

The Federal Remediation Technologies Roundtable

30 Years of Advancing Interagency Cooperation and Technology Innovation

Overview

The Federal Remediation Technologies Roundtable (FRTR) is an interagency collaboration advancing the use of innovative technologies to clean up hazardous waste contamination. Meeting every year since its inception in 1990, the FRTR has been a forum to share information, advance the application of innovative site cleanup technologies, and leverage federal technology investments and lessons learned through technology transfer activities. The FRTR hosts twice-yearly open meetings, webinars and other activities to promote information resources that have proven valuable to federal agencies and a broad community of remediation practitioners in the development and use of new technologies for improved remediation of hazardous waste sites.

A Legacy of Technology Transfer Success

Throughout the last 30 years, the FRTR has fostered widespread scientific and engineering knowledge transfer activities that have improved our approach to site cleanups and advanced deployment of technologies across all agencies involved. Our improved understanding of current technologies and cutting-edge methods for contaminant source and site characterization, modeling and remedy optimization is helping us respond to challenges at complex sites. Use of advanced and high-resolution site characterization methods has promoted better definition of subsurface features, conditions, processes, and natural and human-induced events. This understanding is in turn helping to build better conceptual site models (CSM) that improve selection of effective remedies. A systematic approach, incorporating the lessons learned and applying them throughout the life cycle of a cleanup project, supports faster, better and cost-effective site cleanups.

Technology transfer efforts have included:

- ▶ Cost and performance of remediation technologies
- ▶ Site characterization and investigation methods
- ▶ Remedy alternatives and innovative technologies
- ▶ Remedy optimization and system evaluations
- ▶ Improved data gathering and management

- ▶ Data visualization and presentation
- ▶ Green remediation practices and implementation

To better capture its legacy of agency cooperation and technology application, the FRTR developed its “[FRTR Presents...](#)” series of webinars, delivered on EPA’s [Contaminated Site Clean-Up Information \(CLU-IN\)](#) website. This effort expanded FRTR’s existing technology transfer to an even wider audience. Proceedings and presentations of FRTR’s meetings are archived on [FRTR.gov](#) and provide a resource to anyone seeking information on innovative technologies.

Benefits of FRTR Collaboration

FRTR collaboration leads proven innovative technologies to become state-of-the-practice for site investigation, cleanup and remedy optimization among member agencies. Collaboration provides opportunities to discuss and solicit input on agency-specific complex issues which helps identify acceptable practical solutions leveraging the combined efforts of all agencies. It also promotes a more consistent, unified federal approach to technology evaluation and regulatory acceptance, through sharing a variety of technology transfer tools and other information resources.



Throughout its 30 year history, FRTR has sought to advance information and expertise on technologies that aggressively treat or remove contaminants at the source. In situ thermal treatment technologies have advanced markedly, due in large part to research and demonstrations supported and conducted by FRTR member Agencies. Velsicol Superfund site.

Current Priorities and Initiatives

Today, FRTR's priorities and initiatives include:

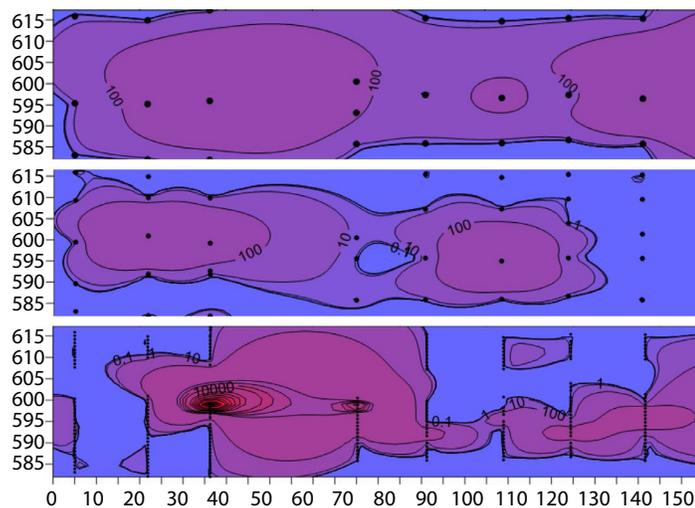
- ▶ Technologies for improving CSMs and optimizing remediation.
- ▶ Emerging techniques for site characterization and treatment of emerging contaminants such as per- and polyfluoroalkyl substances (PFAS).
- ▶ Advances in site characterization and remediation technologies for heavy metals and radionuclides in soil, sediments, and water, including those used at mine sites.
- ▶ Mutual understanding of subsurface modeling and visualization capabilities and limitations.
- ▶ Web-based strategies for improving technology transfer.

