In Situ Soil And Groundwater Bioremediation Techniques And

As recognized, adventure as with ease as experience approximately lesson, amusement, as well as concord can be gotten by just checking out a ebook In Situ Soil And Groundwater Bioremediation Techniques And along with it is not directly done, you could consent even more nearly this life, a propos the world.

We allow you this proper as well as easy habit to get those all. We find the money for In Situ Soil And Groundwater Bioremediation Techniques And and numerous book collections from fictions to scientific research in any way. along with them is this In Situ Soil And Groundwater Bioremediation Techniques And that can be your partner.

Groundwater and Subsurface Remediation Helmut Kobus 2012-12-06 The complex topic of in-situ subsurface remediation technologies has been ad dressed at an international symposium at the Universitat Stuttgart on September 26 and 27, 1995, on the occasion of

the inauguration of the research facility VEGAS (Versuchseinrichtung zur Grundwasser- und Altlastensanierung). The results are contained in this book with 22 contributions from leading experts in the field from Europe and North America. The book illustrates the role of large-scale experiments in groundwater and subsurface remediation research. The subtopics address the various links between conventional laboratory experiments, technology-scale experiments and field-site studies, showing the contribution of large-scale experiments to bridging the gap between small-scale investigations and large-scale field investigations (upscaling). The interdisciplinary nature of the problems requires a multidisciplinary approach. Therefore, the idea has been followed to bring together the various disciplines in volved in the different aspects and facets of subsurface flow, transport and trans as hydraulics and hydrology, physics, formation, involving such diverse disciplines chemistry, microbiology, geology, industrial, chemical and hydraulic engineering, mathematics and hydroinformatics. The individual contributions from these di versified fields address the subject from different angles in an attempt to form a coherent picture of the various aspects of the complex problems of subsurface remediation. The focus is on research approaches and strategies with respect to the development of new and improved technologies and to the role of large-scale experiments in research and application.

New and Emerging in Situ Soil and Groundwater Remediation Technologies Sikina Jinnah 2002

The Handbook of Environmental Remediation Chaudhery Mustansar Hussain 2020-03-30 Environmental remediation technologies to control or prevent pollution from hazardous waste

material is a growing research area in academia and industry, and is a matter of utmost concern to public health, to improve ecology and to facilitate the redevelopment of a contaminated site. Recently, in situ and ex situ remediation technologies have been developed to rectify the contaminated sites, utilizing various tools and devices through physical, chemical, biological, electrical, and thermal processes to restrain, remove, extract, and immobilize mechanisms to minimize the contamination effects. This handbook brings altogether classical and emerging techniques for hazardous wastes, municipal solid wastes and contaminated water sites, combining chemical, biological and engineering control methods to provide a one-stop reference. This handbook presents a comprehensive and thorough description of several remediation techniques for contaminated sites resulting from both natural processes and anthropogenic activities. Providing critical insights into a range of treatments from chemical oxidation, thermal treatment, air sparging, electrokinetic remediation, stabilization/solidification, permeable reactive barriers, thermal desorption and incineration, phytoremediation, biostimulation and bioaugmentation, bioventing and biosparging through ultrasound-assisted remediation methods, electrochemical remediation methods, and nanoremediation, this handbook provides the reader an inclusive and detailed overview and then discusses future research directions. Closing chapters on green sustainable remediation, economics, health and safety issues, and environmental regulations around site remediation will make this a must-have handbook for those working in the field.

Soil Enhancement by Fluid Injection for in Situ Treatment of Contaminated Soil

1999
Remediation Engineering of Contaminated Soils Donald L. Wise 2000-07-25 "Offers thorough coverage of the remediation of soils contaminated by hazardous wastes, including materials, analytical techniques, cleanup design and methodology, characterization of geomedia, monitoring of contaminants in the subsurface, and waste containment. Cites specific case studies in hydrocarbon remediation that offer a concise overview of possible technological approaches."
Micro-pollutants Remediation from Soil and Groundwater by In-situ Treatment Technologies César Alberto Valderrama Ángel 2007
In Situ Bioremediation of Perchlorate in Groundwater Hans F. Stroo 2008-12-02 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.

Groundwater and Soil Remediation Evan K. Nyer 1998-05-01 This bestselling author presents his latest compilation of time- and cost-saving techniques, methods, and strategies for soil and groundwater remediation. This book outlines advanced technologies, including phytoremediation, air sparging, reactive zones, vacuum-enhanced recovery, and more!

