

Landfill Leachate Treatment Case Studies

This book brings together contributions from experts in water management, scientists, researchers, academics and lecturers, sharing experiences and successes in this field. It is devoted to a wide range of water resources management issues, including water quality to water quantity, considering all impacts of water issues in the environment. The book presents international approaches to the latest developments in both the fundamental bases and the applicability of state-of-the-art knowledge that can be effectively used for solving a variety of large problems in integrated water resources management. The main focus of the book is on water pollution - physical, chemical, biological, and geographical pollution, hydrology problems, and limnology tasks. It is necessary to understand the extent of pollution in the environment in terms of the air, water, and soil in order for both humans and animals to live healthier lives. Poor waste treatment or pollution monitoring can lead to massive environmental issues, such as diminishing valuable resources, and cause a significant negative impact on society. Solutions, such as reuse of waste and sustainable waste management, must be explored to prevent these adverse effects. The Handbook of Research on Resource Management for Pollution and Waste Treatment is a collection of innovative research that examines waste and pollution treatment methods that can be adopted at local and international levels and examines appropriate resource management strategies for environmentally related issues. Featuring coverage on a wide range of topics such as soil washing, bioremediation, and runoff handling, this book is ideally designed for environmentalists, engineers, waste management professionals, natural resource regulators, environmental policymakers, scientists, academicians, researchers, and students seeking current research on viable resource management methods for the regeneration of their immediate environment.

This book is divided into seven chapters, which address various leachate landfill management issues such as the quality, quantity and management of municipal landfill leachate, together with new methods. There are many methods available for the treatment and management of municipal landfill leachate. The waste management methods presented here can be applied in most third-world countries, due to the lack of waste separation and high organic content of waste. The book provides descriptions and a hierarchy of waste management, reviews the history of solid waste disposal, and covers a range of topics, including: leachate and gas generation in landfills; natural attenuation landfills; landfill site selection; leachate and stormwater management, collection and treatment; landfill gas management; landfill cover requirements; leachate collection; types of natural treatment systems; and design procedure and considerations. In closing, it provides an overview of the current solid waste management status in Iran.

Solid Waste Landfilling: Concepts, Processes, Technology provides information on technologies that promote stabilization and minimize environmental impacts in landfills. As the main challenges in waste management are the reduction and proper treatment of waste and the appropriate use of waste streams, the book satisfies the needs of a modern landfill, covering waste pre-treatment, in situ treatment, long-term behavior, closure, aftercare, environmental impact and sustainability. It is written for practitioners who need specific information on landfill construction and operation, but is also ideal for those concerned about the possible return of these sites to landscapes and their subsequent uses for future generations. Includes input by international contributors from a vast number of disciplines Provides worldwide approaches and technologies Showcases the interdisciplinary nature of the topic Focuses on sustainability, covering the lifecycle of landfills under the concept of minimizing environmental impact Presents knowledge of the legal framework and economic aspects of landfilling

This book presents recent developments in the field of environmental biotechnology. Three major forces are currently driving this discipline: the exploration of microbial diversity by genetic and genomic tools, the ongoing progress in the modelling of various transient phenomena, and environmental biotechnology. This book provides a state-of-art-overview of developments in the field of environmental biotechnology concerning exploration, implementation, modelling, economic development and safety. It comprises selected, peer-reviewed papers that were presented at the European Symposium on Environmental Biotechnology (ESEB) 2004, held in Oostende, Belgium, April 2004.

Population growth and industrial development have increased the amount of wastewater generated by urban areas, and one of the major problems facing industrialized nations is the contamination of the environment by hazardous chemicals. Therefore, to meet the standards, suitable treatment alternatives should be established. **Advanced Oxidation Processes (AOPs) in Water and Wastewater Treatment** is a pivotal reference source that provides vital research on the current, green, and advanced technologies for wastewater treatment. While highlighting topics such as groundwater treatment, environmental legislation, and oxidation processes, this publication explores the contamination of environments by hazardous chemicals as well as the methods of decontamination and the reduction of negative effects on the environment. This book is a vital reference source for environmental engineers, waste authorities, solid waste management companies, landfill operators, legislators, environmentalists, and academicians seeking current research on achieving sustainable management for wastewater treatment.

