Be and W in Neutral Mine Drainage and the impact on Silican Algaes

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The geochemical behavior of Be and W in the terrestrial environment are poorly studied even though both are potentially harmful elements.

In Yxsjöberg, Sweden, skarn tailings containing Be and W together with Fe-sulfides, carbonates and fluorite have been stored uncovered for more than 50y. Chemical analysis of the mine drainage enables a comparison and understanding of the geochemical behavior of Be and W. The presence and deformation of silican algaes from the river-bed was used as bioindicators of the ecosystem.

Oxidation of the unusual mineral danalite in the tailings had released the highest Be-concentrations worldwide to the groundwater (4.5 mg/L) and severely high concentrations to the surface water. Beryllium in circumneutral mine drainage were strongly correlated with F (R^2=0.95). In the tailings, carbonates released from calcite due to neutralization of sulfide oxidation had exchanged with WO_4 at the surfaces of scheelite and mobilized W. Most W was retained in the tailings by adsorption to hydrous ferric oxides, and therefore, W-concentrations in ground and surface water were low. Downstream the repository, the present species of Silican Algaes and their deformation indicated a potentially harmful environment compared to a reference sample. This was probably due to the low pH and the high concentrations of Be and F.

A negative impact on silican algaes was also detected downstream a newer covered repository of Yxsjöberg, where the river water had a neutral pH (6.7) and solely high concentrations of dissolved W.

Both the Be-F-complexes from the old uncovered tailings and diss.W from the new covered tailings were transported >5 km from the mine site.