Phytoremediation of Hydrocarbon-Contaminated Soils Stephanie Fiorenza 2020-12-17 Interest in phytoremediation as a solution for contaminants in groundwater and soil has exploded. The project documented in Phytoremediation of Hydrocarbon Contaminated 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 technology. Phytoremediation of Hydrocarbon 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.
Environmental Remediation Technologies for Metal-Contaminated Soils Hiroshi Hasegawa 2015-09-28 This book presents a comprehensive and detailed description of remediation techniques for metal-contaminated soils derived from both natural processes and anthropogenic activities. Using a methodical, step-by-step presentation, the book starts by overviewing the origin of toxicants and the correlated comparative extent of contamination to the environment. The legal provisions as proposed or applied in different countries are then discussed to explain the global regulatory situation regarding soil contamination and the extent of consequent concern. The core part of this publication describes the major techniques for in situ or ex situ treatment of the contaminated soil to meet the regulatory limits. Finally, risk evaluation is incorporated, giving special attention to possible impacts during or after implementation of the remediation strategies. The intrusion of metals in soils mostly occurs from various anthropogenic activities, e.g., agricultural practices, industrial activities, and municipal waste disposal. The volumes of metal-contaminated soil are becoming greater than before and are ever-increasing due to rapid urbanization, intensified

industrialization, and/or population booms in certain parts of the world. Hence, the options previously proposed, such as isolation of the contaminated site or movement of the contaminated mass to a secure disposal site after excavation, are becoming unsuitable from the economic point of view, and instead, decontamination alternatives are preferred. This book will help readers such as scientists and regulators to understand the details of the remediation techniques available to deal with the soils contaminated by toxic metals.
Soil and Groundwater Remediation Technologies Jörg Rinklebe 2020 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.

Remediation of Petroleum-contaminated Soils David J. Friend 1996 This synthesis will be of interest to state transportation personnel involved with project planning and location (administrative and regulatory personnel), design staff (general civil, geotechnical, and environmental engineers), and project managers (construction and maintenance engineers and staff). It will also be of interest to federal and state environmental agencies and to environmental consultants and contractors as well as to trainers in the field of petroleum-contaminated soil remediation. This synthesis describes the remedial technologies that may be available to transportation agencies faced with the regulatory responsibility to clean or remediate petroleum-contaminated soils in the vadose zone (unsaturated soils above the groundwater table) at a particular site as well as the state of the practice within the agencies. This report of the Transportation Research Board describes the applicability and cost-effectiveness of alternate technologies to remediate petroleum-contaminated soil. Practices currently being used by state transportation agencies to remediate petroleum-contaminated soils, both on site and off site are also described. This summary of transportation agency practice complements the limited telephone survey of soil remediation techniques that was performed in preparing NCHRP Report 351, Hazardous Wastes in Highway Rights-of-Way.

Twenty Years of Research and Development on Soil Pollution and Remediation in China Yongming Luo 2018-01-17 This book reviews the progresses and achievements made in the

past 20 years of research on soil pollution and remediation in China, and presents 50 review and research articles from all over China, including Hong Kong and Taiwan. The authors include scientists, engineers, entrepreneurs and managers from 26 universities, 18 institutes, 4 leading enterprises and 2 government environmental protection departments. The contents cover fundamental research on soil pollution and remediation, technical development, project demonstration, policy and governance. The polluted soil/site types include farmland, industrial sites, mining areas and oilfields, with heavy metals (cadmium, arsenic, copper, chromium, mercury, lead, zinc, nickel, etc.), organic pollutants (PAHs, PCBs, organochlorine pesticides, phthalate esters, halogenated hydrocarbons, etc.), and metal–organic mixed pollutants. The remediation techniques mainly include physical and chemical remediation (thermal desorption, soil vapor extraction, in situ advanced chemical oxidation, solidification and stabilization), phytoremediation (phytostabilization, phytoextraction by hyperaccumulators, phyto-prevention by low accumulation plants), bioremediation (microbial adsorption and immobilization, microbial degradation, microbe-enhanced phytoremediation), and combined remediation merging multiple technologies. The governance and policy section mainly explores laws and regulations, criteria and standards, financial guarantees and the industrial market for soil environment and pollution prevention.

Practical Techniques for Groundwater & Soil Remediation Evan K. Nyer 2019-08-13

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.

