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**Surfactants and Cosolvents for NAPL Remediation A Technology Practices Manual**

- Donald F. Lowe - 1999-03-26

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**Surfactants and Cosolvents for NAPL Remediation** - - 1999

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**NAPL Removal Surfactants, Foams, and Microemulsions** - C. H. Ward - 2016-04-19

Complete and quantitative, NAPL Removal: Surfactants, Foams, and Microemulsions, belongs to a ten-monograph series that records the results of the Department of Defense/Advanced Applied Technology Demonstration Facility environmental technology demonstrations. It presents the outcome of field demonstrations of innovative in situ remediation technology.
The Handbook of Environment and Waste Management, Volume 2, Land and Groundwater Pollution Control, is a comprehensive compilation of topics that are at the forefront of many of the technical advances and practices in solid waste management and groundwater pollution control. These include biosolids management, landfill for solid waste disposal, landfill liners, beneficial reuse of waste products, municipal solid waste recovery and recycling and groundwater remediation. Internationally recognized authorities in the field of environment and waste management contribute chapters in their areas of expertise. This handbook is an essential source of reference for professionals and researchers in the areas of solid waste management and groundwater pollution control, and as a text for advanced undergraduate and graduate courses in these fields.
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Contaminants and the Soil Environment in the Australasia-Pacific Region - R. Naidu - 2012-12-06
The Australasia-Pacific Region supports approximately 50% of the world’s population. The last half-century has witnessed a rapid increase in the regional population, agricultural productivity, industrial activities and trade within the region. Both the demand for increased food production and the desire to improve the environmental quality. This volume presents an overview of the fate of contaminants in the soil environment; current soil management factors used to control contaminant impacts, issues related to sludge and effluent disposals in the soil environment; legal, health and social impacts of contaminated land, remediation approaches and strategies to manage contaminated land, some of the problems associated with environmental degradation in the Australasia-Pacific Region and steps that we need to take to safeguard our environment.

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**Physicochemical Groundwater Remediation** - James A. Smith - 2001-07-31
You will learn how palladium catalyzes the dehalogenation of chlorinated solvents.

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**Subsurface Contamination Monitoring Using Laser Fluorescence** - Katharine Balshaw-Biddle - 2019-08-30
While innovative technologies in remediation need to be developed, so do innovative ways of site assessment. This monograph describes the development, testing, and performance of a new laser-induced fluorescence soil probe. A screening tool for site characterization, this probe has the potential to provide an economical, rapid assessment of contaminated sites. Cone Penetrometer testing equipment advances the probe into the subsurface. The probe identifies hydrocarbon classes using a multi-channel excitation-emission matrix. This technique facilitates the collection of significant amounts of subsurface information - surpassing conventional data collection methods - that can be used to rapidly identify areas of concern beneath a site. The technology has significant application for the following: Rapid environmental site assessment...
Penetrometer testing equipment advances the manufacturing processes and industrial waste water operations. Subsurface Contamination Monitoring Using Laser Fluorescence provides comprehensive reference material for researchers and engineers as well as engineering consultants interested in subsurface monitoring techniques or further development of this technology. It describes innovative technology that focuses on finding cost effective solutions for site assessment and remediation.


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Remediation of Firing Range Impact Berms -
Modular Remediation Testing Systems
A part of the continuing effort to provide innovative in situ remediation techniques, Remediation of Firing-Range Impact Berms presents the results of a soil washing and leaching project. The demonstration set as its primary objective providing reliable, detailed performance data to evaluate the feasibility and cost of implementing a full-scale sys

