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# Bioavailability in Contaminated Soil: ITRC Guidance around the Corner

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**Background/Objectives.** When a person is exposed to contaminated soil, only a fraction of the total amount of the chemicals present in the soil are absorbed systemically and is available to cause toxic effects. There has been a considerable effort to develop default bioavailability factors and methods to evaluate site-specific in vivo bioavailability. While the use of default bioavailability factors is a step forward compared to assuming 100% bioavailability, it does not address site-specific conditions. The in vivo methods that are available for some of the contaminants can provide us with insights –to 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 bioavailability. These in vitro methods are currently available for arsenic (As) and lead (Pb) and their relatively low cost and turnaround time allow for the inclusion of bioavailability considerations for “lower” budget sites. In vitro methods do not necessarily work well with all types of soils and chemical forms of the contaminant. For example, a method that performs well at a former orchard where the soil is contaminated by lead arsenate, used several decades ago as a pesticide, may not be effective at evaluating the bioaccessibility of arsenic in mining tailings with high iron content.

In addition to the high cost of the in vivo studies, the lack of familiarity with the site-specific evaluation of bioavailability and/or bioaccessibility, as well as with how to integrate those estimates to refine the human health risk assessment, have been major roadblocks to the application and use of site-specific bioavailability evaluation on a much broader scale.

**Approach/Activities.** The “Bioavailability in Contaminated Soil” (BCS) guidance from the Interstate Technology and Regulatory Council (ITRC) will cover three contaminants in depth: lead, arsenic, and Polycyclic Aromatic Hydrocarbons (PAHs). There are already a number of documents describing detailed individual methods for evaluating the bioavailability of contaminants in soil. The ITRC BCS guidance will be a consensus-based, easy-to-read, web-based document that represents the shared knowledge of representatives of regulatory agencies from different states, federal partners, industry affiliates, academics, and tribal and public stakeholders. A “one-size-fits-all” approach is not possible for evaluating the bioavailability of contaminants in soil because of the complexities. The BCS guidance will provide information on the various options and present pros and cons so that the user can make informed decisions for a specific site.

**Results/Lessons Learned.** BCS guidance will include several case studies for the various contaminants covered in the document, show how the evaluation of lead, arsenic and PAHs has been used at sites, discuss the challenges, and present how these challenges were overcome.