In Situ Remediation of Chlorinated Solvent Plumes Hans F. Stroo 2010-09-10 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 Envir- mental Response, Compensation, and Liability Act (CERCLA), commonly known as Sup- fund, 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 techn- ogies for cleaning up contaminated sites were wildly optimistic. Original estimates, in 1980, projected an average Superfund cleanup cost of a mere $3.
Field applications of in situ remediation technologies groundwater circulation wells.
Recent developments for in situ treatment of metal contaminated soils
Soil and Groundwater Remediation Chunlong Zhang 2019-10-30 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.

Physicochemical Groundwater Remediation James A. Smith 2007-05-08 As we transition into the 21st century, it is apparent that this is an exciting time for environmental engineers and scientists studying remediation technologies. There has been a rapid development of new ways to clean-up polluted groundwater. Research activities of the past and next 10 years will have a dramatic impact on the quality of the subsurface environment for the next century. In 20, or even 10 years from now, our approach to subsurface remediation will probably be vastly different than it is today. Many of the emerging technologies presented in this book will form the basis of standard remediation practices of the future. Physicochemical Groundwater Remediation presents detailed information on multiple emerging technologies for the remediation of the contaminated subsurface environment. All of these technologies apply our knowledge of physical and chemical processes to clean up ground water and the

unsaturated zone, and many (if not all) of these emerging technologies will help define standard practices in the future. These technologies include in situ sorptive and reactive treatment walls, surfactant-enhanced aquifer remediation, optimization analyses for remediation system design, chemical, electrochemical, and biochemical remediation processes, and monitored natural attenuation. You will learn how palladium catalyzes the dehalogenation of chlorinated solvents. You will find out how barometric pumping can naturally remove significant quantities of volatile organic pollutants from shallow ground water and the unsaturated zone. You can learn about mobilizing non-aqueous phase liquids (NAPLs) without risking significant downward migration of the NAPL. You can find out how processes such as electroosmosis and electromigration can be exploited for groundwater remediation purposes and how zero-valent iron and zeolite treatment walls can be used in situ to treat and control contaminant plume migration. Contributors to this book are experts in groundwater remediation processes, and they represent industry, consulting, academia, and government. If your work involves the clean up of contaminated soil and groundwater, this book is an essential reference to keep you up to date on the most promising new developments in remediation research.

In Situ Bioremediation Bruce E. Rittmann 1994 This critical review of the status of in situ bioremediation, which is used to clean up contaminated groundwater aquifers and surface soils, has been organized according to possibilities and restrictions. Possibilities are based on present knowledge and indicate that in situ bioremediation can achieve decontamination of aquifers and soils. Restrictions encompass the scientific, engineering, legal, and other

questions that stand in the way of successful development and application of in situ bioremediation. Although much has been written about bioremediation, this critical review is unique because it is comprehensive, critical, and integrated. This situation was no accident; the organization of the authorship team and the report's contents were designed to achieve each of the three attributes. Combining a good plan, outstanding individuals contributing, and an incredible amount of work, they created a critical review that defines the technical and non-technical issues that will determine how much of an impact in situ bioremediation makes on solving the world's challenges for cleanup of our legacy of improperly disposed of materials. Readers of this review will find the issues identified and connected. They will have a solid foundation for research, application, or evaluation of in situ bioremediation in the future.

Practical Design Calculations for Groundwater and Soil Remediation, Second Edition Jeff Kuo 2014-06-02 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.

Development in Wastewater Treatment Research and Processes Maulin P. Shah 2022-02-25 Development in Wastewater Treatment Research and Processes: Microbial Degradation of Xenobiotics through Bacterial and Fungal Approach covers the active and applicable role that bacteria and fungi play in the degradation of xenobiotic compounds from the environment. The book gives up-to-date information on recent advancements in the field of environmental xenobiotics and how they disturb a plant's metabolism. The book also gives information on aerobic and anaerobic degradation of xenobiotic compounds through bacteria

or fungi and/or a combined approach. Finally, the book covers the characteristics of environmental microbiology, biochemical engineering, agricultural microbiology, environmental engineering, and soil bioremediation. Emphasizes up-to-date research on the microbial degradation of xenobiotic compounds through a bacterial-fungal approach Covers multidisciplinary features of environmental microbiology, biochemical engineering, agriculture microbiology, environmental engineering and soil bioremediation Includes sections on aerobic and anaerobic degradation Presents the significance of the bacterial-fungal role and their metabolic activities in the digestion of xenobiotic compounds Focuses on the most recent developments in environmental biotechnology to enhance the action of the bacterial-fungal systems in the remediation of xenobiotic compounds

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.

