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Evapotranspiration Covers for Landfills and Waste Sites *Solid Waste Landfilling Design of Landfills and Integrated Solid Waste Management* No Funding for Markets, No Markets for Recycling, No Time for Landfills; And: A Proposal to Cut Landfill Flow in Illinois Landfills Nonhazardous Waste *Waste Containment Systems, Waste Stabilization, and Landfills* Sustainable Practices for Landfill Design and Operation **The Handbook of Landfill Operations Waste Away The Waste Crisis** *Natural Resources and Environment* **Final Covers for Solid Waste Landfills and Abandoned Dumps Management of Pollutant Emission from Landfills and Sludge Feasibility Study, Primary Designs and Development of Alternative EvapoTranspiration Covers for Landfills and Waste Dump Sites in Tropical Locations Proposed Draft Remedial Action Plan (RAP) for Landfills 8 and 10, PHSH Fill Site, and Four Small Arms Firing Ranges** Solid Waste Landfills in Middle and Lower-income Countries **Minimum Technology Guidance on Double Liner Systems for Landfills and Surface Impoundments** Sustainable Solutions for Environmental Pollution, Volume 1 **Get a Job at the Landfill Opportunities for Landfill Gas Energy Recovery in Washington Siting of Hazardous Waste Landfills and Their Correlation with Racial and Economic Status of Surrounding Communities Opportunities for Landfill Gas Energy Recovery in Illinois** *Integrated Evaluation of Greenhouse Gas Emissions, Traditional Air Pollutants, and Economics of Three Types of Landfills* **Load-checking for Hazardous Waste at Solid Waste Landfills and Inert Debris Engineered Fill Operations Landfill Research Trends Minimum Technology Guidance on Final Covers for Landfills and Surface Impoundments** *Opportunities for Landfill Gas Energy Recovery in New Jersey* Opportunities for Landfill Gas Energy Recovery in Louisiana Solid Waste Disposal Alternatives for the U.S. Military Academy From Landfill Gas to Energy **Physical Characterization and Evaluation of Energy Potential for Mined Waste from Irving Landfill** *Gone Tomorrow* **Landfill Waste Pollution and Control Computer-linked Terrane Analysis for Landfill Waste-disposal Site Selection Attitudes of Nearby Residents Toward Establishing Sanitary Landfills (Classic Reprint) Environmental Considerations in the Selection of Sites for Sanitary Landfills and in Landfill Site Management** Zero Waste: Management Practices for Environmental Sustainability **Sanitary Landfill Leachate** *Extension Landfill Planning* **Development of an Environmental GIS Database for Landfills and Storage Facilities in Lucas County, Ohio**

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 con- sultants 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. Historically landfills have been seen as the ultimate solution for storing waste at minimum cost. But, now it is a well-known fact that these deposits have numerous implications such as long term methane emissions, local pollution and many space-related issues etc. In most parts of the world, however, landfilling is the most common method to dispose waste. Even developed countries with recycling and waste treatment facilities have been no exception in landfilling. Therefore over the years, several old and operating landfills have been accumulated with an enormous amount of obsolete materials and products. To address such issues related to waste deposits, landfill mining has been proclaimed as an innovative strategy. Although landfill mining is a solution for a number of problems, it creates new waste by extracting waste that was previously buried. So it is important to find suitable treatment and utilization routes for different types of materials considering the economic aspects and the minimization of the re-landfilled fraction of the waste. This study focuses on the characterization and valorization potential of waste from a prospective landfill mining site. According to the USEPA's (United State Environmental Protection Agency) waste management hierarchy, energy recovery is better preferred than disposal into landfills. So energy potential was calculated from the mined waste and compared to the previous studies to check the feasibility of incineration. The present study was conducted by using the municipal solid waste (MSW) samples collected from the City of Irving landfill, Texas. Mined waste was collected from three different closed cells from the City of Irving landfill, and the composition was determined. It was observed that fine and degraded portion of the mined waste made up to 60%. The calorific value of the mined waste was investigated with an oxygen bomb calorimeter. For the analysis, the major contributors for energy, that are paper, plastic, textile and wood were considered. The average calorific value of the mined waste was found to be 3365.16 Btu/lb which is above the minimum calorific value (3010 Btu/lb) specified according to the feasibility study conducted by the World Bank. Also, different parameters like moisture, volatile solids, age of waste were analyzed to understand the factors that affect the energy of mined waste. The fine fraction had a negative effect on the calorific value. Overall, the study enhances the understanding of the physical characteristics and energy potential of landfilled mined waste. Major conclusions are that there is a high potential for using mined waste to produce energy and the remaining waste, which is majorly fines can be used as a cover material for landfills. Therefore, reclamation operation in this landfill can be proved to have an evident advantage. This text addresses a worldwide problem of pollution hazards, with an understanding of scientific and technical control of the landfill method of waste disposal. European and North American practices and controls are contrasted, so identifying world-wide landfill controls and techniques. New, natural, self-renewing, and low-cost, evapotranspiration (ET) covers for landfills

