6.6 Using Bioavailability Methods to Evaluate Remedies (Bioavailability-Based Remediation)

Bioavailability-based remediation does not remove the soil contaminant, but rather reduces its bioavailability and, thus, the health hazard that may be associated with exposure. For example, excavation and replacement of contaminated soil is expensive and may be ecologically destructive. Applying in situ soil amendments that reduce contaminant bioavailability, however, is a cost-effective alternative that could limit or eliminate the need for excavation. Extensive research has shown a variety of soil amendments can successfully reduce lead bioavailability, most notably phosphate (P) fertilizers. Applying phosphate fertilizers, however, may inadvertently increase the bioavailability of other contaminants, such as arsenic (Scheckel et al. 2013). Phosphate amendment has been comprehensively reviewed, see (Chaney and Mahoney 2014; Scheckel et al. 2013; Hettiarachchi and Pierzynski 2004).

Confirmation of reduced bioavailability after treatment with soil amendments may be problematic. Several studies have shown that USEPA Method 1340 potentially over predicts lead RBA in soils amended with P treatments (Obrycki 2017; Obrycki et al. 2016; Ryan et al. 2004; Zia et al. 2011; Scheckel et al. 2013). Consequently, Method 1340 has not been validated as an accurate predictor of the reduction of lead RBA achieved by soil amendments. Additional research is needed to determine the accuracy and precision of these and other IVBA methods to predict lead RBA, specifically in P-treated soils. Possible approaches being investigated for using IVBA of treated soils is to modify Method 1340 raising the extraction solution pH to 2.5 instead of 1.5, or simply use an alternative method (for example, IVG).