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[Groundwater Remediation and Treatment Technologies](#) Nov 27 2019 Principles of Geology -- Relationship Between Groundwater and Surface Water -- Principles of Hydrogeology -- Groundwater Contamination -- Groundwater Restoration -- Pump-and-Treat Remediation Technology -- Treating Contaminated Groundwater and Leachate -- Appendices -- Glossary -- Abbreviations -- Index.

Ground Water Contamination Aug 17 2021 This text addresses the scientific and engineering aspects of subsurface contaminant transport, analysis, and modeling as well as remediation in ground water. It offers a modern engineering approach to ground water contamination problems of the nineties and beyond.

Remediation of Soil and Groundwater Apr 12 2021 Proceedings of the NATO Advanced Research Workshop on 'Remediation of Soil and Groundwater as a Technical, Institutional and Socio-Economic Problem: Opportunities in Eastern Europe', Prague, Czech Republic, November 6-10, 1995

Environmental Engineering Jul 16 2021 First published in 1958, Salvato's Environmental Engineering has long been the definitive reference for generations of sanitation and environmental engineers.

Approaching its fiftieth year of continual publication in a rapidly changing field, the Sixth Edition has been fully reworked and reorganized into three separate, succinct volumes to adapt to a more complex and scientifically demanding field with dozens of specializations. Updated and reviewed by leading experts in the field, this revised edition offers new process and plant design examples and added coverage of such subjects as urban and rural systems. Stressing the practicality and appropriateness of treatment, the Sixth Edition provides realistic solutions for the practicing public health official, water treatment engineer, plant operator, and others in the domestic and industrial waste treatment professions. This volume, *Environmental Engineering: Water, Wastewater, Soil and Groundwater Treatment and Remediation, Sixth Edition*, covers: Water treatment Water supply Wastewater treatment

Soil and Groundwater Remediation Technologies Aug 29 2022 This book offers various soil and water treatment technologies due to increasing global soil and water pollution. In many countries, the management of contaminated land has matured, and it is developing in many others. Topics covered include chemical and ecological risk assessment of contaminated sites; phytomanagement of contaminants; arsenic removal; selection and technology diffusion; technologies and socio-environmental management; post-remediation long-term management; soil and groundwater laws and regulations; and trace element regulation limits in soil. Future prospects of soil and groundwater remediation are critically discussed in this book. Hence, readers will learn to understand the future prospects of soil and groundwater contaminants and remediation measures. Key Features: Discusses conventional and novel aspects of soil and groundwater remediation technologies Includes new monitoring/sensing technologies for soil and groundwater pollution Features a case study of remediation of contaminated sites in the old, industrial, Ruhr area in Germany Highlights soil washing, soil flushing, and stabilization/solidification Presents information on emerging contaminants that exhibit new challenges This book is designed for undergraduate and graduate courses and can be used as a handbook for researchers, policy makers, and local governmental institutes. *Soil and Groundwater Remediation Technologies: A Practical Guide* is written by a team of leading global experts in the field.

Hydrogeological Conceptual Site Models Jan 28 2020 A reference for students, researchers, and environmental professionals, *Hydrogeological Conceptual Site Models: Data Analysis and Visualization* explains how to develop effective conceptual site models, perform advanced spatial data analysis, and generate informative graphics for applications in hydrogeology and groundwater remediation. Written by expert practitioners, this full-color book illustrates how fundamental hydrogeological concepts are translated into quantitative, high-resolution computer visualizations. In addition, the authors discuss topics not typically covered in conventional textbooks, including GIS technology and the relationship between conceptual site models and environmental policy. *Advanced Methods for Data Analysis and Visualization* Featuring more than 500 color illustrations, this unique and visually powerful book outlines the required elements of a conceptual site model and provides numerous examples of supporting charts, cross-sections, maps, and 3D graphics. The authors describe advanced analytical methods such as geospatial processing, kriging, and groundwater modeling through practical real-life examples. They also present numerous case studies in groundwater supply and remediation to help explain key engineering design concepts. *Data-Driven Assessments of Groundwater Management Policy* The authors tackle controversial topics, ranging from technical impracticability of groundwater remediation to sustainable management of groundwater resources. They encourage discussion and independent thought about how current environmental policies and practices can evolve to achieve better outcomes at less cost to society. *Practical Strategies for Communicating Your Findings to the General Public* While the book is technical in nature, equations and advanced theory are kept to a minimum. The text focuses on practical strategies to help you create easy-to-understand data tables, graphs, maps, and illustrations for technical and nontechnical audiences alike. A companion DVD includes animations, reference material, modeling software, and more.

