incorporated from the rubble zone and on the thermal evolution of the cavity. Bubbles and foam can form, creating pumice-like zones of melt under certain circumstances. The potential interactions of the fission products with the magma, their trapping in bubbles and their transport through a complex matrix made of blocks of rocks surrounded in part by some bubble-bearing magma are evaluated here in order to determine whether this is likely to diminish the activity or modify the source term and the fraction of it that is eventually released to the atmosphere.

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