Successes in transferring knowledge of innovative technologies and their applications have been summarized and archived in past [FRTR meetings](#), which also can be found at [FRTR.gov](#).

High-Resolution Site Characterization, Modeling and Remedy Optimization

Application of innovative techniques such as sequence stratigraphy and focused investigations presents opportunities to develop better CSMs and related numerical models and to test them using monitoring programs tailored to complex environments.

- ▶ Modeling in Support of Site Remediation, [Session 1](#) & [Session 2](#).
- ▶ [Synthesizing Evolving Conceptual Site Models \(CSMs\) with Applicable Remediation Technologies](#).
- ▶ Evolution of Subsurface Remediation: Lessons Learned from Technical Challenges to Achieving Cleanup Goals, [Session 1](#) & [Session 2](#).

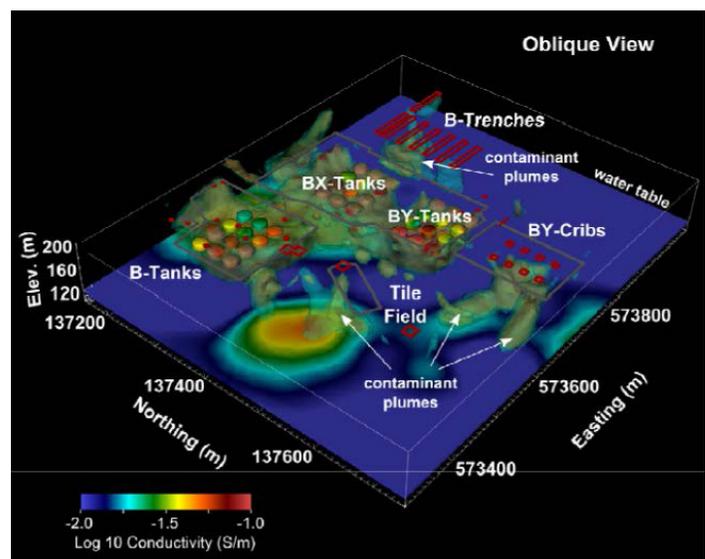


Using higher vertical resolution improves understanding of the plume, which can lead to use of more effective remediation technologies. Source: [FRTR 2015](#)

Heavy Metals and Radionuclides in Soil, Sediment, and Water, and at Mine Sites

Heavy metals and radionuclides continue to present challenges that stimulate innovation at hazardous and mine waste sites. Two recent meetings explored new identification and characterization methods, including incremental sampling, use of unmanned aircraft systems, and modeling. FRTR agencies weighed in on risk assessment and risk management issues to help select and apply remediation methods for radionuclides. Remediation methods including in situ bioremediation, use of bioreactors, and optimization were discussed with a renewed approach and understanding.

- ▶ Heavy Metals—Mining Site Characterization and Treatment, [Session 1](#), [Session 2](#), & [Session 3](#).
- ▶ Remediation Technologies for Radionuclides and Heavy Metals in Soil, Ground Water and Sediments, [Session 1](#) & [Session 2](#).