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Modular Remediation Testing Systems - C. H. Ward - 1999-08-23
documents a unique modular testing environment designed for use in the development of remediation technology and for on-site selection of remedial technologies. This complete design and operation manual gives you the tools you need to conduct successful, cost effective remediation projects. The major attributes of this system, the Experimental Controlled Release System (ECRS), that distinguish it from past test facilities include the following: Portable - shippable to the researcher's location or remediation site Tightly sealable - facilitates mass balance Large pilot-scale facility - step below full-scale demonstration Flexible testing conditions - vadose zone or aquifer, chemical release or contaminated soil, air sparging or SVE Easy to construct - design drawings developed, standard equipment Easy to operate and maintain - easy access, standard equipment Affordable - easily shipped and set up, reduced regulatory requirements, minimal maintenance
environment designed for use in the development operate within one week of arrival, programmable for 24-hour duration This monograph presents key information needed to design, construct, and operate similar modular remediation testing systems or to utilize the two existing modular ECRS facilities. The well-sealed, above-ground modular system design minimizes leaks to the environment, facilitates mass balances, and controls test conditions. This allows for multiple uses with minimal permitting. Modular Remediation Testing Systems is a comprehensive reference for researchers in environmental engineering and for engineering consultants and regulators looking for a pilot-scale system. These pilot-scale systems are uniquely suited to both research development and real-world application at remediation sites.

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Phytoremediation of Hydrocarbon Contaminated Soils monograph presents key information needed to design, construct, and operate similar modular remediation testing systems or to utilize the two existing modular ECRS facilities. The well-sealed, above-ground modular system design minimizes leaks to the environment, facilitates mass balances, and controls test conditions. This allows for multiple uses with minimal permitting. Modular Remediation Testing Systems is a comprehensive reference for researchers in environmental engineering and for engineering consultants and regulators looking for a pilot-scale system. These pilot-scale systems are uniquely suited to both research development and real-world application at remediation sites.

Phytoremediation of Hydrocarbon-Contaminated Soils - Stephanie Fiorenza - 2020-12-18
Interest in phytoremediation as a solution for contaminants in groundwater and soil has exploded. The project documented in Soils presents innovative technology for environmental clean up using in situ treatment. It describes the results of a field study focusing on hydrocarbon contamination, especially polynuclear aromatic hydrocarbons, in surface and near surface soils. The field demonstration used soils contaminated with aged diesel fuels. The random block design enabled the investigators to test the statistical difference in the effects of different vegetated and unvegetated treatments. They tested the degradation of diesel and polynuclear aromatic hydrocarbon components in plots containing three different vegetation treatments, two grasses and a legume, and a non-vegetated control. Part one of the monograph gives a complete and thorough account of the results of the field study. Part two covers the design and potential costs of a full-scale implementation of the demonstration system as well as the performance and potential application of the new
investigators to test the statistical difference in Contaminated Soils supplies quantitative results about the use of vegetation in soil remediation. The information given on the niches and limitations of the technologies allows for a more informed selection of remedial solutions for environmental cleanup.

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**Geotechnical and Geoenvironmental Engineering Handbook** - R. Kerry Rowe -

**Geotechnical and Geoenvironmental Engineering Handbook** - R. Kerry Rowe - 2012-12-06

**Geoenvironmental Engineering** - Raymond Nen Yong - 1999
Geoenvironmental engineering issues are of increasing importance around the world. This international trend is apparent in the UK governments active encouragement of the use of brownfield sites for urban development to ease the pressure on the countryside. This book contains the collected papers from the 2nd Geoenvironmental Engineering Conference, organised by the British Geotechnical Society and Cardiff Universitys Geoenvironmental
work in the field. It provides a comprehensive overview for students, environmental professionals, and real estate developers, and includes the latest environmental regulations, environmental site assessment and remediation practices, and industry standards. It examines pollution sources and the related impacts on drinking water supplies, the associated health risks, and how to protect water resources. The monitoring of surface water, groundwater, and soil is explained, as well as vapor intrusion. It will include several practical case studies throughout. Features Includes the latest and best practices for environmental site assessment and remediation procedures. Presents a multidisciplinary approach, including environmental forensics, nanotechnology, microbiology (DNA technology) and isotopes, etc. Examines various pollutants and their related impacts on drinking water supplies, the associated health risks, and how to protect water resources. Presents the best practices for the

