LETTERS TO THE EDITOR


Dear Editor:

The paper by Boon and Soltanpour (1992) reviews an important subject that is relevant to many communities located in the vicinity of mine wastes in the western United States. The authors analyzed samples of soil and garden vegetables collected in Aspen, CO, and presented data indicating that certain garden vegetables may accumulate Pb and Cd when grown in soils that have been impacted by mine overburden and contain elevated concentrations of these metals. However, inconsistencies specific to the data base presented in this paper weaken the authors’ attempts to establish such a correlation. For example, chemical data from a suite of vegetables have been reported that are inconsistent across the low, medium, and high metal concentration soils, obfuscating inter-soils comparison. Specifically, lettuce is the only vegetable that was analyzed for metal uptake from each of the three soils.

The authors repeatedly cite a study by Spitler and Feder (1979) as indicating that soil Pb levels in excess of 500 mg/kg pose a health hazard to children, and therefore must be remediated. However, the Spitler and Feder study was conducted in an urban setting (Boston) and focused on elevated soil Pb levels that were definitely traceable to urban Pb sources. Therefore, the results of that study cannot be applied to a mining site, because the bioavailability of Pb at mining sites is much lower than that from urban soils (Davis et al., 1992).

Specifically, the anthropogenic Pb available for plant uptake or human ingestion in urban settings are more soluble, and hence more bioavailable (Barltrop and Meek, 1975; Dacre and Ter Haar, 1977), than Pb from mine waste, the bioavailability of which appears to be limited by a number of geochemical factors (Davis et al., 1992).

The USEPA recognizes that Pb bioavailability from mine-waste-impacted soils may be significantly different than the bioavailability of soluble forms of Pb (e.g., Pb acetate) used in many toxicological studies, and has funded animal feeding studies to evaluate this difference (Lavelle et al., 1991). Two independent research groups have also performed animal studies (RTI, 1991; Freeman et al., 1992), which indicate that mine wastes bearing galena (PbS) and anglesite (PbSO₄) are less than 20% bioavailable relative to Pb acetate. The study by Freeman et al. (1992) indicated that percent bioavailability of Pb from mine-waste impacted soil relative to Pb acetate in Sprague-Dawley rats was independent of two different test soils, four dose levels, and sex, and that mean relative percent bioavailability of Pb was 20% based on blood data, 9% based on bone data, and 8% based on liver data.

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