Progress and prospects of mine water management in the former East German Uranium Mining Province

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Extended Abstract

Uranium mining operations conducted from 1945 through 1990 in the East German uranium province had left behind mining legacies of unprecedented dimensions.

When designing holistic remediation concepts for five mine and two mill sites the mitigation of adverse impacts to downstream water courses was of key importance. Therefore, remedial work was focused on concentration, conditioning and encapsulation of solid mine waste to ensure the minimization of contaminant fluxes in the long run.

By the end of 2015 all mines have been decommissioned and chiefly flooded, while physical remedial work on mine dumps, tailings ponds and plant areas is to a large extent completed. Notwithstanding this, the operation of water treatment systems proved indispensable at six former production sites in the medium term to ensure compliance with protection goals for receiving streams and aquifers. During the period 2010-2015 total annual water treatment throughput amounted to approximately 20 million m^3.

Since long-term water management will continue to require the provision of considerable resources, optimisation of respective business procedures is one of Wismut's key management tasks. Ongoing retrofitting of 1st generation treatment plants relies on changes in water quantity and quality, cost optimization, tightening of treatment standards, and advances in state-of-the-art technology. Projected adaptions in existing facilities are aimed first and foremost at improving uranium removal and optimizing residue disposal. Process combinations of ion exchange and fixed bed adsorption are under consideration as alternative technology to lime treatment. Smaller satellite plants are being operated by remote control and surveillance.

Geochemical long term processes, their prerequisites, boundary conditions and modes of action need further investigation across scales and levels in order to detect, harness and enhance potential NA-processes. In addition to uranium and Ra-226, the relevant spectrum of contaminants to be considered for long term mitigation primarily includes As, Fe and sulfate.