

Immobilization of trace elements in contaminated soil – what else do we need to prove?

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Since the seventies, soil contamination has been widely acknowledged as a considerable threat to human health and the environment. Intensive site investigations are on-going worldwide, often followed by a realization of the need for risk mitigation. The variety of contaminants, sites and circumstances require flexible and adaptable remediation solutions.

Fundamentally there are two ways of managing inorganic contaminants such as trace elements (TE): either removing them from soil by increasing TE solubility; or immobilizing them in soil by decreasing TE solubility. The latter option has attracted a lot of attention among researchers propagating perception that the risk mitigation of a contaminated site does not necessary require the removal of the source (i.e. contaminated soil), but rather the constraint of the spreading pathways of contaminants and their exposure for living organisms. Interest for this approach among researchers has not faded yet and hundreds of papers are being published each year over the past decade. Various techniques have been proposed and tested at different scales with varying degrees of efficiency. Usually, soil amendments inducing chemical reactions in soil are applied in combination with vegetation cover (attributing the methods to phytotechnologies). Over 30 field tests have been established in Europe and ca 20 cases are documented where phytotechnologies (including phytodegradation and phytoextraction) were used at Superfund sites in USA.

Despite the positive prospects in terms of cost efficiency and environmental benefits, the contaminant immobilization techniques are not readily accepted by decision makers. What evidence do we have and what is still needed to make these techniques widely accepted will be discussed.