

## 10. Arsenic stability and mobilization in soil at an amenity grassland overlying chemical waste (St. Helens, UK)

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### Abstract:

A mown 6.6 ha grassland, established on a former chemical waste site adjacent to a residential area, contains elevated arsenic (As) in surface soil at concentrations 200 times higher than UK soil guideline values. The site is not recognized as statutory contaminated land and is not routinely monitored, partly on the assumption that speciation and mobility of the metalloid (and additionally elevated Pb) present a negligible threat to human health, groundwater and ecological receptors. We evaluate the evidence supporting this assumption, based on a collation of results from several studies at the site and new data on the effect of organic (green waste compost) and inorganic (iron oxides, lime and phosphate) amendments on As fractionation, mobility, plant uptake and earthworm communities. Significant mobility of As was found, largely related to dissolved soil organic matter and phosphate, although iron oxides tended to immobilize the metalloid. Uptake by plants was low and there was no apparent impact on earthworm communities. Analysis of a wide range of biological soil descriptors showed the site to be ranked above-average in terms of soil quality amongst regional brownfield sites remediated for soft end-use. The existing vegetation cover is likely to minimize re-entrainment of dust-blown particulates that may otherwise present a risk to human health. Risks to other receptors appear to be currently low, but the results suggest it is advisable to avoid disturbance and exposure of soil surface, and compost and phosphate application that may mobilize As in leachates.

Keywords: brownfield, phytoremediation, arsenic, soil, risk assessment

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