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**Fundamentals of Environmental Site Assessment and Remediation** - Yue Rong - 2018-07-03

Fundamentals of Environmental Site Assessment and Remediation examines all aspects of environmental site assessment and remediation and outlines the interdisciplinary skills needed to
surfactants-and-cosolvents-for-napl-remediation
particular, more data on the behavior of inorganic contaminants and on engineered nanomaterials were included, the latter comprising a group of “emerging contaminants” that may reach the soil and subsurface zones. New chapters are devoted to a new perspective of contaminant geochemistry, namely irreversible changes in pristine land and subsurface systems following chemical contamination. Two chapters were added on this topic, focusing attention on the impact of chemical contaminants on the matrix and properties of both liquid and solid phases of soil and subsurface domains. Contaminant impacts on irreversible changes occurring in groundwater are discussed and their irreversible changes on the porous medium solid phase are surveyed. In contrast to the geological time scale controlling natural changes of porous media liquid and solid phases, the time scale associated with chemical pollutant induced changes is far shorter and extends over a “human lifetime scale”.

**Contaminant Geochemistry** - Brian Berkowitz - 2014-04-22

In this updated and expanded second edition, new literature has been added on contaminant fate in the soil-subsurface environment. In New chapters are devoted to a new perspective of contaminant geochemistry, namely irreversible changes in pristine land and subsurface systems following chemical contamination. Two chapters were added on this topic, focusing attention on the impact of chemical contaminants on the matrix and properties of both liquid and solid phases of soil and subsurface domains. Contaminant impacts on irreversible changes occurring in groundwater are discussed and their irreversible changes on the porous medium solid phase are surveyed. In contrast to the geological time scale controlling natural changes of porous media liquid and solid phases, the time scale associated with chemical pollutant induced changes is far shorter and extends over a
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Addresses the challenges that oil and gas industries may confront for gas shale reservoir exploration and development
Introduces petrophysical analysis, rock physics, geomechanics and passive seismic methods for gas shale plays
Details shale gas environmental issues and challenges, economic consideration for gas shale reservoirs
Includes case studies of major producing gas shale formations

Soil Vapor Extraction Using Radio Frequency Heating - Donald F. Lowe - 1999-12-06
One of the most widely used techniques for treating soils contaminated with volatile organic compounds, soil vapor extraction (SVE) can also be applied to semi-volatile organic compounds (SVOCs) if the soil is heated, by applying electromagnetic energy in the radio frequency (FR) range, to increase the vapor pressure of the
The book includes the necessary databases, equations, and example calculations for RF heating. The theoretical and practical information included will facilitate future testing of RF-SVE treatment of soils. Additionally, the book provides information for a full-scale engineering design of potential RF-SVE applications. The authors use this information to examine predicted performance, magnitude of costs, and modifications to the design that may decrease cost. Soil Vapor Extraction Using Radio Frequency Heating: Resource Manual and Technology Demonstration gives an economic analysis of this innovative technology and considers other possible applications for it. Although RF-SVE systems used in previous field demonstrations have had varying degrees of success, questions remain concerning its viability and cost-effectiveness. Soil Vapor Extraction Using Radio Frequency Heating: Resource Manual and Technology Demonstration covers detailed scientific and engineering information that answers these questions. The book includes the necessary databases, equations, and example calculations for RF heating. The theoretical and practical information included will facilitate future testing of RF-SVE treatment of soils. Additionally, the book provides information for a full-scale engineering design of potential RF-SVE applications. The authors use this information to examine predicted performance, magnitude of costs, and modifications to the design that may decrease cost. Soil Vapor Extraction Using Radio Frequency Heating: Resource Manual and Technology Demonstration gives an economic analysis of this innovative technology and considers other possible applications for it.