Sustainable Remediation of Contaminated Soil and Groundwater May 26 2022 Sustainable Remediation of Contaminated Soil and Groundwater: Materials, Processes, and Assessment provides the remediation tools and techniques necessary for simultaneously saving time and money and maximizing environmental, social and economic benefits. The book integrates green materials, cleaner processes, and sustainability assessment methods for planning, designing and implementing a more effective remediation process for both soil and groundwater projects. With this book in hand, engineers will find a valuable guide to greener remediation materials that render smaller environmental footprint, cleaner processes that minimize secondary environmental impact, and sustainability assessment methods that can be used to guide the development of materials and processes. Addresses materials, processes, and assessment needs for implementing a successful sustainable remediation process Provides an integrated approach for the unitization of various green technologies, such as green materials, cleaner processes and sustainability assessment Includes case studies based on full-scale commercial soil and groundwater remediation projects

Natural Attenuation for Groundwater Remediation Jul 24 2019 In the past decade, officials responsible for clean-up of contaminated groundwater have increasingly turned to natural attenuation-essentially allowing naturally occurring processes to reduce the toxic potential of contaminants-versus engineered solutions. This saves both money and headaches. To the people in surrounding communities, though, it can appear that clean-up officials are simply walking away from contaminated sites. When is natural attenuation the appropriate approach to a clean-up? This book presents the consensus of a diverse committee, informed by the views of researchers, regulators, and community activists. The committee reviews the likely effectiveness of natural attenuation with different classes of contaminants-and describes how to evaluate the "footprints" of natural attenuation at a site to determine whether natural processes will provide adequate clean-up. Included are recommendations for regulatory change. The committee emphasizes the importance of the public's belief and attitudes toward remediation and provides guidance on involving community stakeholders throughout the clean-up process. The book explores how contamination occurs, explaining concepts and terms, and includes case studies from the Hanford nuclear site, military bases, as well as other sites. It provides historical background and important data on clean-up processes and goes on to offer critical reviews of 14 published protocols for evaluating natural attenuation.

Groundwater Arsenic Remediation Sep 05 2020 Arsenic abatement from groundwater in locations with a central water distribution system is relatively simple. The real challenge is selecting the most effective and affordable treatment and scale up option for locations which lack the appropriate infrastructure. Groundwater Arsenic Remediation: Treatment Technology and Scale UP provides the latest breakthrough groundwater treatment technologies and modeling and simulation methods for project scale up and eventually field deployment in locations which lack the proper central water distribution system to ensure arsenic free groundwater. Covers the different removal methods, such as chemical, adsorption, separation by membranes, and membrane distillation Includes the state-of-the-art modeling & simulation methods for optimization and field deployment Provides economic and comparative analysis of each arsenic treatment technology

Soil and Groundwater Remediation Sep 29 2022 An introduction to the principles and practices of soil and groundwater remediation Soil and Groundwater Remediation offers a comprehensive and up-to-date review of the principles, practices, and concepts of sustainability of soil and groundwater remediation. The book starts with an overview of the importance of groundwater resource/quality, contaminant sources/types, and the scope of soil and groundwater remediation. It then provides the essential components of soil and groundwater remediation with easy-to-understand design equations/calculations and the practical applications. The book contains information on remediation basics such as subsurface chemical behaviors, soil and groundwater hydrology and characterization, regulations, cost analysis, and risk assessment. The author explores various conventional and innovative remediation technologies, including pump-and-treat, soil vapor extraction, bioremediation, incineration, thermally enhanced techniques, soil washing/flushing, and permeable reactive barriers. The book also examines the modeling of groundwater flow and contaminant transport in saturated and unsaturated zones. This important book: Presents the current challenges of remediation practices Includes up-to-date information about the low-

cost, risk-based, sustainable remediation practices, as well as institutional control and management Offers a balanced mix of the principles, practices, and sustainable concepts in soil and groundwater remediation Contains learning objectives, discussions of key theories, and example problems Provides illustrative case studies and recent research when remediation techniques are introduced Written for undergraduate seniors and graduate students in natural resource, earth science, environmental science/engineering, and environmental management, Soil and Groundwater Remediation is an authoritative guide to the principles and components of soil and groundwater remediation that is filled with worked and practice problems.