provide a solution to landfill waste that is clean, green, and economical. Evapotranspiration Covers for Landfills and Waste Sites examines the concept theory and the practical proof, then explains the technology, design, and application. It delineates the essential technology that governs successful application of ET covers and discusses how the technology meets the requirements for covers on landfills, mining waste, and other sites. The book describes the design, construction, and maintenance of innovative ET covers for landfills and waste. The author discusses why several vegetative covers have failed and provides simple, inexpensive solutions. He examines the design and construction of ET covers and other methods, highlighting their differences and successful alternative construction methods. The text contains the first proposed performance measurements for conventional and innovative landfill covers based on the data collected at more than fifty-five sites. This data also provides the basis for an assessment of landfill cover performance, design, and the creation of the site-specific performance criteria presented in the book. This is the first resource to explore the technology required to apply the ET cover concept to landfill waste, spill sites, mineland restoration, and similar waste sites. After thoroughly describing the concept, technology, design, construction, and maintenance of ET covers, the book explains how this cost-effective, practical, easily maintained, and self-renewing biological system should maintain its effectiveness for centuries. “A galvanizing exposé” of America’s trash problem from plastic in the ocean to “wasteful packaging, bogus recycling, and flawed landfills and incinerators” (Booklist, starred review). Eat a take-out meal, buy a pair of shoes, or read a newspaper, and you’re soon faced with a bewildering amount of garbage. The United States is the planet’s number-one producer of trash. Each American throws out 4.5 pounds daily. But garbage is also a global problem. Today, the Pacific Ocean contains six times more plastic waste than zooplankton. How did we end up with this much rubbish, and where does it all go? Journalist and filmmaker Heather Rogers answers these questions by taking readers on a grisly and fascinating tour through the underworld of garbage. Gone Tomorrow excavates the history of rubbish handling from the nineteenth century to the present, pinpointing the roots of today’s waste-addicted society. With a “lively authorial voice,” Rogers draws connections between modern industrial production, consumer culture, and our throwaway lifestyle (New York Press). She also investigates the politics of recycling and the export of trash to poor countries, while offering a potent argument for change. “A clear-thinking and peppery writer, Rogers presents a galvanizing exposé of how we became the planet’s trash monsters. . . . [Gone Tomorrow] details everything that is wrong with today’s wasteful packaging, bogus recycling, and flawed landfills and incinerators. . . . Rogers exhibits black-belt precision.” —Booklist, starred review Converting old landfills to energy producing sites, while capturing emitted greenhouse gases, has faced numerous technical, financial and social challenges and developments lately. Also, the re-mining of landfills to recover useful land in dense urban areas and proper landfill closure has been a subject of discussion and investigation. Designed as an overview text for landfill management from cradle to grave, this volume’s content stretches from the fundamentals to the rather indepth details. By putting down their joint international experience, the authors have intended to both guide and inspire the user for his or her landfill project. Introducing the fundamental concepts of landfill gas management and its needs and importance in the present world energy scenario, this accessible reference volume presents key landfill gas management techniques at regional, national and global levels. In detail, it gives an account of the recent technologies available for landfill gas treatment and its utilization. It summarizes landfill gas prediction models developed in various parts of the world and details their adequacy in various field conditions. Covering both landfill remediation aspects and economic considerations while selecting a landfill gas to energy utilization project, the reader gets familiar with the practical aspects of converting a landfill site. Also, the challenges faced by municipalities and landfill operators in recovering landfill gas as an energy source are described, and solutions are suggested for solving them effectively. These include practical execution problems, governmental issues, and developing policies to encourage investment. The volume also includes various case studies of landfill gas-to-energy utilization projects from around the world, which can be reviewed and customized for the reader’s own application with the help of extensive reference