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 (e.g. petroleum hydrocarbons, NAPLs 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.

Handbook of Metal-Microbe Interactions and Bioremediation Surajit Das 2017-04-07 Around the World, metal pollution is a major problem. Conventional practices of toxic metal removal can be ineffective and/or expensive, delaying and exacerbating the crisis. Those communities dealing with contamination must be aware of the fundamentals advances of microbe-mediated metal removal practices because these methods can be easily used and require less remedial intervention. This book describes innovations and efficient applications for metal bioremediation for environments polluted by metal contaminates.

In-Situ Remediation of Arsenic-Contaminated Sites Jochen Bundschuh 2018-10-30 Providing an introduction, the scientific background, case studies and future perspectives of in-situ arsenic remediation technologies for soils, soil water and groundwater at geogenic and anthropogenic contaminated sites. The case studies present in-situ technologies about natural arsenic, specifically arsenate and arsenite, but also about organic arsenic compounds. This work covers geochemical, microbiological and plant ecological solutions for arsenic remediation. It will serve as a standard textbook for (post-)graduate students and researchers in the field of Environmental Sciences and Hydrogeochemistry as well as

researchers, engineers, environmental scientists and chemists, toxicologists, medical scientists and even for general public seeking an in-depth view of arsenic which had been classed as a carcinogen. This book aims to stimulate awareness among administrators, policy makers and company executives of in-situ remediation technologies at sites contamined by arsenic and to improve the international cooperation on the subject. Groundwater and Subsurface Remediation Helmut Kobus 1996 The complex topic of in-situ subsurface remediation technologies has been ad dressed at an international symposium at the Universitat Stuttgart on September 26 and 27, 1995, on the occasion of the inauguration of the research facility VEGAS (Versuchseinrichtung zur Grundwasser- und Altlastensanierung). The results are contained in this book with 22 contributions from leading experts in the field from Europe and North America. The book illustrates the role of large-scale experiments in groundwater and subsurface remediation research. The subtopics address the various links between conventional laboratory experiments, technology-scale experiments and field-site studies, showing the contribution of large-scale experiments to bridging the gap between small-scale investigations and large-scale field investigations (upscaling). The interdisciplinary nature of the problems requires a multidisciplinary approach. Therefore, the idea has been followed to bring together the various disciplines in volved in the different aspects and facets of subsurface flow, transport and trans as hydraulics and hydrology, physics, formation, involving such diverse disciplines chemistry, microbiology, geology, industrial, chemical and hydraulic engineering, mathematics and hydroinformatics. The individual contributions from these di versified fields address the

subject from different angles in an attempt to form a coherent picture of the various aspects of the complex problems of subsurface remediation. The focus is on research approaches and strategies with respect to the development of new and improved technologies and to the role of large-scale experiments in research and application.

In Situ Soil Remediation A.M. Otten 2012-12-06 In situ remediation techniques have experienced a boom over the last few years, thereby producing a wide range of valuable experiences. Their results have demonstrated that in situ techniques are a mature alternative to conventional remediation techniques. Irrespective of future policy developments, it is impossible to imagine future remediation practice without the use of in situ techniques. The book presents an overview of recent developments in the field of in situ soil remediation. The book is unique in that it is not a compilation of unrelated case studies. A conceptual approach has been chosen; remediation models described in this book are illustrated from a practical point of view. The authors present the Dutch way of treating contaminated land; The Netherlands is renowned for being at the forefront of remediation techniques as a result of the country's progressiveness and experience in this area.

Soil and Groundwater Remediation Technologies Yong Sik Ok 2020-03-23 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.

Bioremediation Ronald L. Crawford 1996-11-21 Presents the most recent advances concerning the use of microorganisms to degrade environmental pollution.

Clean Soil and Safe Water Francesca F. Quercia 2011-11-17 This book addresses questions of relevance to governments and industry in many countries around the world, in particular concerning the link between contaminated-land-management programs and the protection of drinking water resources and the potential effects of climate changes on the availability of these same resources. On the “problem” side, it reports and analyzes methodologies and experiences in monitoring and characterization of drinking water resources (at basin, country and continental scales), pollution prevention, assessment of

background quality and of impacts on safety and public health from land and water contamination and impacts of climate change. On the “solution” side, the book presents results from national cleanup programs, recent advances in research into groundwater and soil remediation techniques, treatment technologies, research needs and information sources, land and wastewater management approaches aimed at the protection of drinking water.