Permeable Reactive Barrier Sep 25 2019 Remediation of groundwater is complex and often challenging. But the cost of pump and treat technology, coupled with the dismal results achieved, has paved the way for newer, better technologies to be developed. Among these techniques is permeable reactive barrier (PRB) technology, which allows groundwater to pass through a buried porous barrier that either captures the contaminants or breaks them down. And although this approach is gaining popularity, there are few references available on the subject. Until now. Permeable Reactive Barrier: Sustainable Groundwater Remediation brings together the information required to plan, design/model, and apply a successful, cost-effective, and sustainable PRB technology. With contributions from pioneers in this area, the book covers state-of-the-art information on PRB technology. It details design criteria, predictive modeling, and application to contaminants beyond petroleum hydrocarbons, including inorganics and radionuclides. The text also examines implementation stages such as the initial feasibility assessment, laboratory treatability studies (including column studies), estimation of PRB design parameters, and development of a long-term monitoring network for the performance evaluation of the barrier. It also outlines the predictive tools required for life cycle analysis and cost/performance assessment. A review of current PRB technology and its applications, this book includes case studies that exemplify the concepts discussed. It helps you determine when to recommend PRB, what information is needed from the site investigation to design it, and what regulatory validation is required.

Bioaugmentation for Groundwater Remediation Apr 24 2022 ?This volume provides a review of the past 10 to 15 years of intensive research, development and demonstrations that have been on the forefront of developing bioaugmentation into a viable remedial technology. This volume provides both a primer on the basic microbial processes involved in bioaugmentation, as well as a thorough summary of the methodology for implementing the technology. This reference volume will serve as a valuable resource for environmental remediation professionals who seek to understand, evaluate, and implement bioaugmentation.

Groundwater and Soil Remediation Mar 12 2021 Hyman and Dupont describe conventional treatment technologies to remediate contaminated soil and groundwater and explain how these treatments are designed and what they cost.

Practical Techniques for Groundwater & Soil Remediation Oct 19 2021 Practical Techniques for Groundwater and Soil Remediation is a compilation of articles by the author that were printed in the National Ground Water Association (NGWA) magazine Groundwater Monitoring Review. The book provides valuable data, emphasizes the practical aspects of remediation, presents results from actual remediation programs, and helps readers prepare remediation strategies. The book also includes detailed technical data on treatment equipment performance and the costs associated with their design and operation. A unique feature of the book is that it also contains data from treatment systems that did not work. Practical Techniques for Groundwater and Soil Remediation is a "must have" source of invaluable data and tips that will be useful for all groundwater and soil remediation professionals.

Advances in Remediation Techniques for Polluted Soils and Groundwater Jul 28 2022 Advances in Remediation Techniques for Polluted Soils and Groundwater focuses on the thematic areas for assessment, mitigation, and management of polluted sites. This book covers advances in modelling approaches, including Machine Learning (ML)/ Artificial Intelligence (AI) applications; GIS and remote sensing; sensors; impacts of climate change on geogenic contaminants; and socio-economic impacts in the poor rural and urban areas, which are lacking in a more comprehensive manner in the previous titles. This book encompasses updated information as well as future directions for researchers working in the field of management and remediation of polluted sites. Introduces fate and transport of multi-pollutants under varying subsurface conditions Details underlying mechanisms of biodegradation and biotransformation of

geogenic, industrial and emerging pollutants Presents recent advances and challenges in assessment, water quality modeling, uncertainty, and water supply management Provides authoritative contributions on the diverse aspects of management and remediation from leading experts around the world

Practical Design Calculations for Groundwater and Soil Remediation, Second Edition Nov 19 2021

