

Preface

The general idea of the book has arisen from the mutual experience of many specialists in numerous disciplines from different countries involved in the problem of environmental assessment, life cycle monitoring/pollution prevention and control approaches for chemicals generated from solid waste disposal. Solid waste worldwide issues nowadays reflect the complexity and unbalanced development of our world at the beginning of the 21st century. There remains a lack of agreement concerning the major basic definitions, e.g. which material should be considered as “waste” and which as a “beneficial raw material”, which wastes are “hazardous-” and which are “non-hazardous” ones. These arguments are far from being just an academic dispute, resulting finally in the way of waste management/disposal is practiced. False-positive evaluation of material causes substantial increase of disposal costs, while false-negative error may pose serious damage to the environment from inadequately used or disposed wastes. It is remarkable, that quite often a failure in proper evaluation of environmental impact originates from an improper testing procedure or generalization of the results of a limited number of basic tests with respect to the heterogeneous high-volume wastes.

There are still a great variety of procedures for the assessment of environmental risks, not only in national regulations of different countries, but also used by different groups of analysts within the same country. The need for waste- and site-specific approaches on one hand, and harmonization of procedures for the assessment of environmental risks from solid wastes on the other hand, is therefore obvious.

In the field of solid waste management, treatment and disposal one faces the enormous (but still not sufficient) amount of information concerning specific problems of different hazardous wastes, and surprisingly limited data on the seemingly harmless great portions of the waste stream entering the environment.

Rapid progress in industry and other branches of the economy in the developing industrialized nations, not accompanied by adequate, environmentally safe waste management strategies, creates new vast “hot spots” in the formerly pristine areas.

Development of new technologies, materials and chemicals poses quite often a hazard from new waste materials of unpredictable environmental behavior and impact.

All this ballast of the old unsolved problems, lack of basic information, knowledge and recognition concerning environmental behavior of waste, the proliferation of new hazardous waste materials and chemicals, new severe damage and new risks to the environment resulted from the discordant development of the world we have taken to the 21st Century.

At the same time, the end of the 20th Century provided us with wonderful opportunities arising from the transformation of the political system of the former communist countries, the end of a cold war and the beginning of a new era of unlimited cooperation and unification in the field of optimization of relevant laws, regulations and environmental impact assessment methods in a large regional and global scale. Now, the most advanced

technologies that formerly served for military purposes have become efficient, reliable, exact and worldwide commonly available tools for monitoring and remediation of waste sites. Some of these technologies and techniques are applicable specifically to waste treatment and disposal, some are integral to the waste management problem, but have a wider scope of use. The doors to better, safer, efficient waste management strategies, and therefore to a better, safer, cleaner environment are open wide. There should be knowledge and awareness of the administration and decision makers to accept the suggestions of experts in the field of the environmentally safe waste disposal, but there should be also a will and ability of experts to evaluate adequately, and to apply properly, the new methods, techniques and technologies for optimization of waste management strategies in a national, regional and global scale and for making national waste management practices compatible with regional and global strategies. These strategies should comprise the total waste stream management and should consider all kinds of waste origins of different volume, properties and extent of the environmental impact in compliance with the up-to-date state of knowledge.

In the last decade, there has been growing awareness and interest in the environmentally safe management of non-hazardous waste; in the European Union and Accession Countries it resulted in consolidated legislative, standardization, administrative and research activity in this arena. It is aimed to develop short- and long-term waste management strategies and their consequent implementation in compliance with the formulated priorities: (1) waste minimization; (2) recycling and reuse; (3) environmentally safe disposal.

This book covers a broad group of wastes, from biowaste to hazardous waste, but primarily the largest (by volume) group of wastes that are not hazardous, but also are not inert, and are problematic for three major reasons: (1) they are difficult to manage because of their volume: usually they are used in civil engineering as a common fill, where they are exposed to atmospheric conditions almost the same way as at disposal sites, or in agriculture as soil amendments etc.; (2) they are not geochemically stable and in the different periods of environmental exposure undergo transformations that might add hazardous properties to the material that are not displayed when it is freshly generated; (3) many designers and researchers in different countries involved in the waste management are often not aware of time-delayed adverse environmental impact of some large-volume waste, and also do not consider some positive properties that may extend the area of their environmentally beneficial application.

The aim of this book is to contribute to:

- Unification of pollution-control legislation with respect to solid waste (SW) and solid waste disposal facilities (SWDFs) through critical discussion of national regulations in different countries;
- Implementation in compliance with current state of knowledge;
- Introduction of advanced, reliable and cost-effective monitoring strategies in SWDF sites that would provide an early alert for undertaking remedial actions;
- Extending information on the most promising and efficient emerging remediation technologies.

The contributors to the book are recognized experts in the various fields associated with the issues and are from different parts of the world. They present their experience and approaches, taking into consideration also local specifics. The book is addressed to the wide range of decision-makers and professionals involved in environmental issues: administration, designers, and to researchers, as well as to academic teachers and university students and is focused on waste properties, environmental behavior and management in an environmentally safe way. It considers municipal waste, hazardous waste and waste other than hazardous, with a special regard to this last and largest group that often combines properties of either biowaste or at some stages of weathering transformations also of hazardous waste. The knowledge and awareness of these properties are still limited. It was not the intention of the editors to exhaust the subject, which is extremely broad, but to give a general idea about the up-to-date trends in the field of solid waste disposal, monitoring, assessment and remedial options, exemplified also in the case studies.

The scope of the book:

1. Critically discuss international and national legislation and regulatory frameworks concerning SW in different countries representing various levels of economy development.
2. Summarize data concerning pollution potential of major groups of bulk solid wastes (both hazardous and other than hazardous as a function of time and storage/disposal conditions, on the background of existing legislation/control strategies.
3. Provide state-of-the-art information and discussion on: (i) advanced monitoring techniques and equipment for SW pollution potential evaluation and SWDF sites screening and characterization; (ii) monitoring strategies, methods, techniques and equipment to provide early means to detect, and *in situ* intercept or remediate environmental contamination; (iii) post-closure and life cycle monitoring strategies.
4. Present and critically discuss innovative methods and technologies for environmentally safe disposal and *in situ* remediation of SW.
5. Present and critically discuss emerging strategies and technologies for solid waste management with regard to adequate adjustment of environmental legislation and monitoring.

We hope this book to some extent will contribute to the harmonization of efforts directed to the proper, environmentally safe solid waste disposal practices as well as to wider and more dynamic implementation of the advanced approach, methods and techniques for waste management, monitoring and contaminated site remediation.

The Editors