The use of cement-binders in the solidification/stabilization of metal-contaminated soils

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The solidification/stabilization (S/S) of contaminated soils is a remedial technique that has grown rapidly in the last decades. S/S employs readily available cement-based binders that can be formulated into a targeted 'system' that cements soil or waste into a hardened engineering material. These methods usually do not destroy the contaminants. Instead, they keep them from "leaching" above safe levels into the surrounding environment, effectively slowing down the leaching processes. S/S provides an economically viable means of treating large contaminated sites. This technology treats and contains contaminated soil on site thereby reducing the need for trasportation and landfills. Furthermore, the technique is also employed to reduce the level of air-dispersed fine particles and air-borne mineral particles after quarrying or industrial activities. To be successful, the technique must be carefully planned and locally adapted to the specific type of contaminants and to the soil mineralogy. It is important to control the hydration reactions and the products developing in the binder matrix, besides reducing the porosity of the media and the water percolation through the material. This project wishes to optimize the formulation of the binder-soil mixture for the entrapping and slow release of metal contaminants. Although widely used, the technique has margins for substantial development. The project aims to (1) define the rationale and the operating parameters for the formulation of the binder-soil mixture; (2) better understanding of the mechanisms of stabilization of the contaminants; (3) develop/optimize alternative binders with respect to Portland cement and/or lime for specific stabilization processes; (4) introduce and implement adequate monitoring and modelling of the remediated areas.

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