Includes Illustrative Applications of Practical Design Calculations Written in a straightforward style and user-friendly format, Practical Design Calculations for Groundwater and Soil Remediation, Second Edition highlights the essential concepts and important aspects of major design calculations used in soil and groundwater remediation. Drawing from the author's teaching and consulting experience, this text provides practical information that addresses the current needs of practicing engineers, scientists, and legal experts in the field. What's New in This Edition: This latest edition covers important aspects of major design calculations as well as practical and relevant working information for groundwater and soil remediation. Realistic examples are used liberally to illustrate the applications of the design calculations. Many examples are designed to assist the readers in building the right concepts. The text begins with an introductory chapter; it then illustrates the engineering calculations needed during site assessment and remedial investigation. It continues with a discussion on plume migration in soil and groundwater. It then covers the mass-balance concept, reaction kinetics, and types, configurations, and sizing of reactors. The author incorporates important design calculations for commonly used in situ and ex situ soil and groundwater remediation technologies, such as soil venting, air sparging, air stripping, bioremediation, and chemical oxidation, and off-gas treatment technologies. He also presents design calculations for capture zone and optimal well spacing. Includes both SI and US customary units, as well as unit conversions Presents examples that directly follow the design equations Provides discussion that assists engineers in building proper concepts Practical Design Calculations for Groundwater and Soil Remediation, Second Edition also serves as a reference or textbook for students dedicated to the study of site remediation.

Groundwater Geochemistry May 02 2020 This book contains both practical and theoretical aspects of groundwater resources relating to geochemistry. Focusing on recent research in groundwater resources, this book helps readers to understand the hydrogeochemistry of groundwater resources. Dealing primarily with the sources of ions in groundwater, the book describes geogenic and anthropogenic input of ions into water. Different organic, inorganic and emerging contamination and salinity problems are described, along with pollution-related issues affecting groundwater. New trends in groundwater contamination remediation measures are included, which will be particularly useful to researchers working in the field of water conservation. The book also contains diverse groundwater modelling examples, enabling a better understanding of water-related issues and their management. Groundwater Geochemistry: Pollution and Remediation offers the reader: An understanding of the quantitative and qualitative challenges of groundwater resources An introduction to the environmental geochemistry of groundwater resources A survey of groundwater pollution-related issues Recent trends in groundwater conservation and remediation Mathematical and statistical modeling related to groundwater resources Students, lecturers and researchers working in the fields of hydrogeochemistry, water pollution and groundwater will find Groundwater Geochemistry an essential companion.

Hydrocarbon Contaminated Soils and Groundwater Feb 08 2021 Proceedings of the February 19-22, 1990, conference held at Newport Beach, California. Conference Directors: PAUL T. KOSTECKI, EDWARD J. CALABRESE, and CHARLES E. BELL. Advisory Committee: RICHARD BOZEK, EEI; TERRY BRAZEL, SWRCB; MARK COUSINEAU, AG; SETH DAUGHERTY, Orange County; RALPH De La PARRA, SCE; JERRY HAGGY, Shell; JOHN HANBY, HAL; JOHN HILL, ICF; JOHN HILLS, City of Anaheim; DOROTHY KEECH, Chevron; BILL KUCHARSKI, WC; DAVID LEU, Mittel Hauser; MARY McLEARN, EPRI; PHIL OLWIN, Texaco; DENNIS PAUSTENBACH, MC; ART POPE, ARCO; LYNNE PRESLO, Weston; DON ROTHENBAUM, KA; KIM SAVAGE, EPA/oust; CARL SHUBERT, IT; WENDELL SUYAMA, Lockheed; MICHAEL WANG, WSPA; JOHN WILLIAMS, TT; and WILLIAM WINTERS, AEM.

Bioaugmentation for Groundwater Remediation Jan 22 2022 ?This volume provides a review of the past 10 to 15 years of intensive research, development and demonstrations that have been on the forefront of developing bioaugmentation into a viable remedial technology. This volume provides both a primer on

the basic microbial processes involved in bioaugmentation, as well as a thorough summary of the methodology for implementing the technology. This reference volume will serve as a valuable resource for environmental remediation professionals who seek to understand, evaluate, and implement bioaugmentation.

Groundwater Remediation Jun 26 2022 This book reviews the sources of soil and groundwater contamination and the potential remediation technologies. It focuses on remediation technologies that are commonly utilized in practice, and discusses a number of innovative technologies that show promise for special problem circumstances.

Biostimulation Remediation Technologies for Groundwater Contaminants Feb 20 2022 The rapid progression of technology has significantly impacted population growth, urbanization, and industrialization in modern society. These developments, while positive on the surface, have created critical environmental problems in recent years. *Biostimulation Remediation Technologies for Groundwater Contaminants* is a critical scholarly publication that examines the release of heavy metals into the environment as a result of human activities and the use of nanoparticles and other technologies to manage and treat the effects of the pollution. Featuring coverage on a broad range of topics such as toxicity of heavy metals, bioremediation, and acclimated bacterial strains, this book is geared toward environmentalists, engineers, academics, researchers, and graduate-level students seeking current research on bioremediation as an alternate way to manage or degrade heavy metal waste.

