

Evaluation of Bioavailability of Contaminants in Soil: State-of-the-Art Guidance from ITRC

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Background/Objectives. The Bioavailability in Contaminated Soil (BCS) guidance from the Interstate Technology and Regulatory Council (ITRC) focuses on lead, arsenic, and polycyclic aromatic hydrocarbons (PAHs). It is a consensus-based, easy-to-read, web-based document that captures the shared knowledge and understanding of representatives from state and federal regulatory agencies, the private sector, academia, and tribal and public stakeholders. It also provides detailed information on available bioavailability and bioaccessibility tests, including what the user should consider to make informed decisions for a specific site.

Approach/Activities. The BCS guidance includes case studies that show how the bioavailability of lead, arsenic, and PAHs have been evaluated at sites and the impact that such evaluation had on risk management decisions at those sites. It discusses the challenges encountered at those sites, how these challenges were overcome, and the lessons learned. In vivo methods can provide us with insights into site-specific bioavailability; however, the high cost and duration of these in vivo studies severely limit their applicability to a small number of large sites where there are considerable resources available and a long timeline. In the past few years, various groups have developed in vitro methods to measure bioaccessibility as a surrogate for in vivo bioavailability testing. These in vitro methods are available for arsenic (As) and lead (Pb) and their relatively low cost and turnaround time allows for the inclusion of site-specific bioavailability considerations for lower-budget sites. However, not all in vitro methods will necessarily work well with all types of soils and chemical forms of the contaminant. Accordingly, the decision on the suitability of any one method to determine bioaccessibility should take into consideration site-specific conditions. Moreover, different lead agencies may have different specific recommendations for one method or approach.

Results/Lessons Learned. We realize that a one-size-fits-all approach is not possible for evaluating the bioavailability of contaminants in soil because of the inherent complexities. The new guidance from ITRC provides regulators, stakeholders, and practitioners with the tools they need to make informed decisions.