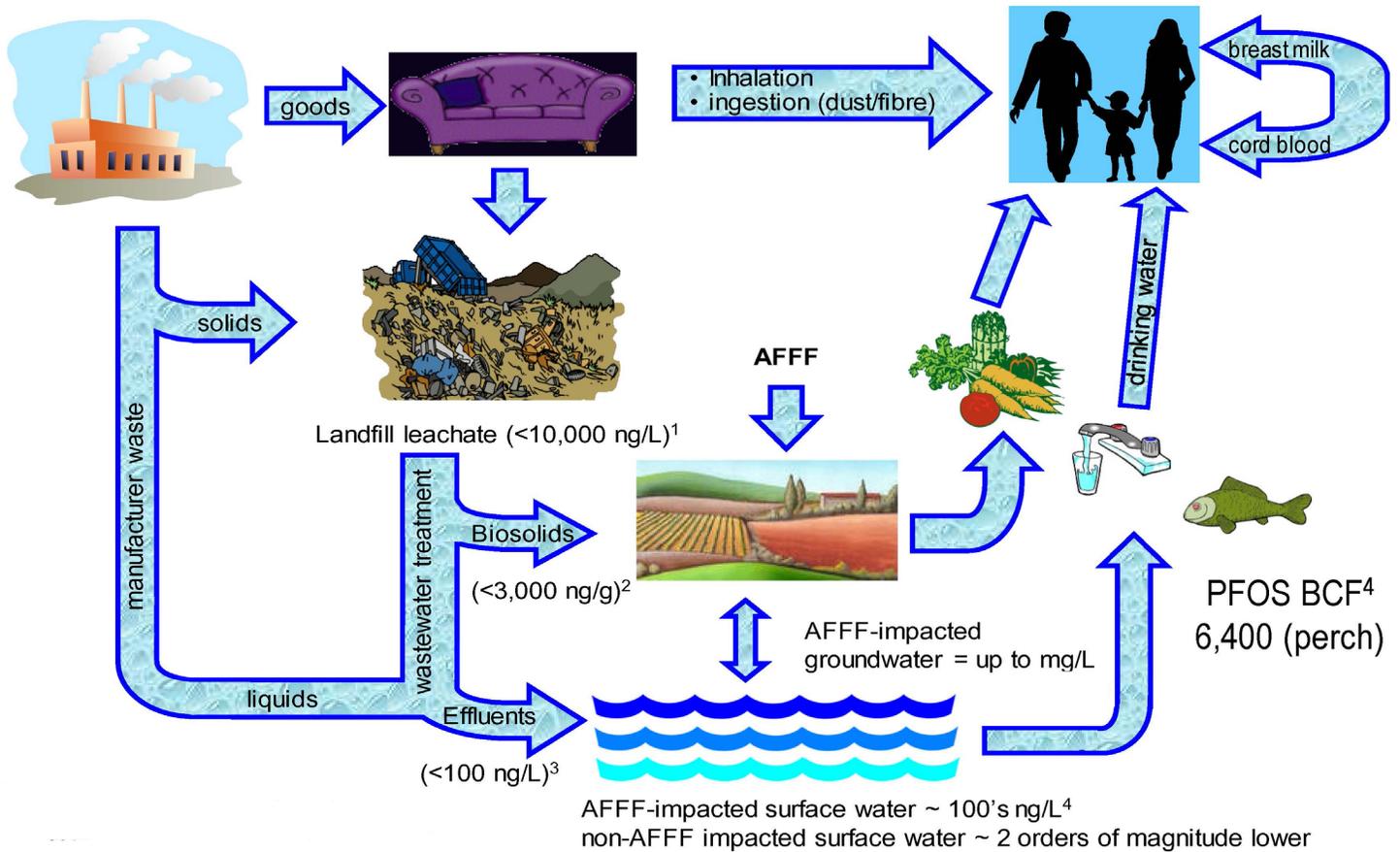


This Hanford site model was developed using contaminant distribution characterization tools. Source: [Truex 2017](#)

PFAS Site Characterization and Remediation

As the prevalence of PFAS is becoming clearer, the challenges of identifying and remediating these chemicals take a priority among our agencies' cleanup programs. Our meeting and related webinar series aimed to understand the basic chemistry, nature, extent, and behavior of these compounds in the subsurface, as well as traditional and innovative methods for treatment and management of PFAS plumes:

- ▶ Per- and Polyfluoroalkyl Substances (PFAS) Emerging Characterization and Remedial Technologies, [Session 1](#) & [Session 2](#).