Groundwater Remediation and Treatment Technologies Nov 07 2020 This volume has been organized for practicing engineers who deal with the problems of groundwater and leachate remediation. It is intended to provide a practical overview of both techniques for evaluating groundwater quality and in selecting remediation technologies that are cost effective. Emphasis is given to advanced remediation methods.

In Situ Chemical Oxidation for Groundwater Remediation Sep 17 2021 This volume provides comprehensive up-to-date descriptions of the principles and practices of in situ chemical oxidation (ISCO) for groundwater remediation based on a decade of intensive research, development, and demonstrations, and lessons learned from commercial field applications.

In Situ Bioremediation of Perchlorate in Groundwater Dec 09 2020 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.

Advanced Groundwater Remediation Jun 22 2019 This book presents a concise summary of advanced groundwater treatment methods, especially 'pump-and-treat' and 'permeable reactive barriers'. The topics include heavy metal removal, with special emphasis on uranium, and sorption, one of the basic mechanisms in groundwater remediation.

Groundwater Engineering Mar 31 2020 This textbook employs a technical and quantitative approach to explain subsurface hydrology and hydrogeology, and to offer a comprehensive overview of groundwater-related topics such as flow in porous media, aquifer characterization, contaminant description and transport, risk assessment, and groundwater remediation. It describes the characterization of subsurface flow of pristine and polluted water and provides readers with easily applicable tools for the design of

water supply systems, drinking-water source protection, and remediation interventions. Specific applications range from groundwater exploitation as a drinking water supply to the remediation of contaminated aquifers, from the definition and safeguarding of drinking-water sources to the assessment of human health risks in connection with groundwater contamination events. The book represents an ideal learning resource for upper-undergraduate and graduate students of civil engineering, environmental engineering, and geology, as well as practitioners in the fields of water resource management and environmental protection who are interested in groundwater engineering and technical hydrogeology.

Groundwater Treatment Technology Aug 24 2019 Groundwater treatment is unique. Removing the sources of contamination, as we did when we cleaned a river or lake, is only the first step. A groundwater remediation must include cleaning of the body of water itself, the aquifer. The revised and updated edition of *Groundwater Treatment Technology* provides a complete review of the technologies developed over the past 10 years for groundwater treatment. It also explains the design techniques that are required to apply those technologies successfully in a groundwater cleanup. Featured areas of coverage include: Specific design methods for the various technologies that are merely described in other publications Physical/chemical and treatability properties of 30 organic compounds that are most often encountered in groundwater situations Detailed strategies for remediation New biological treatment methods Specific data on treatment methods as applied in the field Practical suggestions on applications of technologies for groundwater treatment Drawing on his experience as a designer of over 100 groundwater treatment systems, Evan K. Nyer starts by showing how to develop the data necessary to define what type of treatment is necessary. He then explains how groundwater treatment is unique. Nyer follows with expert accounts of specific treatment technologies. Physical/chemical organic methods such as air stripping, carbon adsorption, and pure compound removal are explored in detail. In addition, new techniques including UV Oxidation and other emerging technologies are explained and directly related to groundwater design situations. An entire chapter is devoted to biological methods, one of the most promising areas for organic groundwater treatment. There is also comprehensive coverage of inorganic methods, that addresses everything from precipitation to solids/liquid separation and advanced ion removal methods. This definitive sourcebook also contains helpful cost factor analyses, plus representative case histories showing how the techniques of groundwater treatment have been applied in the field. Wide-ranging, authoritative, and completely updated, the Second Edition of *Groundwater Treatment Technology* is essential reading for wastewater engineers, industrial managers, hydrologists, soil experts, government officials, and environmental lawyers who want to keep abreast of the latest developments in this important field.

Advances in Bioremediation of Wastewater and Polluted Soil Mar 24 2022 The pollution of soil and groundwater by heavy metals and other chemicals is becoming a serious issue in many countries. However, the current bioremediation processes do not often achieve sufficient remediation, and more effective processes are desired. This book deals with advances in the bioremediation of polluted soil and groundwater. In the former chapters of this book, respected researchers in this field describe how the optimization of microorganisms, enzymes, absorbents, additives and injection procedures can help to realize excellent bioremediation. In the latter chapters, other researchers introduce bioremediation processes that have been performed in the field and novel bioremediation processes. Thus, the readers will be able to obtain new ideas about effective bioremediation as well as important information about recent advances in bioremediation.