FROM THE PREFACE Sanitary landfills are the most widely utilized method of solid waste disposal around the world. With increased use and public awareness of this method of disposal, there is much concern with respect to the pollution potential of the landfill leachate. Depending on the composition and extent of decomposition of the refuse and hydrological factors, the leachate may become highly contaminated. As leachate migrates away from a landfill, it may cause serious pollution to the groundwater aquifer as well as adjacent surface waters. There is growing concern about surface and groundwater pollution from leachate. Better understanding and prediction of leachate generation, containment, and treatment are needed. This book contains a literature review of various methodologies that have been developed for prediction, generation, characterization, containment, control, and treatment of leachate from sanitary landfills. The contents of this book are divided into nine chapters. Each chapter contains theory and definition of the important design parameters, literature review, example calculations, and references. Chapter 1 is devoted to basic facts of solid waste problems current status and future trends towards waste reduction and recycling. Chapter 2 provides a general overview of municipal solid waste generation, collection, transport, resource recovery and reuse, and disposal options. The current status of sanitary landfill design and operation, problems associated with the landfilling, and future trends are presented in Chapter 3. Methods of enhanced stabilization, recycling landfill space, methane recovery, and above grade landfilling, and closure and post closure care of completed landfills are also discussed in detail. Chapter 4 provides a general overview of Subtitle D regulations and its impact upon sanitary landfilling practices. Chapter 5 is devoted entirely to moisture routing and leachate generation mechanisms. Examples of calculation procedure for determining the leachate quantity produced at a landfill are presented.

Chapter 6 is devoted to chemical characterization of leachate that changes over the life of the fill. Both theoretical and experimental results are provided to estimate the leachate quality. Chapter 7 provides leachate attenuation processes and mechanisms. Chapter 8 is devoted to leachate collection systems. Natural soil sealants, admixed materials and synthetic membranes, their effectiveness, and methods of installation and economics are fully discussed. Chapter 9 provides a detailed review of leachate treatment methodology. Kinetic coefficients and treatment plant design considerations are summarized for the sole purpose of assisting consultants to design leachate treatment facilities. Leachate treatment case histories and numerous process trains are presented for treating leachate from young landfill. The book also describes how the process train can be changed effectively as leachate quality changes with time.

This book brings together papers from the Fourth International Conference on Waste Management and the Environment and will be of interest to environmental engineers, local authority representatives, waste disposal experts, research scientists in the area of waste management, civil engineers and chemical engineers.

This book presents research studies on landfills which are sites for the disposal of waste materials by burial. Historically, landfills have been the most common methods of organised waste disposal and remain so in many places around the world. Landfills may include internal waste disposal sites (where a producer of waste carries out their own waste disposal at the place of production) as well as sites used by many producers. Many landfills are also used for other waste management purposes, such as the temporary storage, consolidation and transfer, or processing of waste material (sorting, treatment, or recycling). A landfill also may refer to ground that has been filled in with soil and rocks instead of waste materials, so that it can be used for a specific purpose, such as for building houses. Unless they are stabilised, these areas may experience severe shaking or liquefaction of the ground in a large earthquake. This book presents research in a field which is demanding and beginning to receive society's attention.

"This book examines the management of different types of wastes and provides relevant theoretical frameworks about new waste management technologies for the control of air, water, and soil pollution"--

A groundbreaking book on the application of the economic and environmentally effective treatment of industrial wastewater Constructed Wetlands for Industrial Wastewater Treatment contains a review of the state-of-the-art applications of constructed wetland technology for industrial wastewater treatment. This green technology offers many economic, environmental, and societal advantages. The text examines the many unique uses and the effectiveness of constructed wetlands for the treatment of complex and heavily polluted wastewater from various industrial sources. The editor — a noted expert in the field — and the international author team (93 authors from 22 countries) present vivid examples of the current state of constructed wetlands in the industrial sector. The text is filled with international case studies and research outcomes and covers a wide range of applications of these sustainable systems including facilities such as the oil and gas industry, agro-industries, paper mills, pharmaceutical industry, textile industry, winery, brewery, sludge treatment and much more. The book reviews the many system setups, examines the different removal and/or transformational processes of the various pollutants and explores the overall effectiveness of this burgeoning technology. This important resource: Offers the first, groundbreaking text on constructed wetlands use for industrial wastewater treatment Provides a single reference with summarized information and the state-of-the-art knowledge of the use of Constructed Wetlands in the industrial sector through case studies, research outcomes and review chapters Covers a range of industrial applications such as hydrocarbons/oil and gas industry, food and beverage, wood and leather processing, agro-industries, pharmaceuticals and many others Includes best practices drawn by a collection of international case studies Presents the latest technological developments in the industry Written for civil and environmental engineers, sustainable wastewater/water managers in industry and government, Constructed Wetlands for Industrial Wastewater Treatment is the first book to offer a comprehensive review of the set-up and effectiveness of constructed wetlands for a wide range of industrial applications to highlight the diverse economic and environmental benefits this technology brings to the industry.

