Lead Carbonate Formation in Contaminated Soils: Chemical Effects and Remediation Dilemmas. (S09-harris144100-Oral)

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Abstract:

Lead carbonate minerals cerussite and hydrocerussite have been reported throughout the world in lead contaminated soils and sediments. They can form very quickly over a range of soil environments, and commonly are the dominant secondary form of Pb. The oxidation of Pb to carbonate is a proton-consuming reaction which can elevate the pH of the contaminated soil. Acidity, an aerobic environment, moisture, and abundant metallic Pb (e.g., a shooting range soil) favor the formation of Pb carbonates. Thus, even leached, originally-acidic soils that have been contaminated with high levels of Pb can contain Pb carbonate minerals. Lead in carbonate minerals is generally stable and immobile in the contaminated soil, but it is highly bioavailable if ingested by children. Remediation to reduce bioavalability requires removal of Pb-carbonate-enriched soil or conversion of Pb carbonate minerals to a less bioavailable form, such as Pb phosphate. Conversion in the soil requires dissolution of the Pb carbonate and precipitation of the new phase. Lead is subject to leaching during the interval between dissolution and precipitation. Therefore, amendments and application rates should be selected that assure Pb precipitation and minimize its movement.

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