Hydrocarbon Bioremediation Dec 29 2019 With oil spills occurring worldwide, much media and practical attention has been given in recent years to the rapidly maturing field of hydrocarbon bioremediation, particularly with application to marine spills. Hydrocarbon contamination of soil and groundwater, although less visible, is even more widespread and has provided the background for the numerous studies presented in this book, in addition to those devoted to shoreline spills. Chapters address a wide variety of theory and practice and cover important subjects such as biofiltration, natural attenuation, surfactants, and the use of in situ bioventing compared to soil venting. This unique book represents the collective global experience of practitioners and researchers in North America, Europe, Africa, and Asia. It describes experiences in tying laboratory studies to field applications. Nowhere else can anyone involved in hydrocarbon bioremediation find more up-to-date, relevant information on field experience using the

various techniques and combinations of techniques in remediating hydrocarbons by biological means. *Groundwater Contamination and Remediation* May 14 2021 This book is a printed edition of the Special Issue "Groundwater Contamination and Remediation" that was published in *Water Handbook of Groundwater Remediation using Permeable Reactive Barriers* Feb 29 2020 Over the last century and a half, groundwaters have become contaminated by a growing number of organic and inorganic substances ranging from petroleum-derived hydrocarbons to radioactive compounds, to cancer-causing hexavalent chromium. The importance of uncontaminated groundwater for agriculture, human consumption, and the environmental health of ecosystems is paramount to the health and productivity of industrial society. Water scientists and managers are focused on developing cost-effective methods to reverse this trend. Several methodologies have been developed, however few are as cost-effective as the use of readily available materials, such as iron and organic compost, for absorbing and isolating contaminants within the matrix of a permeable barrier. The *Handbook of Groundwater Remediation using Permeable Reactive Barriers* presents readers with this latest technology and developments within four main sections: 1. Innovations in Design, Construction, and Evaluation of PRBs 2. Development of Reactive Materials 3. Evaluations of Chemical and Biological Processes 4. Case Studies of Permeable Reactive Barrier Installations The *Handbook* is one of the first references specifically on this topic. It is an excellent fit for graduate students entering this emerging field as well as professionals conducting research or implementing this technology.

In Situ Bioremediation of Perchlorate in Groundwater Jun 14 2021 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.

Sustainable Remediation of Contaminated Soil and Groundwater Jul 04 2020 *Sustainable Remediation of Contaminated Soil and Groundwater: Materials, Processes, and Assessment* provides the remediation tools and techniques necessary for simultaneously saving time and money and maximizing environmental, social and economic benefits. The book integrates green materials, cleaner processes, and sustainability assessment methods for planning, designing and implementing a more effective remediation process for both soil and groundwater projects. With this book in hand, engineers will find a valuable guide to greener remediation materials that render smaller environmental footprint, cleaner processes that minimize secondary environmental impact, and sustainability assessment methods that can be used to guide the development of materials and processes. Addresses materials, processes, and assessment needs for implementing a successful sustainable remediation process Provides an integrated approach for the unitization of various green technologies, such as green materials, cleaner processes and sustainability assessment Includes case studies based on full-scale commercial soil and groundwater remediation projects

Remediation Technologies for Soils and Groundwater Jun 02 2020 This report provides a comprehensive and thorough overview of conventional engineered processes and technologies used for the remediation of contaminated sites.

[Pump-and-treat Ground-water Remediation](#) Oct 07 2020

[Bioremediation and Natural Attenuation](#) Dec 21 2021 A groundbreaking text and professional resource on

natural attenuation technology Natural attenuation is rapidly becoming a widely used approach to manage groundwater and soil contamination by hazardous substances in petroleum-product releases and leachate from hazardous waste sites and landfills. This book provides, under one cover, the current methodologies needed by groundwater scientists and engineers in their efforts to evaluate subsurface contamination problems, to estimate risk to human health and ecosystems through mathematical models, and to design and formulate appropriate remediation strategies. Incorporating the authors' extensive backgrounds as educators, researchers, and consultants in environmental biotechnology and hydrogeology, the text emphasizes new concepts and recent advances in the science, including: Quantification of the role of microbes in natural attenuation Biodegradation and chemical transformation principles Immobilization and phase change Biotransformation mechanisms Groundwater flow and contaminant transport Analytical models for contaminant transport and reaction processes Numerical modeling of contaminant transport, transformation, and degradation Detailed descriptions of fundamental processes, characterization approaches, and analytical and numerical methods tied to relevant real-world applications make Bioremediation and Natural Attenuation: Process Fundamentals and Mathematical Models both a timely course text in hydrogeology and environmental engineering and a valuable reference for anyone in the groundwater or risk assessment professions.