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Features

Soil and Groundwater Remediation - Chunlong Zhang - 2019-11-26
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-
Soil and Groundwater Remediation - Chunlong Zhang - 2019-11-26
An introduction to the principles and practices of soil and groundwater remediation

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.
Several long-term trends in technology evolution have become apparent since these symposia began in 1989. Earlier presenters more frequently discussed treatment methods involving harsh and extensive human intervention. As the symposia have continued, the number of presentations describing extremely harsh and expensive treatment technologies have gradually been supplanted by more subtle and gentler methods. Such methods include subsurface-engineered barriers, phytoremediation, and bioremediation. Nineteen manuscripts were selected for inclusion in this volume, based upon peer review, scientific merit, the editors' perceptions of lasting value or innovative features, and the general applicability of either the technology itself or the scientific methods and scholarly details provided by the authors. General topics include: soil treatment, groundwater treatment, and radioactive waste treatment.

Emerging Technologies in Hazardous Waste Management 8 - D. William Tedder - 2000-05-31

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Most books on ground water and soil cleanup address only the technologies themselves—not why new technologies are or are not developed. Innovations in Ground Water and Soil Cleanup takes a holistic approach to the entire field, addressing both the sluggish commercial development of ground water and soil cleanup technologies and the attributes of specific technologies. It warns that, despite cleanup expenditures of nearly $10 billion a year, the technologies remain rudimentary. This engaging book focuses on the failure of regulatory policy to link cleanup with the financial interests of the company responsible for the contamination. The committee explores why the market for remediation technology is uniquely lacking in economic drivers and why demand for innovation has been so much weaker than predicted. The volume explores how to evaluate the
technologies and the attributes of specific points of view of the public, regulators, cleanup entrepreneurs, and other stakeholders. The committee discusses approaches to standardizing performance testing, so that choosing a technology for a given site can be more timely and less contentious. Following up on Alternatives for Ground Water Cleanup (NRC, 1994), this sequel presents the state of the art in the cleanup of various types of ground water and soil contaminants. Strategies for making valid cost comparisons also are reviewed.

Innovations in Ground Water and Soil Cleanup - National Research Council - 1997-11-21
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Groundwater and Soil Cleanup - National Research Council - 1999-11-21
This book presents a comprehensive, up-to-date review of technologies for cleaning up contaminants in groundwater and soil. It provides a special focus on three classes of contaminants that have proven very difficult to treat once released to the subsurface: metals, radionuclides, and dense nonaqueous-phase liquids such as chlorinated solvents. Groundwater and Soil Cleanup was commissioned by the Department of Energy (DOE) as part of its program to clean up contamination in the nuclear weapons production complex. In addition to a review of remediation technologies, the book describes new trends in regulation of contaminated sites and assesses DOE’s program for developing new subsurface cleanup technologies.

In Situ Chemical Oxidation for Groundwater Remediation - Robert L. Siegrist - 2011-02-26
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.

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Environmental Soil Remediation and Rehabilitation - Eric D. van Hullebusch - 2020-04-22
This book provides a comprehensive overview of innovative remediation techniques and strategies for soils contaminated by heavy metals or organic compounds and chlorinated organic compounds. It discusses various novel chemical remediation approaches (in-situ and ex-situ) used alone and in combination with physical and/or thermal treatment. Further, it addresses the recovery of NAPLs, reuse of leaching solutions, and in-situ chemical reduction and oxidation, and explores the chemical enhancement of physical NAPLs recovery from both practical and theoretical perspectives. Also presenting the state-of-the-art in waste-assisted bioremediation to improve soil quality and the remediation of petroleum hydrocarbons, the book is a valuable resource for students, researchers and R&D professionals in industry engaged in the treatment of contaminated soils.

