The Mobility of Nickel in Soil and the Efficacy of Sphagnum Peat Moss to Immobilize Nickel with Contaminated Soils

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Soils contaminated with nickel are a major human health hazard as many food crops, including legumes, and leafy and root vegetables readily uptake nickel. Consequently, consumption of food and water high in nickel can lead to major health issues, including cancer. Current soil remediation methods include physical (relocation/replacement), chemical (leaching, fixation, electro-kinetic removal, vitrification), and biological (phytoremediation, microbial and animal) of contaminated soil, which can be expensive, hazardous, and time consuming, sometimes taking decades to be effective. In order to address these issues, Sphagnum Peat Moss (SPM) was selected as a test sorbent for metal absorption due to its extremely low cost ($27-$69 per metric ton), sustainability, and high Cation Exchange Capacity (CEC). In this study, soil samples, collected from three Texas Superfund sites, were tested for heavy metal content and leachability to determine metal mobility in soil. SPM was added to contaminated soil (10% and 20%) to determine how much metal could be absorbed. The results showed a mixture of 20% SPM to soil immobilized 11% more nickel than the soil alone, showing the addition for SPM to nickel contaminated soils is an effective nickel absorbent over a short period of time (12 hours). This study showed that application of SPM to contaminated soils limits nickel mobility and has potential field application in the environment.