Increasing demand on industrial capacity has, as an unintended consequence, produced an accompanying increase in harmful and hazardous wastes. Derived from the second edition of the popular Handbook of Industrial and Hazardous Wastes Treatment, Hazardous Industrial Waste Treatment outlines the fundamentals and latest developments in hazardous waste

As the global population grows and many developing countries modernize, the importance of water supply and wastewater treatment becomes a much greater factor in the welfare of nations.

Clearly, in today's world the competition for water resources coupled with the unfortunate commingling of wastewater discharges with freshwater supplies creates additional pressure on treatment systems. Recently, researchers focus on wastewater treatment by difference methods with minimal cost and maximum efficiency. This volume of the Wastewater Engineering:

Advanced Wastewater Treatment Systems is a selection of topics related to physical-chemical and biological processes with an emphasis on their industrial applications. It gives an overview of various aspects in wastewater treatments methods including topics such as biological, bioremediation, electrochemical, membrane and physical-chemical applications. Experts in the area of environmental sciences from diverse institutions worldwide have contributed to this book, which should prove to be useful to students, teachers, and researchers in the disciplines of wastewater engineering, chemical engineering, environmental engineering, and biotechnology. We gratefully acknowledge the cooperation and support of all the contributing authors.

Pollution Control Technology for Leachate from Municipal Solid Waste explores the physical, chemical and biological factors that produce leachate and technological solutions for its control. The book introduces the integrated and pre-treatment leachate treatment processes that are necessary to deal with the variations of pollutants in leachate. Real world case-studies are provided to illustrate these treatment processes, along with leachate treatment engineering process design and the construction of municipal solid waste incinerator power plants. This book will be of particular interest to Civil, Chemical and Environmental Engineers, but will also be ideal for Environmental Scientists. Provides quantity and quality prediction models, along with properties of effluent concentrated leachate liquid Includes physical and chemical treatment processes for leachate, including ammonia nitrogen removal using struvite precipitation, crystal variation and microstructure of the struvite, etc. Covers leachate treatment engineering processes for design and construction of treatment plants

Sanitary Landfilling: Process, Technology, and Environmental Impact is a collection of essays that discusses the role of landfilling in solid waste management. The book presents the approach in the principles of landfilling and the basic biochemical processes in landfills. The text describes the landfill hydrology and leachate production. It discusses the design and construction of liner systems and the surface capping with natural liner materials. The section that follows describes the soil and refuse stability in sanitary landfills. The book will provide valuable insights for

engineers, environmentalists, students, and researchers in the field of solid waste management.

This book covers the principles, underlying mechanisms, thermodynamic functions, kinetics and modeling aspects of sustainable technologies, particularly from the standpoint of applying physical, chemical and biological processes for the treatment of wastewater polluted with heavy metals. Particular emphasis has been given to technologies that are based on adsorption, electro-coagulation, bio-precipitation, bio-solubilization, phytoremediation and microbial electrolysis. Metal contamination in the environment is one of the persisting global issues. The adverse health effects of heavy metals on human beings and its impact on the environment has been well-documented. Several physico-chemical and biological technologies have been successfully implemented to prevent and control the discharge of industrial heavy metal emissions. On the contrary, metal resource depletion has also accelerated dramatically during the 20th century due to rapid advances in industrial engineering and medical sciences, which requires large amount of raw materials. To meet the global metal demand, in recent years, novel research lines have started to focus on the recovery of metals from metal contaminated waste streams. In order to conflate both metal removal and recovery, new technologies have been successfully tested, both at the lab and pilot-scale. The target audience of this book primarily comprises of research experts, practicing engineers in the field of environmental/chemical technology and graduate students.

