Federal Remediation Technologies Roundtable (FRTR) Presents…

Large and Dilute Plumes

Karla Harre, NAVFAC EXWC
Brian Looney, Ph.D., DOE-SRNL
Fred Payne, Ph.D., ARCADIS

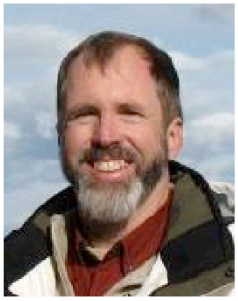
May 1, 2013

Recently, "large-dilute plumes" of chlorinated solvents have emerged as a peculiar challenge in environmental clean-up. This class of plume has several defining characteristics. These characteristics include biogeochemical conditions that result in slow contaminant degradation and that allow plume expansion, as well as matrix diffusion that results in secondary sources and that extends remediation timeframe. Research at these sites has highlighted key challenges and potential opportunities. Complicated fine-scale heterogeneity resulting from the interaction of migrating contaminants with subsurface lithology and hydrology is a particularly significant and recurring challenge — resulting in concentrated plume cores and the need for innovative-focused characterization and monitoring. Understanding the subsurface distribution of contaminants and how the plume is changing in time and space are keys to successful environmental response actions. Research and data on attenuation of contaminants resulting from physical assimilation along the flow path (such as a plume interacting with inactive pore spaces) and from degradation by abiotic and microbial processes have extended our knowledge of natural attenuation rates in aerobic-oligotrophic aquifers. The research indicates that aerobic processes, particularly abiotic degradation due to magnetite/minerals and aerobic cometabolism, are occurring in many large-dilute plumes. The attenuation rates are correlated with measurable parameters such as magnetic susceptibility or various microbial population metrics, including oxygenase enzyme activity probes, DNA composition/quantity, and total microbial counts. Consistent with the observed plume scales, the data confirm that aerobic degradation processes are slower than anaerobic degradation processes. Nonetheless, incorporation of these natural rates into models and predictions provides an important tool to aid in developing a comprehensive strategy for large-dilute plumes — mitigating the requirement for complete removal during source treatment and encouraging combined remedies as well as the development of amendments to sustainably and cost-effectively enhance degradation rates.

Meet the Speakers

Karla Harre
NAVFAC EXWC

Brian Looney, Ph.D.
DOE-SRNL



Fred Payne, Ph.D.
ARCADIS

3

Purpose and History of FRTR

- Formed in 1990 as multiagency collaborative focused on haz waste site technology transfer
- Over 40 technical meetings (2x/yr), topical
  - Recent topics: Large Dilute Plumes, Optimization
- Subgroups dive into topics, shared assessment and tool development
  - GSR footprint calculator assessments & training
  - Inform agency VI guidance development
  - Best practices in optimization
  - Alternative end points
  - FRTR Technology Screening Matrix

4

FRTR Participating Agencies

- DOD
  - Army (AEC, USACE)
  - Navy
  - SERDP-ESTCP
  - USAF (AFCEC)
- DOE
- DOI
  - HQ
  - USGS
- EPA
- NASA
- Nuclear Regulatory Commission

5

FRTR Operating Principles

- Promote cooperation and information sharing among federal agencies to:
  - Advance innovative remediation technologies
  - Encourage multi-agency contributions to technical guidance
- Semi-annual meetings & website provide a forum for:
  - Technology-related efforts of mutual interest
  - Collective technical experience with specific technologies
  - Partnerships to pursue cooperative initiatives and projects
- Benefits the entire cleanup community
  - Information on demonstrations of innovative technologies
  - Less duplication by Federal agencies
  - Clearer, more comprehensive picture of the cost and performance of innovative treatment technologies

6

Technical Info from FRTR

- www.FRTR.gov
- Next FRTR Technical Meeting:
  - November 2013 in Washington, DC
  - Topic: Emerging Contaminants
  - Virtual participation via Adobe Connect (or conference call)
- FRTR Presents Webinars
  - Select presentations from past meetings

7