section. Intended as an overview text for advanced students and researchers in the relevant engineering and technology fields (Environmental, Civil, Geotechnical, Chemical, Mechanical and Electrical), this book will also be particularly helpful to practitioners such as municipal managers, landfill operators, designers, solid waste management engineers, urban planners, professional consultants, scientists, non-governmental organizations and entrepreneurs. Excerpt from Attitudes of Nearby Residents Toward Establishing Sanitary Landfills Sanitary landfills are the major method of community solid waste disposal in the United States. A waste disposal site must comply with various State and local environmental protection and health standards, land use control regula tions, and permit requirements. In addition, the distance between the disposal site and source Of solid wastes must be close enough to permit economical operation. State and local Officials assigned responsibility for establishing and approving new sanitary landfills and other disposal facilities are faced with a dilemma. As communities grow in population and their citizens continue to increase their use of disposable products and containers, additional disposal facilities must be established for the larger amounts Of wastes produced. Yet, when officials attempt to select and approve sites for these new facilities, they Often encounter strong citizen Opposition. Adverse public reaction may be strong enough at times and so well organized as to prevent the selection Of a particular site for sanitary landfill purposes even though it otherwise com plies with all Of the technical, economic, and legal requirements. Cities and villages are experiencing particular difficulty in attempting to purchase sites for solid waste disposal outside their corporate boundaries. 1. About the Publisher Forgotten Books publishes hundreds of thousands of rare and classic books. Find more at www.forgottenbooks.com This book is a reproduction of an important historical work. Forgotten Books uses state-of-the-art technology to digitally reconstruct the work, preserving the original format whilst repairing imperfections present in the aged copy. In rare cases, an imperfection in the original, such as a blemish or missing page, may be replicated in our edition. We do, however, repair the vast majority of imperfections successfully; any imperfections that remain are intentionally left to preserve the state of such historical works. Resource added for the Environmental Engineering Waste and Water Technology program 105062. The U.S. Military Academy (USMA) at West Point, NY, currently disposes of its solid wastes through several contractors at the Orange County (NY) landfill. This landfill is expected to run out of space within 5 years, and expansion of the landfill cannot be assumed because it is located over a primary aquifer. Therefore, USMA must have a solid waste disposal plan in place and ready to operate within 5 years, but formulating such a plan is complicated by technical, political, and regulatory considerations. This report discusses the major issues USMA has had to consider in its attempt to create a solid waste plan, including disposal alternatives, costs, siting and environmental issues for landfills and waste incinerators, and the role of recycling. The authors recommend economically viable solid waste management alternatives for USMA. By combining integrated solid waste management with the traditional coverage of landfills, this new edition offers the first comprehensive guide to managing the entire solid waste cycle, from collection, to recycling, to eventual disposal. * Includes new material on source reduction, recycling, composting, contamination soil remediation, incineration, and medical waste management. * Presents up-to-date chapters on bioreactor landfills, wetland mitigation, and landfill remediation. * Offers comprehensive coverage of the role of geotechnical engineering in a wide variety of environmental issues. SUSTAINABLE SOLUTIONS FOR ENVIRONMENTAL POLLUTION This first volume in a broad, comprehensive two-volume set, Sustainable Solutions for Environmental Pollution, concentrates on the role of waste management in solving pollution problems and the value-added products that can be created out of waste, turning a negative into an environmental and economic positive. Environmental pollution is one of the biggest problems facing our world today, in every country, region, and even down to local landfills. Not just solving these problems, but turning waste into products, even products that can make money, is a huge game-changer in the world of environmental engineering. Finding ways to make fuel and other products from solid waste, setting a course for the production of future biorefineries, and creating a clean process for generating fuel and other products are just a few of the topics covered in the groundbreaking new first volume in

the two-volume set, Sustainable Solutions for Environmental Pollution. The valorization of waste, including the creation of biofuels, turning waste cooking oil into green chemicals, providing sustainable solutions for landfills, and many other topics are also covered in this extensive treatment on the state of the art of this area in environmental engineering. This groundbreaking new volume in this forward-thinking set is the most comprehensive coverage of all of these issues, laying out the latest advances and addressing the most serious current concerns in environmental pollution. Whether for the veteran engineer or the student, this is a must-have for any library. AUDIENCE Petroleum, chemical, process, and environmental engineers, other scientists and engineers working in the area of environmental pollution, and students at the university