Constructed wetlands are proving to be the best natural treatment system for landfill leachates. Most of the contaminants in landfill leachates are degraded in treatment wetlands. Potential for long-term sustainability and significant cost savings are attractive features of this eco-technology. Documentation of the experience in this use of constructed wetlands has been limited.

Constructed Wetlands for the Treatment of Landfill Leachates is the first compilation of the results of research from North America and Europe. Originally presented at an international symposium, this collection of papers offers the most recent research findings from the leading researchers in this new and innovative natural treatment system. Specific issues addressed in the text include: leachate characteristics, and the potential for treatability by constructed wetlands wetland treatment, processes and transformation use of constructed wetlands in cold climatic conditions assessment of the tolerance of wetland plants to the toxicity of leachates role of plants in the treatments of leachates integrated wetland systems performance of different wetland treatment systems cost comparisons of wetland technology vs. traditional treatment technologies The potential for environmental contamination due to leachates from landfills is increasing, and there is an urgent need to find ways and means to treat leachates in a sustainable way Constructed Wetlands for the Treatment of Landfill Leachates will provide an invaluable source of information on the subject for scientists, engineers, practitioners, policy makers, and regulatory officials.

Most industrial and hazardous waste management resources cover the major industries and provide conventional in-plant pollution control strategies. Until now however, no book or series of books has provided coverage that includes the latest developments in innovative and alternative environmental technology, design criteria, managerial decision met

Environmental Technologies to Treat Nitrogen Pollution will provide a thorough understanding of the principles and applications of environmental technologies to treat nitrogen contamination. The main focus will be on water and wastewater treatment, with additional coverage of leachates and off-gasses. The book will bring together an up-to-date compilation of the main physical, chemical and biological processes demanded for the removal of nitrogenous contaminants from water, wastewater, leachates and off-gasses. It will include a series of chapters providing a deep and broad knowledge of the principles and applications required for the treatment of nitrogen pollution. Each chapter will be prepared by recognized specialists across the range of different aspects involved in the removal of nitrogenous contaminants from industrial discharges. Environmental Technologies to Treat Nitrogen Pollution will be the first book to provide a complete review of all the different processes used for the global management of nitrogen pollution. It will also contain updated information about strategies to achieve nitrogen recovery and reuse in different industrial sectors. Several case studies will document the application of different environmental technologies to manage nitrogen pollution. This book will be of interest to lecturers and graduate students in the following subject areas: environmental engineering, environmental biotechnology, wastewater treatment plant design, water pollution control, contaminants recovery and reuse. The book will also be an attractive reference for environmental engineering consultants.

As the world's population continues to grow and economic conditions continue to improve, more solid and liquid waste is being generated by society. Improper disposal methods can not only lead to harmful environmental impacts but can also negatively affect human health. To prevent further harm to the world's ecosystems, there is a dire need for sustainable waste management practices that will safeguard the environment for future generations. Waste Management: Concepts, Methodologies, Tools, and Applications is a vital reference source that examines the management of different types of wastes and provides relevant theoretical frameworks about new waste management technologies for the control of air, water, and soil pollution. Highlighting a range of topics such as contaminant removal, landfill treatment, and recycling, this multi-volume book is ideally designed for environmental engineers, waste authorities, solid waste management companies, landfill operators, legislators, environmentalists, policymakers, government officials, academicians, researchers, and students.

This book contains a collection of research works focused on the biodegradation of different types of pollutants, both in water and solids. The book is divided in three major sections: A) Biodegradation of organic pollutants in solids and wastewater, B) Biodegradation of complex pollutants, and C) Novel technologies in biodegradation and bioremediation.

Municipal solid waste (MSW) disposal is an ever-increasing problem in many parts of the world, especially in developing countries. To date, landfilling is still the preferred option for the disposal and management of MSW due to its low-cost operation. While this solution is advantageous from a cost perspective, it introduces a high level of potential pollutants which can be detrimental to the local environment. Control and Treatment of Landfill Leachate for Sanitary Waste Disposal presents research-based insights and solutions for the proper management and treatment of landfill leachate. Highlighting relevant topics on emerging technologies and treatment innovations for minimizing the environmental hazards of waste disposal, this innovative publication contributes to filling in many of the gaps that exist in the current literature available on leachate treatment. Waste authorities, solid waste management companies, landfill operators, legislators, environmentalists, graduate students, and researchers will find this publication beneficial to their professional and academic interests in the area of waste treatment and management.

