



In Situ Remediation of Chlorinated Solvent Plumes (SERDP ESTCP Environmental Remediation Technology)

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In the late 1970s and early 1980s, our nation began to grapple with the legacy of past disposal practices for toxic chemicals. With the passage in 1980 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund, it became the law of the land to remediate these sites. The U. S. Department of Defense (DoD), the nation's largest industrial organization, also recognized that it too had a legacy of contaminated sites. Historic operations at Army, Navy, Air Force, and Marine Corps facilities, ranges, manufacturing sites, shipyards, and depots had resulted in widespread contamination of soil, groundwater, and sediment. While Superfund began in 1980 to focus on remediation of heavily contaminated sites largely abandoned or neglected by the private sector, the DoD had already initiated its Installation Restoration Program in the mid-1970s. In 1984, the DoD began the Defense Environmental Restoration Program (DERP) for contaminated site assessment and remediation. Two years later, the U. S. Congress codified the DERP and directed the Secretary of Defense to carry out a concurrent program of research, development, and demonstration of innovative remediation technologies. As chronicled in the 1994 National Research Council report, "Ranking Hazardous-Waste Sites for Remedial Action," our early estimates on the cost and suitability of existing technologies for cleaning up contaminated sites were wildly optimistic. Original estimates, in 1980, projected an average Superfund cleanup cost of a mere \$3.



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Editorial Review

From the Back Cover

In Situ Remediation of Chlorinated Solvent Plumes

H.F. Stroo & C.H. Ward

Editors

This volume presents a critical analysis and timely synthesis of the past two decades of intensive research, development and demonstrations on the in situ remediation of chlorinated solvent plumes. The intended audiences include the decision makers, practicing engineers and hydrogeologists who will select, design and operate these remedial systems, as well as the researchers seeking to improve the current state of the science and technology. Our hope is that this volume will serve as a useful resource to assist remediation professionals in applying and developing these technologies as effectively as possible.

Topics addressed in this volume include:

- An overview of the current state of understanding of chlorinated solvents remediation.
- A summary of the chemistry of solvents, the physical, chemical and biological processes that underpin the most frequently employed remediation technologies, and the engineering and implementation issues that influence their efficacy.
- A discussion of site characterization, source zone and plume management, and modeling strategies and tools.
- An analysis of the advantages, performance and relative costs of a range of remedial technologies, including bioremediation technologies such as monitored natural attenuation, biostimulation and bioaugmentation for anaerobic degradation of chlorinated solvents; and physical-chemical technologies such as air sparging, chemical oxidation and reduction, barrier walls, and in-well treatment.
- A cost assessment of the most frequently used technologies, with case studies of several template sites and analyses of the capital costs, as well as costs for laboratory testing, pilot-scale demonstration, design, system operation, monitoring and maintenance during operations, and demolition and restoration after remediation. In addition, analogous cost data are presented for pump-and-treat systems for each template site to illustrate the potential cost savings associated with the use of alternative approaches.
- A summary of emerging technologies such as phytoremediation and electrolytic reactive barriers to illustrate their current stage of maturity and the potential applicability of these approaches for specific situations.
- An assessment of the research needed to more cost-effectively address what remains of a multi-billion dollar legacy environmental contamination problem.

Each chapter in this volume has been thoroughly reviewed for technical content by one or more experts in each of the subject areas covered. The editors and chapter authors have produced a well-written and up-to-date treatise that we hope will be a useful reference for decision-makers, practitioners and developers of advanced technologies for in situ remediation of chlorinated solvent plumes.

Users Review

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John Casale:

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Christopher Hill:

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