and graduate level studying these areas Zero Waste: Management Practices for Environmental Sustainability presents approaches for resource management centered on reducing waste and reusing and recycling materials. It aims to save energy by reducing energy consumption associated with extracting, processing, and transporting raw materials and waste, and also to reduce and eventually eliminate the need for landfills and incinerators. This book presents the various principles, methods, and tools that can be used to address different issues in the areas of industrial waste reduction and sustainability. It examines how to eliminate waste at the source and at all points of a supply chain, and how to shift from the current one-way linear resource model to a sustainable "closed-loop" system. Proposes strategies for businesses to reduce and reuse waste with a goal of reaching a zero waste status. Focuses on how mitigating waste and promoting recycling can save vast amounts of energy. Explains how the zero waste approach would be a key measure to ensure environmental sustainability and help to offset global climate change. As populations continue to increase, society produces more and more waste. Yet it is becoming increasingly difficult to build new landfills, and the existing landfills are causing significant environmental damage. Finding solutions is not simple; the problem is enormous in size, vital in terms of its impact on the environment, and complex in scope. This book provides a vast look at solid waste management in North America and seeks solutions to the waste crisis. It describes the magnitude and complexity of the problem, focusing on municipal wastes and placing them in the perspective of other wastes such as hazardous, biochemical, and radioactive debris. It describes the components of an integrated waste management program, including recycling, composting, landfills, and waste incinerators, and it presents in detail the scientific and engineering principles underlying these technologies. To illustrate both the problems and solutions of waste management programs, the authors provide seven case histories, among them the Fresh Kills (Staten Island, New York), the East Carbon Landfill (Utah), and the Lancaster County Municipal Waste Incinerator (Pennsylvania). The Waste Crisis is unique in its attempt to analyze waste management in a broader societal context and to propose solutions based on basic principles. And by doing so, it encourages readers to challenge commonly held perceptions and to seek new and better ways of dealing with waste. As such, this book deserves a place on the bookshelf of anyone who deals with or feels the need to confront the growing problems of waste management. In Get a Job at the Landfill, fictional character Jeremiah Oliver Baumgartner (Job, for short) introduces readers to a wide variety opportunities found (through his adventure and misadventures) at a landfill. Back matter includes creative writing prompts and activities. This book gives an overview of recent findings on the mitigation of gas emission from landfills and sludge processing. Special attention is given to methane and the migration of POPs, heavy metal ions, ammonia and nitrate from landfills to the water-soil system and to the atmosphere. Strategies for mitigating the impact of pollution on ecosystems a This dissertation, "Extension Landfill Planning: Food Waste, Composting Plant Design, Garbage Separation, Shenzhen" by Zhongyuan, Hu, □□□, was obtained from The University of Hong Kong (Pokfulam, Hong Kong) and is being sold pursuant to Creative Commons: Attribution 3.0 Hong Kong License. The content of this dissertation has not been altered in any way. We have altered the formatting in order to facilitate the ease of printing and reading of the dissertation. All rights not granted by the above license are retained by the author. Abstract: Shenzhen is a fast growing modern city. In 1980, Shezhen was just a fishing village. With the urbanization, it extended land inside. In 2000, Shenzhen land use has

already exploited 80%. With the urbanization, there are many migrant workers go to work and settle down in Shenzhen. The population grow up from 314,100to 10,357,938 in these thirty years. With the population growth, the problem is the garbage production volume increase more and more. Now, Shenzhen garbage production is 13,100t/d and the annual growth rate is 8%. There are 8 districts in Shenzhen, which is Nanshan, Futian, Baoan, Luohu, Yantian, Longgang, Guangming and Pingshan district. Nanshan, Futian and Luohu district are downtown of Shenzhen. The other districts are still in developing process. In Shenzhen, there are 9 existing landfills and 7 existing incineration plants and 23 small informal landfills. With the urbanization, the relationship between landfills and city are changing. At the beginning, landfills were set far away the city. Their distance become closer and closer when both of them extended. Until now, some of landfills has connected and existed in the middle of city. For the land use situation of shenzhen. There are 80% land use has already been exploited which means there is no more land for landfill in the future. However, the garbage volume increasing more and more and landfill is still the main way to treat garbage. It is a very serious issue need to face and solve. The garbage structure of shenzhen is, construction waste occupied 78% and 22% belongs to domestic waste. In this 22% domestic waste, food waste occupied 65%. Food waste is the biggest problem of pollution. However, the existing domestic waste