

Antimony in soils and mine waste around the Mau Due mine, North-Vietnam

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Antimony (Sb) is an element with a growing concern because of its toxicity, but also because of its criticality. While the impact of Sb mining is documented in literature from China and Europe, little data are available concerning the environmental impact of Sb mining in Vietnam. This paper presents the results of the geochemical and mineralogical characterization of mine waste and soil samples from the Mau Due mine (North Vietnam). The chemical and mineralogical composition of the samples was determined as well as the exchangeable and specifically adsorbed Sb species, and the release of Sb at different pH values. Antimony concentrations in the mine waste samples (slags and waste rock) was in the range 186-27,221 mg/kg, while soils were characterized by Sb concentrations in the range 31-91 mg/kg. The leaching of Sb from all the samples with water was relatively low, as less than 1% of the total Sb content in the samples was released. In absolute values, this resulted in water extractable Sb concentrations up to 46 µg/l, except for one mine waste sample containing stibnite (Sb₂S₃), which released 1660 µg/l of Sb. Experimental leaching of Sb as a function of pH was compared with modelled results (VisualMinteq). Based on the outcomes of this reconnaissance study, recommendations for further investigation of the waste heaps around the mine were made, taking into account the protection of health and environment, and the sustainable management of secondary (waste) resources.