



Conceptual ideas on multi-barrier systems for nuclear waste repositories in deep wells

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For nuclear waste disposal different rock types such as magmatic, clay dominated or salt formations are possible host rocks. They differ in their properties which is essential for the individual disposal concept in which normally—depending on availability— one of the rock types is foreseen as host rock. In this presentation we discuss a conceptual model for a deep repository in a well while using multiple barriers with different properties. The idea is to combine in a systematic way the advantages of different host and barrier systems at greater depth. The concept is based on two major assumptions: 1) rock properties cannot be predicted far beyond observational times (100 a). As a safety concept should include failure mechanisms which are based on a time constant far beyond our experimental times, and due to geological observations, a combination of different materials will lead to a significantly higher reliability of the system. 2) One should base safety concepts on long proven technologies. To our knowledge the known abandonment of old mines is rather limited whereas abandonment of wells (> 100 000) has a long lasting history allowing for a more reliable assessment. While combining both ideas one might obtain a repository with much higher trustworthiness. In most technologies it is a standard procedure to have more than one barrier (e.g. oil tank) and that the overall safety is achieved by combining it with at least a second barrier (tight sump) with different properties. In other geological deposition sites natural multi-barrier-concepts are defined as minimum standard (directive of European commission 2009/31/EC). How this could be implemented for nuclear waste repository will be discussed.