treatment is still dumping the mix garbage to landfill. When food waste mix with the other domestic waste together, they will decompose and the produce a lot of biogas and dioxin and so on. It will produce serious air pollution, soil pollution and produce germs. That is why the existing landfill produce so serious pollution to the city. In other aspect, food waste is a good energy if we use it correctly. It could change to energy and fertilizer by biogas collecting, composting and chang to diesels. In Shenzhen, the government has already pay attention to garbage separation. Some communities has already implement garbage separation action. These are 3 large landfill of Shenzhen. The first one is Xiaping landfill of Luohu, the second one is Laohukeng landfill of Baoan and the yahoo landfill of Pingshan district. Base on the location situation, Yahoo landfill will be a best choice to make it as an experimental plot to plan. In Yahoo landfill, the existing landfill has already influenced thirty thousand surrounding people's life. In future, the extension landfill will connect to the the residents area and polluted more seriously. So how to maximum reduce the pollutions is a urgent problem need to solve. The strategy is separating two part to solve garbage in this landfill. One for dumping, the other one is food waste composting. When the food waste composted to fertilizer, it will be transported to the surround farm lands to use. DOI: 10.5353/th_b5325189 Subjects: Fills (Earthwork) - China - Shenzhen Shi ABSTRACT: Simulations were performed to evaluate the effect of the weather period, the effect of soil thickness, the effect of vegetation, the LAI (Leaf Area Index) and finally to determine what regions in Puerto Rico show potential for implementing ET covers. Results from this study showed some sub-regions (or locations) belonging to the six Ecozones (or regions) of Puerto Rico were able to meet the preliminary requirements for hydrological performance as required by the RCRA. However, field evaluation of these designs should be performed before full implementation of ET covers in these regions. Of the 21 locations studied in the preliminary design, 15 were adequate for study by modeling them to confirm the feasibility of using the Evapotranspiration covers in them. After this modeling or simulation was conducted, the results were as follows: eight locations can effectively use ET covers using as covering vegetation pastures. Five locations can use ET covers, but the vegetation needs to be changed using then shrubs and grass. The other locations are being rejected for this study. The selected locations are supposed to have thickness less than 2.0 m. The number of worldwide solid waste landfills and abandoned dumps is growing steadily in both industrialized and developing nations. The key to successful waste containment is often a final cover for placement over the landfill or dump. This book presents the essential elements for the design of final covers which are environmentally safe and secure. With an overview of regulations in the United States and Germany provided, the authors emphasize performance-based design for site specific conditions. Individual components of candidate cover systems are examined, including surface, protection, drainage, barrier, gas collection, and foundation layers for the entire range of natural soil materials and geosynthetics. Solid waste management is a global concern, and landfilling remains the

predominant management method in most areas of the world. This book provides a comprehensive view of state-of-the-art methods to manage landfills more sustainably, drawing upon more than two decades of research, design, and operational experiences at operating sites across the world. Sustainable landfills implement one or multiple technologies to control and enhance the degradation of waste materials to realize a multitude of potential benefits during or shortly after the landfill's operating phase. This book presents detailed approaches in the development, design, operation, and monitoring of sustainable landfills. Case studies showcasing the benefits and challenges of sustainable landfill technologies are also provided to give the reader additional context. The intent of the book is to serve as a reference guide for regulatory personnel, a practical tool for designers and engineers to build on for site-specific applications of sustainable landfill technologies, and a comprehensive resource for researchers who are continuing to explore new and better ways to more sustainably manage waste materials. The most comprehensive design reference available on remediation techniques, waste disposal methods and various waste containment systems. Covers several important new issues such as the regulatory structure of RCRA Subtitles C and D; subsurface flow and transport of contaminants; liner systems, leachate collection and removal systems for landfills; and seismic stability analysis of landfills. Describes new waste stabilization technologies including the process of converting non-solid toxic waste into inert solids. Despite the decreasing rate of landfilled waste due to increases in reuse and recycling, landfilling remains an enormous part of the waste industry of the United States due to population and economic growth. In addition, certain wastes are not easily recycled due to their mixed composition (i.e. a cardboard carton with a plastic lining) or their contamination (i.e. diapers). The primary goal of this research is to develop a comprehensive framework that can help and fill designers chose the