



## **The chromium issue in soils of the leather tannery district in Italy**

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Among heavy metals, up to now chromium has received little attention in comparison to f.i. Cd, Cu, Pb, Zn and even Se. The reasons for this lack of interest are diverse. One is that Cr was considered a “local source” contaminant, thus constituting a non-widespread environmental problem; nevertheless, due to lax regulatory guidelines, disposal of Cr-containing waste over large areas has led to the present extensive contamination of soils and waters in many parts of the world.

A second reason is that the dominant naturally occurring form of Cr is the trivalent oxide Chromite, a very stable spinel crystal structure. Consequently, it is very slow to react and is considered essentially immobile in the environment, in contrast with the highly mobile and toxic  $\text{Cr}^{VI}$ , although its occurrence is rare in nature.

Based on these assumptions, until recently some regulatory Agencies conservatively acknowledged the analysis of non-valence specific total Cr in their guidelines. The European Union Directive (1986), for instance, does not provide limits for chromium, the suggested range (100-150 mg/kg) being a reference value still under discussion.

In the most important tannery district of Italy, close to Vicenza (NE Italy), mean Cr concentration in soils is 210 mg/kg (range 50-10.000), much higher than the guideline value indicated for residential sites (130 mg/kg), and than the soil screening level suggested by USEPA for  $\text{Cr}^{III}$  ingestion. Most of the investigated sites present surface Cr concentrations higher than subsurface, suggesting local sources of Cr to be responsible for soil contamination.

To determine the groundwater pollution hazard in the examined district, the distri-

bution maps of surface and subsurface soil Cr have been compared with the soil vulnerability map of the district itself. Surface soils having the highest Cr concentration correspond to sites with very high to high vulnerability. Instead, subsurface soils contaminated with Cr correspond to areas with moderate to limited vulnerability. However, considering the present soil Cr concentrations and the pollution hazard, precaution and control acts are needed, in order to avoid more damage to soils and waters, considering that Cr<sup>III</sup> toxicity and its effects on plants and animals are not well known, and Cr<sup>VI</sup>, besides toxic effects on plants and animals, is a well known cancerogenous agent.

#### References

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