

## NATURAL ARSENIC IN NORTHERN SWEDEN A RISK ASSESSMENT

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Arsenic (As) is an old poison that has made a “comeback” especially as a chronic toxicant in drinking water coming from groundwater sources. There are three mechanisms that mobilize arsenic into water, a high pH decreasing adsorption of anions, oxidation of sulphides and reduction of ferric compounds. The redox dependence in combination with the low permissible limits for water means that even moderate amounts of arsenic in soils and rocks could pose an environmental risk. In Northern Sweden large areas are underlain by metasediments containing about 1 % S. This project has investigated the cycling of arsenic in metasediment areas and in tills overlying them. The media taken into consideration are water, plants and the aquatic fauna like macroinvertebrates and fish.

Till rich in sulphidic metasediments oxidize and an accumulation of the released arsenic can be seen in the B-horizons of the podsols. In wetland ferric reduction raises the arsenic content in groundwater up to 100 µg/L as compared to the permissible limit for drinking water which is 10 µg/L. After discharge into drainages and streams the released ferrous iron oxidizes and the ferric precipitates may contain as much as 0.5 % As and sandy sediments 200-500 mg/kg As. Larger streams and lakes have above background concentrations of As and a number of lakes have in the order of 5-9 µg/L As. Wetland plants do show elevated As but only the silica rich *Equisetum* spp. have largely elevated content up to 30 mg/kg. Presumably the uptake of arsenic occurs via similar mechanisms as for silica. The silica rich and crispy *Equisetum* spp. is not palatable for wild grazing animals like reindeers and mooses. In macroinvertebrates and fish arsenic has been speciated into As(III), As(V), MMA, DMA and arsenobetain. The data for macroinvertebrates are somewhat difficult to decipher presumably due to problems in extraction. Fish show predominantly organic arsenic and can be considered suitable for consumption.

Thus the overall assessment is that in spite of strikingly high concentrations in sediments and in groundwater the As does not represent a great environmental risk. Only wetland groundwater is a risk if used for water supply when high in Fe and As.

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