best type of landfill (conventional, bioreactor, or aerobic) for a given situation based on greenhouse gas (GHG) emissions, traditional air pollutants and costs (internal and external). This study focuses on estimation of life cycle costs (LCC), appraisal of life cycle inventory (LCI) of air emissions, and estimation of external costs arising from environmental damages during disposal of solid waste into landfills. The study fills several gaps in the existing literature: Several life cycle inventories of air pollutant and greenhouse gas emissions have been conducted to date for landfills outside the United States. Generally, the studies focus on direct emissions from landfills. Few studies include infrastructure construction or transportation of required material for construction in the analysis. Furthermore, these international studies do not necessarily apply to US conditions. Previous studies have reported useful methodologies for assessing the economic performance of landfills and implementing landfill gas-to energy (LFGtE) projects, but they have typically not considered the role of solid waste acceptance rate and the effect of cost amortization over the lifetime of landfill. In addition, a cost function for each phase of life cycle of landfill has not been provided in the context of the US. In many studies about landfill-biogas-to energy, landfill biogas collection efficiency has been assumed to be a single value rather than a temporally weighted collection efficiency depending on the stage of landfill operation. Additionally, the combination of internal combustion engines that convert biogas to electricity have been chosen arbitrarily, so that the effect of upper and lower bounds of required rate of biogas flow entering to run such engines were not taken into account. Specific objectives of the study are:1. To develop a landfill life cycle internal cost model for all types of landfills for raw materials acquisition, construction, operation, closure and post-closure phases of 3 types of landfills (conventional, bioreactor, and aerobic). 2. For the use/operation phase of landfill-gas-to-energy systems, including fugitive methane emissions escaping through landfill covers, to determine the quantities of GHG emissions, traditional air pollutants , potential electricity generation and internal costs from LFGtE implementation in conventional and bioreactor landfills and subsequent revenue from electricity sales within a 100-year time horizon. 3. To quantify greenhouse gas emissions and air pollutant emissions for all types of landfills from landfill raw materials acquisition, construction, operation and end of life. 4. To integrate environmental damage-based external costs from GHGs and air pollutants, and internal costs estimated by LCC, for the all types of landfills. To determine the LCC associated with different types of landfills, a Landfill Life

Cycle Cost model (2L2C) was developed using LCC methodology and economic elements of pre-construction and construction, operation and end of life of phases of landfill to estimate costs within estimation range defined by Association for the Advancement of Cost Engineering (AACE). The range of total annual life cycle cost of a conventional landfill was found to be $25 to $43 per ton of landfilled waste based on the type of landfill and waste acceptance rate. The operational phase was responsible for the majority of the costs (40 to 50%), largely from equipment costs and, particularly for conventional landfills, from leachate treatment costs. The construction phase contributed in the range of 30% to 50%, of which the excavation costs contribute around 25-35% of the construction costs. Finally, end-of-life activities were responsible for 13 to 20% of the total annual life cycle costs, owing mainly to the final cover costs and especially post closure care for conventional landfills. To determine the quantities of GHG emissions, traditional air pollutants and potential electricity generation from conventional and bioreactor landfills during operation phase of landfill-gas-to energy (LFGtE) system, a model was developed to incorporate environmental factors such as biogas generation, impacts of various collection efficiencies, converting the methane portion of biogas to electricity, offsetting fossil fuel based-electricity by burning recovered methane,methane oxidation through the landfill soil cover and emission inventories of biogas control devices. The average electricity production for bioreactor landfill and conventional landfill was estimated to be 4993 and 3153 MWh per million ton of waste in place. In bioreactor landfills,the annual revenue ranged from $8.50 to $24.77 per ton of waste based on acceptance rate. Also, total GHG emission in the most realistic case ranged from 168 and 371 kg CO2e per 1 t of landfilled MSW. To quantify greenhouse gas emissions and air pollutant emissions from landfill raw materials acquisition, construction, operation and end of life, the sub-stages of the construction and operational and end of life stages (including LFGtE system) of MSW landfills were identified. Using the LCI method, GHG and traditional air pollutant emissions inventories were performed for a generic "national average" landfill. The analyses revealed that construction and operation phases make up about 75% of total CO2e emissions within the entire life cycle of landfill. Manufacturing of materials for construction phase and equipment use during operational phase account for the majority of emissions to the atmosphere. To integrate environmental damage-based external