Electrochemical Remediation Technologies for Polluted Soils, Sediments and Groundwater Aug 05 2020 An unmatched reference on electrochemical technologies for soil, sediment, and groundwater pollution remediation Electrochemical technologies are emerging as important approaches for effective and efficient pollution remediation, both on their own and in concert with other remediation techniques. Electrochemical Remediation Technologies for Polluted Soils, Sediments and Groundwater provides a systematic and clear explanation of fundamentals, field applications, as well as opportunities and challenges in developing and implementing electrochemical remediation technologies. Written by leading authorities in their various areas, the text summarizes the latest research and offers case studies that illustrate equipment, installation, and methods employed in real-world remediations. Divided into nine sections, the coverage includes: Introduction and fundamental principles Remediation of heavy metals and other inorganic pollutants Remediation of organic pollutants Remediation of mixed contaminants Electrokinetic barriers Integrated (coupled) technologies Mathematical modeling Economic and regulatory considerations Field applications and performance assessment Unique as a comprehensive reference on the subject, Electrochemical Remediation Technologies for Polluted Soils, Sediments and Groundwater will serve as a valuable resource to all environmental engineers, scientists, regulators, and policymakers.

Soils and Groundwater Pollution and Remediation Jan 10 2021 The increasing population densities of Asia, Africa and Oceania are in conflict with the ecosystem. A growing demand for food and fiber causes agriculture to rely heavily upon chemical fertilization, herbicides and pesticides. Rising industrial output creates higher contamination from cadmium, lead, selenium, and other metals. Soils and Groundwater Remediation explores the toxic levels of metals, radionuclides, inorganics, and anthropogenic organic compounds found in the soils and groundwater of Asia, Africa and Oceania. This 14 chapter book reviews the distribution, transformation, and dynamics of the pollutants. The authors also reflect on the impact of Acid-rain. The contributors to this book are well-known scientists from Japan, China, Korea, Malaysia, New Zealand, Australia, and Kenya. The authors address their findings to researchers, educators, government regulators, and students. As the title suggests, the book is ultimately concerned with remediation. Huang and Iskandar feel "the potential for restoring ecosystem health ... in these areas is enormous." The contributions of Soils and Groundwater Remediation will bring science closer to achieving that possibility.

Groundwater Remediation Oct 31 2022 Written by one of the world's foremost authorities on the subject, this is the most comprehensive and in-depth treatment available to environmental engineers and scientists for the remediation of groundwater, one of the earth's most precious resources. Groundwater is one of the Earth's most precious resources. We use it for drinking, bathing, and many other purposes. Without clean water, humans would cease to exist. Unfortunately, because of ignorance or lack of caring, groundwater is often contaminated through industrialization, construction or any number of other ways. It is the job of the environmental engineer to remediate the contaminated groundwater and make what has

been tainted safe again. Selecting the proper remediation strategy and process is the key to moving forward, and, once this process has been selected, it must be executed properly, taking into consideration the costs, the type of contaminants that are involved, time frames, and many other factors. This volume provides a broad overview of the current and most widely applied remedial strategies. Instead of discussing these strategies in a generic way, the volume is organized by focusing on major contaminants that are of prime focus to industry and municipal water suppliers. The specific technologies that are applicable to the chemical contaminants discussed in different chapters are presented, but then cross-referenced to other chemical classes or contaminants that are also candidates for the technologies. The reader will also find extensive cost guidance in this volume to assist in developing preliminary cost estimates for capital equipment and operations & maintenance costs, which should be useful in screening strategies. The eight chapters cover all of the major various types of contaminants and their industrial applications, providing a valuable context to each scenario of contamination. This is the most thorough and up-to-date volume available on this important subject, and it is a must-have for any environmental engineer or scientist working in groundwater remediation.

Groundwater Contamination by Organic Pollutants Oct 26 2019 MOP 100 surveys important technologies used in the remediation of contaminated aquifers.

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