Printed from: Interstate Technology & Regulatory Council (ITRC). 2017. *Bioavailability of Contaminants in Soil: Considerations for Human Health Risk Assessment.* BCS-1. Washington, D.C.: Interstate Technology & Regulatory Council, Bioavailability in Contaminated Soil Team. http://bcs-1.itrcweb.org.

1 Introduction

Contaminants in soil may not be as available as the forms used in the toxicity tests used to develop risk-based criteria (such as the Reference Dose or Cancer Slope Factor). However, cleanup goals are often calculated assuming that the uptake of contaminants from soil is the same as when the chemicals are dosed in water or feed. This assumption can result in inaccurate exposure estimates and associated risks for some contaminated sites because the amount of a chemical absorbed (the chemical's bioavailability) from contaminated soil can be a relatively small fraction of the total amount present. Properly accounting for the impacts of soil-chemical interactions on the bioavailability of chemicals from soil can lead to more accurate estimates of exposures to soil contaminants and improve risk assessments by decreasing uncertainty.

This guidance describes the general concepts of the bioavailability of contaminants in soil, reviews the state of the science, and discusses how to incorporate bioavailability into the human health risk assessment process. This guidance addresses lead, arsenic, and polycyclic aromatic hydrocarbons (PAHs) because evaluating bioavailability is better understood for these chemicals than for others, particularly for the incidental ingestion of soil. This guidance will help regulators, practitioners, and stakeholders with the following tasks:

- Understand the tools available to develop site-specific bioavailability values in human health risk assessment, including the pros and cons of different in vivo methods and in vitro methods.
- Identify methods most appropriate for site conditions without compromising human health protection.
- Apply these tools and methods in different scenarios.

Techniques for evaluating the bioavailability of lead, arsenic, and PAHs in soil are better developed than for other chemicals. While the risk assessment section discusses other contaminants, the information currently available is not sufficient to develop detailed guidance for those contaminants. The information presented in this guidance may be useful, however, when considering and planning site-specific studies for other contaminants.

This guidance includes information about the dermal exposure pathway for PAHs. Dermal PAH exposure from soil can be significant under standard default exposure calculations. While the bioavailability of chemicals from other media, to other receptors, or by other exposure pathways may be important considerations in the risk assessment process, those considerations are not addressed here.