costs from GHGs and air pollutants, and internal costs estimated by LCC, for the 3 types of landfills, the contributions of the emissions to external costs and internal costs over the life cycle of landfills was combined. Direct emissions from the landfilling system represented the major contributor to overall GHG emissions, whereas emissions from LCI of the landfill were determined to be responsible for nearly 2%,which is extremely low. External system costs, for a landfill with a low waste acceptance rate, did not exceed $1.35 per ton of waste. This value never went below $0.77 per ton waste for anaerobic landfill. If average LFG collection efficiency were installed in bioreactor and conventional landfills, the aerobic landfill would have more sustainable performance in terms of GHG emissions and traditional air pollutants. In the case of high LFG collection efficiency considered for bioreactor and conventional landfills, the bioreactor landfill was recognized to have the lowest total cost including Internal and external costs compared to other types of landfills. 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. 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 The U.S. Environmental Protection Agency (EPA) was introduced on December 2, 1970 by President Richard Nixon. The agency is charged with protecting human health and the environment, by writing and enforcing regulations based on laws passed by Congress. The EPA's struggle to protect health and the environment is seen through each of its official publications. These publications outline new policies, detail problems with enforcing laws, document the need for new legislation, and describe new tactics to use to solve these issues. This collection of publications ranges from historic documents to reports released in the new millennium, and features works like: Bicycle for a Better Environment, Health Effects of Increasing Sulfur Oxides Emissions Draft, and Women and Environmental Health. This technical guide seeks to demonstrate that, by encouraging small, continuous improvements in landfill siting, construction, and operation, the accumulative effect over time is the achievement of better operations. The guide does not seek an immediate adoption of sanitary landfill practices. Instead, sanitary landfill is regarded as an eventual goal for which middle- and lower-income countries can plan during the course of several years. A common theme throughout the guide is the emphasis on the practical ways landfills can evolve, as resources and confidence increase, from open dumps to "controlled" dumps to "engineered" landfills and perhaps, one day, to sanitary landfills. In response to a congressional request, GAO determined the correlation between the location of hazardous waste landfills and the racial and economic status of the surrounding communities in eight southeastern states. GAO also provided information on Environmental Protection Agency (EPA) site location standards and permitting procedures. GAO found that blacks make up the majority of the population in three of the four communities where the region's four offsite hazardous waste landfills are located. At least 26 percent of the population in these communities has an income below the poverty level. The determination as to where a hazardous waste landfill will be located is currently a state responsibility. However, effective January 1983, federal regulations require that selected sites meet minimal location standards, and EPA has begun its review process to determine whether the sites meet these standards. Federal legislation requires public participation in the hazardous waste landfill permit process, except for the approval of the disposal of polychlorinated biphenyls (PCB's). Because of delays in issuing final regulations, three of the four landfills in the region have not yet undergone the final permit process where public participation is required. The fourth PCB landfill has been subjected to the process and granted a permit, even though it was not required by federal regulations. Finally, GAO found that the EPA class permit proposal for less complex waste management facilities would limit public participation at the local level. However, class permits would apply to storage tanks, not landfills. Though we are the most wasteful people in the history of the world, very few of us know what becomes of our waste. In Waste Away, Joshua O. Reno reveals how North Americans have been shaped by their preferred means of disposal: sanitary landfill. Based on the author’s fieldwork as a common laborer at a large, transnational landfill on the outskirts of Detroit, the book argues that waste management helps our possessions and dwellings to last by removing the transient materials they shed and sending them elsewhere. Ethnography conducted with waste workers shows how they conceal and contain other people’s wastes, all while negotiating the filth of their occupation, holding on to middle-class aspirations, and occasionally scavenging worthwhile stuff from the trash. Waste Away also traces the circumstances that led one community to host two landfills and made Michigan a leading importer of foreign waste. Focusing on local activists opposed to the transnational waste

trade with Canada, the book’s ethnography analyzes their attempts to politicize the removal of waste out of sight that many take for granted. Documenting these different ways of relating to the management of North American rubbish, Waste Away demonstrates how the landfills we create remake us in turn, often behind our backs and beneath our notice.