Natural and constructed wetlands play a very important role within the landscape and their ecological services are highly valuable. Water management, including flood water retention, biomass

production, carbon sequestration, wastewater treatment and as a biodiversity source are among the most important ecological services of wetlands. In order to provide these services, wetlands need to be properly evaluated, protected and maintained. This book provides results of the latest research in wetland science around the world. Chapters deal with such topics as the use of constructed wetlands for treatment of various types of wastewater, use of constructed wetlands in agroforestry, wetland hydrology and evapotranspiration, the effect of wetlands on landscape temperature, and chemical properties of wetland soils.

Membrane Technology and Engineering for Water Purification, Second Edition is written in a practical style with emphasis on: process description; key unit operations; systems design and costs; plant equipment description; equipment installation; safety and maintenance; process control; plant start-up; and operation and troubleshooting. It is supplemented by case studies and engineering rules-of-thumb. The author is a chemical engineer with extensive experience in the field, and his technical knowledge and practical know-how in the water purification industry are summarized succinctly in this new edition. This book will inform you which membranes to use in water purification and why, where and when to use them. It will help you to troubleshoot and improve performance and provides case studies to assist understanding through real-life examples. Membrane Technology section updated to include forward osmosis, electro dialysis, and diffusion dialysis Hybrid Membrane Systems expanded to cover zero liquid discharge, salt recovery and removal of trace contaminants Includes a new section on plant design, energy, and economics

The Handbook of Environment and Waste Management, Volume 1, Air and Water Pollution Control, is a comprehensive compilation of topics that are at the forefront of many technical advances and practices in air and water pollution control. These include air pollution control, water pollution control, water treatment, wastewater treatment, industrial waste treatment and small scale wastewater treatment. 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 air, water, and waste management, and as a text for advanced undergraduate and graduate courses in these fields.

Following on from the successful first edition of Waste Treatment & Disposal, this second edition has been completely updated, and provides comprehensive coverage of waste process engineering and disposal methodologies. Concentrating on the range of technologies available for household and commercial waste, it also presents readers with relevant legislative background material as boxed features. NEW to this edition: Increased coverage of re-use and recycling Updating of the usage of different waste treatment technologies Increased coverage of new and emerging technologies for waste treatment and disposal A broader global perspective with a focus on comparative international material on waste treatment uptake and waste management policies

The use of membranes is increasing throughout industry, and particularly the water industry. The municipal water industry, which is concerned with the provision of clean drinking water to the population, is a big user and developer of membrane technology which helps it to provide water free of pathogens, chemicals, odours and unwanted tastes. Municipal authorities also have to process sewage and waste water, and membranes are used extensively in these processes. The MBR Book covers all important aspects of Membrane BioReactors in water and waste water treatment, from the fundamentals of the processes via design principles to MBR technologies. Industrial case studies help interpret actual results and give pointers for best practice. Useful appendices provide data on commercial membranes and international membrane organisations. * Major growth area in the water industries * Internationally-known author * Principles and practice, backed by case studies

FROM THE PREFACE Sanitary landfills are the most widely utilized method of solid waste disposal around the world. With increased use and public awareness of this method of disposal, there is much concern with respect to the pollution potential of the landfill leachate. Depending on the composition and extent of decomposition of the refuse and hydrological factors, the leachate may become highly contaminated. As leachate migrates away from a landfill, it may cause serious pollution to the groundwater aquifer as well as adjacent surface waters. There is growing concern about surface and groundwater pollution from leachate. Better understanding and prediction of leachate generation, containment, and treatment are needed. This book contains a literature review of various methodologies that have been developed for prediction, generation, characterization, containment, control, and treatment of leachate from sanitary landfills. The contents of this book are divided into nine chapters. Each chapter contains theory and definition of the important design parameters, literature review, example calculations, and references. Chapter 1 is devoted to basic facts of solid waste problems current status and future trends towards waste reduction and recycling. Chapter 2 provides a general overview of municipal solid waste generation, collection, transport, resource recovery and reuse, and disposal options. The current status of sanitary landfill design and operation, problems associated with the landfilling, and future trends are presented in Chapter 3. Methods of enhanced stabilization, recycling landfill space, methane recovery, and above grade landfilling, and closure and post closure care of completed landfills are also discussed in detail. Chapter 4 provides a general overview of Subtitle D regulations and its impact upon sanitary landfilling practices. Chapter 5 is devoted entirely to moisture routing and leachate generation mechanisms. Examples of calculation pr

