

Comprehensive and Innovative Guidance for DNAPL Site Characterization and Remediation: Capturing Lessons Learned through Collaboration

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Background/Objectives. Over the past decade, the Interstate Technologies and Regulatory Council (ITRC) has published multiple cutting edge technical and regulatory guidance for characterization, remediation, and management of sites contaminated with dense non-aqueous phase liquids (DNAPLs). This presentation will summarize the four most recent guidance documents, as outlined below.

Approach/Activities.

By its nature, the ITRC process encourages collaboration and incorporates lessons learned from the dozens of team members into the guidance documents. The four guidance documents to be discussed include the following:

INTEGRATED DNAPL SITE STRATEGY. This document presents a framework for managing and remediating sites contaminated with DNAPL. The approach, structured as an iterative flowchart, includes emphasis on developing a comprehensive conceptual site model (CSM), creating SMART objectives (Specific, Measurable, Attainable, Relevant, and Time-bound), appropriately applying/evaluating remedial technologies, and continually assessing the remedy.

DNAPL SITE CHARACTERIZATION. This DNAPL Site Characterization guidance builds on the CSM component of the IDSS by introducing new concepts that are the foundation of current understanding of contaminant fate and transport at DNAPL sites. Concepts presented include fundamentals of DNAPLs, the DNAPL life cycle, the 14-compartment model, and an Integrated Site Characterization process. In addition, this guidance includes a stand-alone, comprehensive matrix that describes tools and techniques available for characterizing DNAPL sites.

USE AND MEASUREMENT OF MASS FLUX AND MASS DISCHARGE. This guidance summarizes the basic concepts of mass flux and mass discharge and describes how this information can improve the management of contaminated sites. It includes a comprehensive presentation of the primary measurement and estimation techniques, including advantages and disadvantages of each. In addition, several case studies are presented as examples of applications of mass flux and mass discharge.

IN SITU BIOREMEDIATION OF CHLORINATED ETHENES: DNAPL SOURCE ZONES

The Bioremediation of DNAPLS guidance presents technical and regulatory guidance for application of in situ bioremediation (ISB) in chlorinated ethene DNAPL source zones. ISB has several advantages compared to other technologies when applied in source zone because of two primary factors: 1) enhanced dissolution and/or desorption of non-aqueous and/or sorbed-phase contaminant mass and 2) biological degradation to nontoxic end products. The ability of ISB to enhance the dissolution and desorption of non-aqueous phase contaminants to the aqueous phase, where they can be degraded by the microbial population, is what makes the ISB technology applicable to DNAPL source zones.

Results/Lessons Learned. These four DNAPL guidance documents represent the integration of the latest thinking, including lessons learned from industry leaders, for management,

characterization, and remediation at DNAPL sites. This presentation will summarize each of the guidance documents and to encourage the audience to download the documents and participate in online webinars and in-person workshops to learn more.