A Long Term Safety Assessment for Waste Disposal Caverns

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Abstract

The idea of waste disposal in deep formations such as salt caverns is to isolate hazardous wastes from the biosphere for a very long period of time. Therefore, disposal caverns have to be planned with a great deal of carefulness for geomechanical stability and security from brine inflow. In addition, disposal caverns are sealed tightly. Nevertheless, it cannot be completely excluded that a larger volume of brine gets in contact with the waste matrix during the temporal evolution of the cavern. Moreover, there is always a certain volume of remaining brine from the leaching process. If there exists a pathway to the biosphere, formed by an accidental event, the contaminated brine will be pressed out by the effect of convergence. The task of long term safety assessment is to estimate the risk of future environment contamination in such cases.

The computer code KACTOS has been developed for simulating such "worst-case" scenarios for disposal caverns with regard to effects like

- radial cavern convergence,
- obstruction of convergence by waste matrix and brine pressure,
- inflow from a brine inclusion in salt,
- dissolution of contaminants from the waste matrix,
- vertical brine flow,
- contaminant transport by advection, dispersion and diffusion.

This paper explains the intention of long term safety assessment studies in general and illustrates the basic concepts of the mentioned computer program as well as some test results.