Bioremediation Technologies Robert L. Irvine 1998-01-08 FROM THE INTRODUCTION This three-volume series, 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 series covers all media-air, water, and soil/sediment-and blends the talents, knowledge, and know-how of academic, industrial, governmental, and international contributors. The series addresses the removal of both hazardous and nonhazardous contaminants from the liquid, solid, and gas phase using biological processes. This includes the biological treatment of wastes of municipal and industrial origin; bioremediation of leachates, soils, and sediments; and biofiltration for contaminated gases.

Environmental Biotechnology Hans-Joachim Jördening 2006-03-06 A deeper insight into the complex processes involved in this field, covering the biological, chemical and engineering

fundamentals needed to further develop effective methodologies. The book devotes detailed chapters to each of the four main areas of environmental biotechnology -- wastewater treatment, soil treatment, solid waste treatment, and waste gas treatment -- dealing with both the microbiological and process engineering aspects. The result is the combined knowledge contained in the extremely successful volumes 11a through 11c of the "Biotechnology" series in a handy and compact form.

Bioremediation of Hydrocarbon-contaminated Soils and Groundwater in Northern Climates 1998 A field demonstration and research project was conducted in Fairbanks, Alaska, to demonstrate, evaluate, and document the construction and operation of three selected bioremediation technologies-landfarming, recirculating leachbeds, and infiltration galleries. Landfarming involves adding water and nutrients to contaminated soil to stimulate microbial activity and contaminant degradation. Infiltration galleries are dynamic in-situ treatment systems designed to stimulate microbial activity and subsequent hydrocarbon degradation by circulating nutrient and oxygen-amended water through petroleum-contaminated soil. Recirculating leachbeds, in a way similar to slurry reactors, aerate and mix nutrients with contaminated soil, and can be built as on-site bioreactors. Estimated biotreatment costs in the landfarm were between $20 to $30 per cubic yard ($15 to $23 per cubic meter). Nutrient placement has been demonstrated to be a critical factor, even though the site is tilled and mixed frequently. Success of the infiltration gallery was more difficult to document. Benzene was detected at less than 2 ppb and BTEX levels were less than 5 ppb for water extracted from the pumping well during 1992, which is significantly lower than the 1991 levels.

Problems were encountered during the brief operation of the recirculating leach bed, but a similar system has performed well. Relatively simple, low-cost techniques provided significant potential for improving degradation rates.
Evaluation of demonstrated and emerging technologies for the treatment of contaminated land and groundwater (phase III) 1998 special sessiontreatment walls and permeable reactive barriers.
Biotechnology for the Environment: Soil Remediation Spiros Agathos 2002-11-30 At the dawn of the 21st century, biotechnology is emerging as a key enabling technology for sustainable environmental protection and stewardship. Biotechnology for the Environment: Soil Remediation offers a state-of-the-art account of environmental biotechnology both in emerging and in more mature technological applications of soil remediation and cleanup of contaminated sites. Harnessing the potential of microorganisms and plants as eco-efficient and robust cleanup agents in a variety of practical situations is not only possible but is becoming widespread practice. Chapters are featured on current experience and trends in bioremediation of contaminated soil, life cycle assessment software tools for remediation planning, ex situ cleanup technologies using slurry reactors, implementation of anaerobic and aerobic in situ processes including monitored natural attenuation, complementary technologies on pesticide immobilisation in soil or humification of nitroaromatics, and, finally, phytoremediation of recalcitrant organic compounds and heavy metals. For more information on Strategy and Fundamentals, see Focus on Biotechnology Volume 3A, and for more information on Waste Water and Waste Gas Handling, see Focus on Biotechnology Volume