The aim of this book is to present an overview of the state of the art with regard to the function, application and design of TWSs in order to better protect surface water from contamination. Accordingly, it also presents applications of constructed wetlands with regard to climatic and cultural aspects. The use of artificial and natural treatment wetland systems (TWSs) for wastewater treatment is an approach that has been developed over the last thirty years. Europe is currently home to roughly 10,000 constructed wetland treatment systems (CWTSSs), which simulate the aquatic habitat conditions of natural marsh ecosystems; roughly 3,500 systems are in operation in Germany alone. TWSs can also be found in many other European countries, for example 200 – 400 in Denmark, 400 – 600 in Great Britain, and ca. 1,000 in Poland. Most of the existing systems serve as local or individual household treatment systems. CWTSSs are easy to operate and do not require specialized maintenance; further, no biological sewage sludge is formed during treatment processes. As TWSs are resistant to fluctuations in hydraulic loads, they are primarily used in rural areas as well as in urbanized areas with dispersed habitats, where

conventional sewer systems and central conventional wastewater treatment plants (WWTPs) cannot be applied due to the high costs they would entail. TWSs are usually applied at the 2nd stage of domestic wastewater treatment, after mechanical treatment, and/or at the 3rd stage of treatment in order to ensure purification of effluent from conventional biological reactors and re-naturalization. New applications of TWSs include rainwater treatment as well as industrial and landfill leachate treatment. TWSs are well suited to these fields, as they can potentially remove not only organic matter and nitrogen compounds but also trace metals and traces of persistent organic pollutants and pathogens. Based on the practical experience gathered to date, and on new research regarding the processes and mechanisms of pollutant removal and advances in the systems properties and design, TWSs continue to evolve.

As the global nature of pollution becomes increasingly obvious, successful hazardous waste treatment programs must take a total environmental control approach that encompasses all areas of pollution control. With its focus on new developments in innovative and alternative environmental technology, design criteria, effluent standards, managerial dec

This book discusses the natural and anthropogenic determinants of the environment and their impact on human health. It throws light on the perspectives of climate change with case studies from Australia, India, Italy, and Latin America. Themes covered are ecology of antibiotic resistant microorganisms, pesticide and heavy metal (arsenic) problems in natural environment; molecular advances in understanding of microbial interactions; ecological studies of human/animal health and diseases; food security, technological developments and more. The various chapters incorporate both theoretical and applied aspects and may serve as baseline information for future research through which significant development is possible.

Japan was ahead of the rest of the world when it introduced intermediate processing of municipal waste by such means as incineration in the 1960s. Owing to the small land area of the country and the difficulty in securing landfill sites, the incineration ratio of municipal combustible waste had reached 100% by the 1990s. Along with the landfill of incineration residues, proprietary technologies such as high salt leachate treatment, desalination treatment, by-product recycling, a focus on the resource of incineration residues, sea surface landfill sites, and covered type landfill sites have spread and developed since then. This book describes the introduction of incineration facilities starting in the 1960s, landfill technology, and issues arising after 1990 following the introduction of the facilities. The necessity of a total system from incineration to landfill is explained as well. The volume is a valuable resource for countries that plan to introduce intermediate processing such as incineration and for countries that are developing a waste management policy. This book presents some of the latest technologies in waste management, and emphasizes the benefits that can be gained from the use of recycled products. Divided into four sections, it deals with phytoremediation, aquatic weed management and the treatment of solid- and water-based wastes, such as those arising from agricultural, industrial and medical activities. With its special emphasis on the utilization of recycled products, this volume will be of interest to students, academicians, policy makers and others who have a practical and academic interest in dealing with the waste society generates.

[Copyright: a39ab52b0c64f13143064c9a56eaa410](#)