

European Commission

EUR 16743 — The effects of gamma radiation in salt

A. García Celma, H. Donker (Editors)

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Disposal of high level radioactive waste in deep repositories in rock salt can lead to radiolytic effects on the salt. Two types of effects can be expected, depending on the design: radiation damage in the salt crystals of the rock and radiolytic gas production and/or release.

An international irradiation programme was performed at Petten (NL), Saclay (F) and Barcelona (E) on both natural and synthetic salt samples.

In particular the investigations on radiolytic gas production covered the whole range of experimental boundary conditions with respect to dose, dose rate and temperatures that can be expected in the vicinity of a waste emplacement borehole. All data on the gamma radiation induced gas formation show that the contribution of this process to the total source term of gas production in an emplacement borehole for vitrified high-level radioactive waste should be small and does not represent a safety problem.

The radiation damage effects have been studied by various techniques such as light absorption measurements, measurements of the amounts of H_2 evolved and $OC1^-$ formed upon dissolution of the irradiated samples, microstructural analysis and differential thermal analysis. In some cases the experimental results have been compared with calculated results using the Jain-Lidiard or Jain-Lidiard related model. The general conclusion concerning radiation damage development in the crystals of the rocksalt is that it will not constitute a safety problem in the eventuality of geological disposal of HLW in deep boreholes.

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