

# **Underground In situ mine water treatment in a flooded uranium mine at the WISMUT site Königstein - motivation, activities and perspective.**

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At the WISMUT site of Königstein uranium was mined, both conventionally but also by acid underground block leaching, from 1967 to 1990. Since 2001, the mine is partially flooded. As a consequence of underground leaching the hydro-chemical milieu of the mine water is characterized by a low pH of about 3 and relatively high Redox values of up to 700 mV/cm. The concentrations of hazardous substances in the water due to natural attenuation by dilution and flushing are only slowly declining. The mine water must therefore be drained, collected and pumped to the surface where it is treated in a sophisticated and expensive water treatment facility. WISMUT expects that water treatment will be necessary over several decades.

To shorten the period for conventional water treatment alternative approaches have been investigated, which aim to minimize the emission of contaminants into the water in-situ, i. e. to immobilize radionuclides and heavy metals locally at the mine where they are emitting. A promising way for that is to create milieu conditions for the flooding waters towards pre-mining conditions. This requires that in the flooding water the redox potential must be lowered, and the pH value must be raised.

As a consequence of that it is expected that mobile radionuclides and heavy metals will become reduced in the flood water. Under most favourable conditions a reduction zone will be established in the mine. The changed water milieu will then permanently ensure that mobilization of contaminants becomes minimized.

The present paper describes preliminary results of laboratory tests and a first pilot experiment to simulate in-situ water treatment. As a next step it is planned to test the feasibility of the approach under field conditions, i.e. in a very local part of the mine the milieu conditions will be biased towards pre-mining conditions. Final target of the investigations is the development of a technology and its full-scale application for the in situ treatment of the flooding water in the Königstein mine.