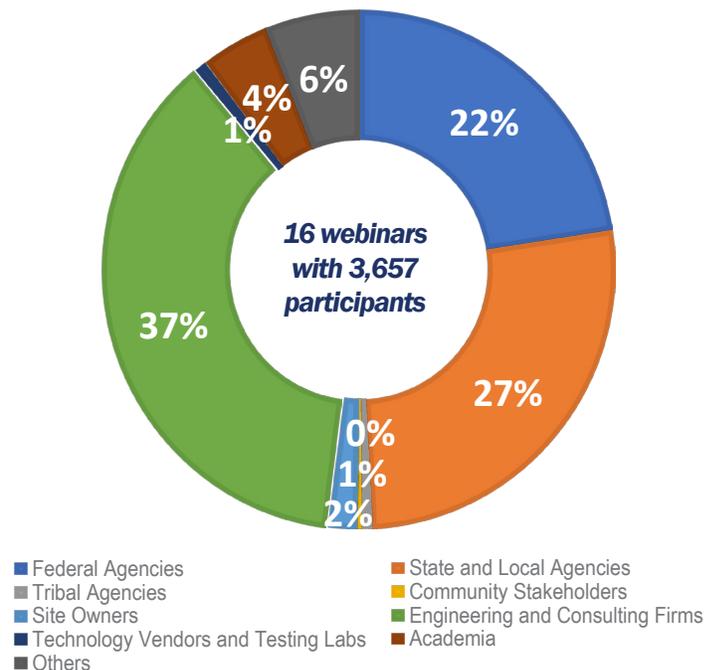


An example risk assessment conceptual site model with sources, receptors and exposure pathways for a typical Aqueous Film Forming Foam (AFFF) release site. Source: [Kornuc 2018](#)

Adapted from Oliaei 2013, Environ Pollut Res. ¹Allred et al. 2014 J Chrom; ²Schultz et al. 2006; Higgins ES&T 2005 ³Schultz et al. 2006 a&b ES&T; ⁴Ahrens et al. Chemosphere 2015

Web-Based Technology Transfer

FRTR's website, FRTR.gov, provides resources and documents spanning the past 30 years. These include [previous meeting materials](#) dating back to 1991, web-based tools such as the recently updated [Remediation Technology Screening Matrix](#), and links to recent webinars. In the past decade, FRTR has made public participation more accessible by live-streaming meetings online. From these meetings, select presentations have been re-delivered as live "FRTR Presents..." webinars that were recorded and archived on U.S. EPA's Contaminated Site Clean-Up Information Network, Clu-In.org. These changes have increased engagement in a single meeting topic from dozens of predominantly federal employees in the D.C. area to thousands of participants across regulatory agencies and the public. Not only do these webinars reach larger audiences, they also facilitate interagency collaboration and improve site cleanups. Over the last four years, we have offered 16 "FRTR Presents..." webinars with 3,657 participants worldwide representing federal, state, and local agencies, universities, consulting firms, and nonprofit organizations.



"FRTR Presents..." participant representation 2015-2020

Setting Future Priorities

Although the environmental mission of each member agency is unique, the work of FRTR during our first 30 years, highlighted in this fact sheet, shows the value of interagency collaboration in identifying shared technology needs and advancing innovative solutions to cleanup. As FRTR observes 30 years of interagency collaboration, it is appropriate for member agencies to identify the future direction of national site remediation programs. FRTR discusses broad technology requirements and priorities and translates these requirements into specific technology needs and technology transfer initiatives. In future meetings, FRTR will reach out to their agencies' senior leadership and technical experts for assistance in setting future priorities. FRTR discussions, conducted face-to-face where possible, will continue to be an important part of this effort.

In addition to identifying strategic directions, the FRTR will continue to focus on key technology issues that include:

- ▶ Improving contaminant source and site characterization.
- ▶ Advancing active remediation technologies and approaches.
- ▶ Addressing emerging contaminant issues as they arise.
- ▶ Ensuring resiliency of our remedies as site conditions evolve due to local environmental and climatic changes.

The perspectives provided by senior leadership will be important. Additionally, input from agency employees and other stakeholders who work day-to-day addressing technology challenges is critical and is encouraged through normal agency channels and contact with FRTR Steering Committee members.

FRTR seeks to enhance this value in the coming years with a renewed understanding among senior leadership and remediation professionals of technology needs for current and emerging cleanup challenges. By recognizing the technical interests that member agencies share, FRTR will be able to improve our current collaborative efforts and begin work to advance new technical innovations.

Member Agencies

