



INFLUENCE OF POROUS MEDIUM PERMEABILITY ON GAS MIGRATION IN THE DISPOSAL TUNNEL OF CONCEPTUAL GEOLOGICAL REPOSITORY

D. Justinavičius

*Lithuanian Energy Institute
Breslaujos g. 3, LT-44403 Kaunas – Lithuania*

ABSTRACT

The long-term safety of the disposal of nuclear waste is a crucial issue for most of countries worldwide. Repositories for the disposal of high-level and long-lived radioactive waste generally rely on a multi-barrier system projected for the waste isolation from the biosphere. The multi-barrier system comprises the natural geological barrier provided by the repository host rock and an engineered barrier system, i.e. engineered materials placed within a repository, including the waste form, waste canisters, backfill and seals. Most recent studies have revealed that in such conditions significant amounts of gases are expected to be produced due to the corrosion of metallic components (e.g. steel linings, waste containers) used during the implementation of the repository. Gas generation will continue for a long period after the repository closure. The accumulation of the gases may lead to a significant desaturation and unacceptable build-up of gas pressure in the disposal tunnels if the gas cannot escape through the low-permeability host rock.

While modelling the complex behaviour of geological disposal system some uncertainties related to physical parameters could arise. In order to optimise the further research the sensitivity analysis is performed usually. The objective of sensitivity analysis was to rank the input parameters with respect to their importance to the gas transfer and how they affect the output indicators. In this paper the influence of absolute permeability coefficient in repository materials on peak pressures and gaseous fluxes out of disposal system was analyzed and the results are presented. Numerical investigation of gas migration around disposal tunnel of repository situated in the clay rock was performed by computer code PETRASIM (USA).

Keywords: Gas migration modelling, porous medium, geological repository, absolute permeability, sensitivity analysis