3C.
Geoenvironmental Engineering Hari D. Sharma 2004-05-20 Geoenvironmental Engineering covers the application of basic geological and hydrological science, including soil and rock mechanics and groundwater hydrology, to any number of different environmental problems. * Includes end-of-chapter summaries, design examples and worked-out numerical problems, and problem questions. * Offers thorough coverage of the role of geotechnical engineering in a wide variety of environmental issues. * Addresses such issues as remediation of in-situ hazardous waste, the monitoring and control of groundwater pollution, and the creation and management of landfills and other above-ground and in-situ waste containment systems.
Engineering Tools for Environmental Risk Management Katalin Gruiz 2019-01-08 The four volumes of the book series "Engineering Tools for Environmental Risk Management" deal with environmental management, assessment & monitoring tools, environmental toxicology and risk reduction technologies. This last volume focuses on engineering solutions usually needed for industrial contaminated sites, where nature’s self-remediation is inefficient or too slow. The success of remediation depends on the selection of an increasing number of conventional and innovative methods. This volume classifies the remedial technologies and describes the reactor approach to understand and manage in situ technologies similarly to reactor-based technologies. Technology types include physicochemical, biological or ecological solutions, where near-natural, sustainable remediation has priority. A special chapter is devoted to natural attenuation, where natural changes can help achieve clean-up objectives. Natural attenuation and biological and ecological remediation establish a serial

range of technologies from monitoring only to fully controlled interventions, using ‘ just’ the natural ecosystem or sophisticated artificial living systems. Passive artificial ecosystems and biodegradation-based remediation – in addition to natural attenuation – demonstrate the use of these ‘green’ technologies and how engineering intervention should be kept at a minimum to limit damage to the environment and create a harmonious ecosystem. Remediation of sites contaminated with organic substances is analyzed in detail including biological and physicochemical methods. Comprehensive management of pollution by inorganic contaminants from the mining industry, leaching and bioleaching and acid mine drainage is studied in general and specifically in the case of an abandoned mine in Hungary where the innovative technology of combined chemical and phytostabilization has been applied. The series of technologies is completed by electrochemical remediation and nanotechnologies. Monitoring, verification and sustainability analysis of remediation provide a comprehensive overview of the management aspect of environmental risk reduction by remediation. This book series focuses on the state of knowledge about the environment and its conscious and structured application in environmental engineering, management and decision making.
Soil and Sediment Remediation Piet Lens 2005-01-01 Soil and Sediment Remediation discusses in detail a whole set of remediative technologies currently available to minimise their impact. Technologies for the treatment of soils and sediments in situ (landfarming, bioscreens, bioventing, nutrient injection, phytoremediation) and ex situ (landfarming, bio-heap treatment, soil suspension reactor) will be discussed. The microbiological, process technological and socio-economical aspects of these technologies will be addressed. Special

attention will be given to novel biotechnological processes that utilise sulfur cycle conversions, e.g. sulfur and heavy metal removal from soils. Also the potential of phytoremediation will be highlighted. In addition, treatment schemes for the clean-up of polluted megasites, e.g. harbours and Manufactured Gaswork Plants (MGP), will be elaborated. The aim of Soil and Sediment Remediation is to introduce the reader in: the biogeochemical characteristics of soil and sediments- new techniques to study soil/sediment processes (molecular probes, microelectrodes, NMR) clean up technologies for soils polluted with organic (PAH, NAPL, solvents) or inorganic (heavy metals) pollutants- preventative and remediative strategies and technologies available in environmental engineering novel process applications and bioreactor designs for bioremediation the impact of soil pollution on society and its economic importance.

Electrochemically Assisted Remediation of Contaminated Soils M. A. Rodrigo 2021-06-15 This book provides an overview of the current development status of remediation technologies involving electrochemical processes, which are used to clean up soils that are contaminated with different types of contaminants (organics, inorganics, metalloids and radioactive). Written by internationally recognized experts, it comprises 21 chapters describing the characteristics and theoretical foundations of various electrochemical applications of soil remediation. The book’s opening section discusses the fundamental properties and characteristics of the soil, which are essential to understand the processes that can most effectively remove organic and inorganic compounds. This part also focuses on the primary processes that contribute to the application of electrochemically assisted

remediation, hydrodynamic aspects and kinetics of contaminants in the soil. It also reviews the techniques that have been developed for the treatment of contaminated soils using electrochemistry, and discusses different strategies used to enhance performance, the type of electrode and electrolyte, and the most important operating conditions. In turn, the book’s second part deals with practical applications of technologies related to the separation of pollutants from soil. Special emphasis is given to the characteristics of these technologies regarding transport of the contaminants and soil toxicity after treatment. The third part is dedicated to new technologies, including electrokinetic remediation and hybrid approaches, for the treatment of emerging contaminants by ex-situ and in-situ production of strong oxidant species used for soil remediation. It also discusses pre-pilot scale for soil treatment and the use of solar photovoltaic panels as an energy source for powering electrochemical systems, which can reduce both the investment and maintenance costs of electrochemically assisted processes.