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**Chlorinated Solvent Source Zone Remediation** - Bernard H. Kueper - 2014-04-22

The purpose of this book is to help engineers and scientists better understand dense nonaqueous groundwater and the methods and technology used for characterization and remediation. Remediation of DNAPL source zones is very difficult and controversial and must be based on state-of-the-art knowledge of the behavior (transport and fate) of nonaqueous phase liquids in the subsurface and site specific geology, chemistry and hydrology. This volume is focused on the characterization and remediation of nonaqueous phase chlorinated solvents and it is hoped that mid-level engineers and scientists will find this book helpful in understanding the current state-of-practice of DNAPL source zone management and remediation.

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**Fundamentals of Hazardous Waste Site Remediation** - Kathleen Sellers - 2017-10-25

Every practicing environmental engineer should already have a firm grasp on the basics of hazardous waste site remediation-the key to confronting a site problem, and devising an effective solution. Since their original introduction to remediation, technology has kept moving ahead with new ideas and procedures. Fundamentals of Hazardous Waste Site Remediation gives environmental professionals immediate access to the basics of the trade, along with information about recent advancements. This comprehensive overview examines the basics of such areas as hazardous materials chemistry, hydrogeology, reaction engineering, and clean-up level development. A chapter on Cost Estimating will be of particular interest to specialists, in light of recent concerns about the increased costs of remediation. After reading each chapter, test your new knowledge with the review problems. As a refresher guide for career environmental engineers, or a helpful tool to newcomers in the field, Fundamentals of Hazardous Waste Site Remediation is a valuable resource for longtime professionals and newcomers alike.

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FROM THE INTRODUCTION This three-volume set, Bioremediation: Principles and Practice, provides state of the art description of advances in pollution treatment and reduction using biological means; identify and address, at a fundamental level, broad scientific and technological areas that are unique to the subject or theme and that must be understood if advances are to be made; and provide a comprehensive overview of new developments at the regulatory, desk-top, bench-scale, pilot scale, and full-scale levels. The set covers all media-air, water, and soil/sediment-and blends the talents, knowledge, and know-how of academic, industrial, governmental, and international contributors. The set addresses the removal of both hazardous and nonhazardous contaminants.
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**Contaminated Soil, Sediment & Water** - - 2001

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**Innovative Approaches to the On-Site Assessment and Remediation of Contaminated Sites** - Danny Reible - 2012-12-06

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On May 24, 2001, a total of 102 students and lecturers participated in an Advanced Study Institute (ASI) sponsored by the North Atlantic Treaty Organization (NATO) under our direction. The Institute was focused on in situ and onsite management of contaminated sites. The objective of the Institute was to balance state of the art science with techniques for field application of a variety of technologies for in situ assessment and remediation of contaminated sites. Many of the lecturers were drawn from the ranks of the Hazardous Substance Research Centers, multi-university consortia that have been funded by the US Environmental Protection Agency to conduct research and technology transfer designed to promote risk-based management and control of hazardous substances for the nation. The Centers have made special contributions to the areas of in situ and onsite assessment and remediation of contaminated sites. Such approaches have the potential for being significantly less expensive than other assessment and remediation approaches while maintaining accuracy and effectiveness. Cost-effective remedial and management approaches that are also effective in minimizing exposure and risk to human health and the environment are a critical need throughout the world but particularly in Eastern Europe and the former Soviet Union where resources that can be devoted to environmental cleanup are especially limited.

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**Remediation Engineering** - Suthan S. Suthersan - 2016-11-25

"This second edition of Remediation Engineering will continue to be the seminal handbook that regulators must have on-hand to address any of the remediation issues they are grappling with daily. The book is wide-ranging, but specific enough to address any environmental remediation challenge." —Patricia Reyes, Interstate Technology Regulatory Council, Washington, DC, USA

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comprehensive look at the state-of-the-science in conducting site investigations and remediation for common and emerging contaminants. It is revolutionary in its approach to conducting subsurface investigation, which greatly influences a successful and appropriate response in assessing and addressing environmental risk. This book is a giant leap forward in understanding how contaminants behave and how to reduce risk to acceptable levels in the natural world." —Daniel T. Rogers, Amsted Industries Incorporated, Chicago, Illinois, USA

