



## Book review

### **Environmental Restoration of Metals-Contaminated Soils**

I.K. Iskandar (Ed.), Lewis Publishers, Boca Raton, FL, 2000, US\$ 69.95, 304 pp., ISBN 0-56670-457-X

Metal-contaminated soils pose a major cleanup problem because, unlike organics, metals can neither be destroyed nor mineralized through treatment technologies such as incineration or bioremediation. For metals, the most commonly used cleanup technique is excavation and reburial in a secure facility.

“Because of the concerns regarding the role of heavy metals in the environment, a series of international conferences was held to explore the emerging issues of the biogeochemistry of trace elements in the environment. In June 1997, the Fourth International Conference on the Biogeochemistry of Trace Elements was held in Berkeley, CA. The contributions in this book were presented in part at this conference.”

This book has 14 chapters divided into two major sections: Physical and Chemical Methods and Processes (eight papers), and Biological Methods and Processes (six papers).

Chapters 1 and 2 describe physical–chemical processes for in situ remediation by adding amendments for stabilization.

Chapter 3 considers the immobilization of lead. Chapter 4 describes the mechanics of metal retention and release from soils. Chapter 5 describes a chemical remediation method for soil contaminated with cadmium and lead.

Chapter 6 examines the effect of soil pH on the distribution of metals among soil fraction. Chapters 7 and 8 describe physical and electrical separation methods for soil remediation. The relationship between the phytoavailability and the extractability of heavy metals in contaminated soils is discussed in Chapter 9, while Chapter 10 provides an overview on environmental restoration of selenium-contaminated soils. Chapter 11 discusses trace elements in soil–plant systems under tropical environment. The process of metal removal by chelation using amino acids is presented in Chapter 12. Chapter 13 examines the effects of natural zeolite and bentonite on the phytoavailability of heavy metals. Chapter 14 discusses metal uptake by agricultural crops from sewage sludge-treated soils.”

Several methods of remediating contaminated soils are evaluated including (1) the effectiveness of adding solid phase amendments such as fly ash, (2) phosphate (for leach contamination), (3) EDTA, HCl,  $\text{Ca}(\text{NO}_3)_2$ , and HOAC for lead and cadmium, (4) physical separation and extraction using an electric field. In the second major section, biological cleanup via phytoremediation is discussed in several papers. The final paper as well as an

important topic is also discussed in other papers. It deals with sewage sludge impact on soil, especially the control and uptake of heavy metals in sludge added to soil. The topic's importance comes not so much from contaminated soils, but from modern society's need to dispose of sewage sludge from large municipalities.

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