SOME REPRESENTATIVE RESULTS OF ROCK MECHANICAL INVESTIGATIONS CONCERNING THE DISPOSAL OF HAZARDOUS WASTE IN ROCK SALT CAVITIES

by

Karl-Heinz Lux & Reinhard Rokahr

Institut Für Unterirdisches Bauen

ABSTRACT

The historical practice of disposing of hazardous waste in landfills has been determined to be detrimental to human health and the environment. The permanent containment of the post treatment hazardous residual constituents in repositories, constructed in geologically secure subsurface formations, is an attractive alternative. Extensive investigation and research has identified salt diapirs or domes as the prime candidate host formations for the perpetual containment repositories.

Caverns in salt domes have been used successfully as storage vessels for hydrocarbons and gas storage. Based upon this general experience, the theoretical prediction of the rock mechanical behavior of these caverns has been developed to the present state of the art. Researchers in the United States and West Germany are involved in a cooperative effort to further develop and apply their collective expertise towards the design and operation of salt caverns for the containment of hazardous waste.

This paper considers some effects of cavern behavior over time based upon the mechanical properties of the salt under conditions of both liquid and solid hazardous waste entombment. Mathematical modeling, based upon theoretical assumptions and actual in-situ experience in salt, is used to predict the performance of the cavern and its contents with respect to established rock mechanics principles. Movement of the waste, resulting from waste densities at odds with the lithostatic pressure gradients, is discussed and graphically depicted. The need for the containment of hazardous constituents over eons of time is considered.