"This text is a superb reference and a good tool for learning about state-of-the-art techniques in remediation of soil and groundwater. [It] will become a ready reference at many companies as the engineering community creates increased value from remediation efforts around the world." —John Waites, AVX Corporation, Fountain Inn, South Carolina, USA

Remediation Engineering was first published in 1996 and quickly became the go-to reference for a relatively young industry, offering the first treatment technologies of the time and the contaminants they applied to. This fully updated Second Edition will capture the fundamental advancements that have taken place during the last two decades within all the subdisciplines that form the foundation of the remediation engineering platform. It covers the entire spectrum of current technologies that are employed in the industry and also discusses future trends and how practitioners should anticipate and adapt to those needs. Features:

- Shares the latest paradigms in remediation design approach and contaminant hydrogeology
- Presents the landscape of new and emerging contaminants
- Details the current state of the practice for both conventional technologies, such as sparging and venting
- Examines newer technologies such as dynamic groundwater recirculation and injection-based remedies to address both organic and inorganic contaminants
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Soil and Groundwater Contamination - Alex S. Mayer - 2005-01-14

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Contaminants in the Subsurface - National Research Council - 2005-03-23

At hundreds of thousands of commercial, industrial, and military sites across the country, subsurface materials including groundwater are contaminated with chemical waste. The last
aggressive source remediation technologies to remove contaminants from the subsurface, but there is limited understanding of (1) the effectiveness of these technologies and (2) the overall effect of mass removal on groundwater quality. This report reviews the suite of technologies available for source remediation and their ability to reach a variety of cleanup goals, from meeting regulatory standards for groundwater to reducing costs. The report proposes elements of a protocol for accomplishing source remediation that should enable project managers to decide whether and how to pursue source remediation at their sites.

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INDOT Guidance Document for In-Situ Soil Flushing - Linda S. Lee - 2007-01-15

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Reclamation of Contaminated Land - C. Paul Nathanail - 2005-09-27
Land contamination is of global concern with many of the world’s industries potentially harming the environment and human health. Along with rapidly changing policy and technological developments, this is an interdisciplinary area in which successful contaminated land management depends on the expertise of and interaction between a number of scientific and engineering disciplines.

Reclamation of Contaminated Land takes into account the different groups involved in contaminated land management and offers a flexible learning approach based on practical experience and research. It presents an overview of the general skills and knowledge required, encompassing both general management and regulatory practice and specific land contamination issues. Divided into two parts, Part I discusses site characterisation and the design of site investigations, and the central role of conceptual models and risk assessment in decision making. Part II discusses how risks from different remediation approaches to achieving this. This book is of great value for 2nd/3rd/4th year undergraduates and MSc students in Environmental Science, Environmental Technology, Environmental Management, Geography, Geology, Estate and Land Management. It is also key reading for undergraduates and MSc students in Chemical Engineering, Civil & Environmental Engineering and Environmental Chemistry, as well as professional planners and developers, and local authorities.

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Hydrogeology and Groundwater Modeling, Second Edition - Neven Kresic - 2006-10-26 Coupling the basics of hygrogeology with analytical and numerical modeling methods, Hydrogeology and Groundwater Modeling, Second Edition provides detailed coverage of both theory and practice. Written by a leading hydrogeologist who has consulted for industry and environmental agencies and taught at major universities around the world, this unique book fills a gap in the groundwater hydrogeology literature. With more than 40 real-world examples, the book is a source for clear, easy-to-understand, and step-by-step quantitative groundwater evaluation and contaminant fate and transport analysis, from basic laboratory

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**Groundwater 2000** - Poul L. Bjerg - 2020-08-18
These proceedings, with cd-rom, present a comprehensive overview of advances in groundwater research. The five main topics covered are: aquifers and contaminant distribution; groundwater quality; natural attenuation; remediation technologies and groundwater protection. Groundwater 2000 is a useful resource to both scientists and to those working in the field.