

Book reviews

Ellen E. Moyer, Paul T. Kosteci (Eds.), MTBE Remediation Handbook, Springer Norwell Publishers, Norwell, MA, 2004, USD 120.00, 712 pp., ISBN 1-884940-29-3.

In the preface, John Wilson of the US EPA's National Risk Management Laboratory in Ada, Oklahoma, writes "As is documented in this MTBE Remediation Handbook, we have the technology to clean up MTBE in a rational and economic manner. In general, the same technologies that have worked well for fuel hydrocarbons will work for MTBE contamination." This is very good news as MTBE is a ubiquitous component of gasoline which was added for many years in the United States to enhance air quality by improving engine performance and thereby reducing air emissions. Unfortunately, gasoline leakage containing this compound has caused much concern because of the subsequent MTBE contamination of water supplies.

Moyer (one of the editors) has authored the first two chapters in which she writes "This book provides comprehensive information on the management of releases of gasoline containing methyltertbutylether (MTBE). Our primary focus is MTBE, but other constituents are also discussed because a gasoline release includes several hundred compounds. Other important gasoline constituents include *tert*-butyl alcohol (TBA) and the aromatic compounds benzene, toluene, ethylbenzene and xylenes (BTEX), among others."

She briefly describes the contents of the book in the following short paragraph:

"Section I (Chapters 1 through 7) presents information on MTBE history, properties, occurrence, and assessment that is essential to a good understanding of MTBE remediation. Section II (Chapters 8 through 16) covers the various remediation technologies that are applicable to MTBE. Section III (Chapters 17 through 31) presents case studies that demonstrate how these technologies have been applied effectively at a variety of sites."

Moyer's introductory chapter provides the background for understanding MTBE and the problems its leakage have caused. Topics discussed are MTBE's history, properties, occurrence, and fate and transport (including biodegradability, MTBE-contaminated site assessment, laboratory analysis, and risk assessment). I found the conclusion of the last chapter of Section I (Risk Assessment) to be of interest.

"Despite the data limitations and lack of a clear environmental or health threat, several efforts have been made to ban the use of MTBE in the US due to perceived impacts on water quality. In contrast, it has been determined that the use of MTBE in gasoline does not pose a threat in Europe. Regardless of these policy decisions, the available data suggest that current environmental exposure levels of MTBE in the US and abroad are not acutely toxic to humans and are unlikely to pose chronic health effects from longer-term exposures. That is, MTBE is rarely detected in public drinking water supplies at notable concentrations; estimated exposures from MTBE in air or drinking water are typically very low for the general population; and predicted toxicity levels (for humans or ecological receptors) are well above those typically encountered in the environment. It is obvious that resolution of the remaining questions on MTBE's carcinogenic potential to humans and additional data on MTBE concentrations in air and drinking water will allow for a more thorough risk characterization of MTBE and greater confidence that human health and ecological risks in MTBE fuel use areas are negligible. It is also likely that decision-makers will continue to seek more information about these issues, particularly on the costs, risks, and benefits of MTBE versus other alternatives in achieving national environmental and air quality goals."

As noted above, the second section of the book deals with Applicable Remediation Technologies. Separate chapters are devoted to receptor protection, source control, soil vapor extraction, bioventing and air sparging, in situ chemical oxidation, aerobic in situ bioremediation, anaerobic in situ bioremediation, phytoremediation, ground water recovery and treatment, and monitored natural attenuation.

One chapter that caught my attention was by Finneran and Lovley. These authors report that anaerobic bioremediation can be just as effective as aerobic bioremediation.

The third and final section utilizes half the book's pages to discuss Remediation Case Studies. Fifteen separate chapters are found here. They comprehensively cover the topic discussing (among other topics) remedial costs for cleanup of MTBE in soil and ground water (of interest was that the average cost to clean up 311 sites was \$200,000.00). Reports on remediation projects in seven different geographic sites are given (Finland, New Hampshire, Massachusetts, California, Texas, and New Jersey). Cleanup techniques used were ozone

microbubble sparging, propane oxidizing bacteria, bioventing, and natural attenuation. The latter section of the book described above contains an abundance of site-specific information on (as noted) full-scale cleanup by a wide variety of processes.

The book ends with two appendices. The first appendix "... describes the occurrence of MTBE in surface and ground water including the last 10 years of sampling results for the United States Geological Survey (USGS) National Water Assessment (NAWQA) Program." The second appendix contains the names and addresses (both postal and e-mail) of the contributors to this book; this is an excellent section giving interested readers a means of contacting contributors.

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Hari D. Sharma, Krishna R. Reddy, Geoenvironmental Engineering: Site Remediation, Waste Containment, and Emerging Waste Management Technologies, John Wiley & Sons Inc., Hoboken, NJ, 2004, 986 pp., US\$ 195.00, ISBN 0-471-21599-6.

An area of environmental engineering that has emerged in the last several years (certainly since Love Canal) is that of geotechnical engineering, which is a discipline that addresses both the prevention and remediation of soil contamination. Sharma and Reddy cover the topic thoroughly in this book, which they note has had prior use in university courses. The authors, much to my liking, have included a discussion of "... basic principles, example problems, case histories and questions/problems with lists of comprehensive up-to-date references at the end of each chapter".

"The book is divided into four major parts: Part I, Basic Principles; Part II, Remediation Technologies; Part III, Landfills and Surface Impoundments; Part IV, Emerging Technologies."

In Part I, the authors discuss "... environmental laws and regulations, chemical and geochemistry background, geotechnical background, groundwater flow, and contaminant fate and transport. In Part II [they] discuss sources of contamination, contaminated site characterization, risk assessment, in situ waste containment, and soil and groundwater remediation technologies. In Part III [they] present information on design and evaluation of landfills and surface impoundments" "Finally, in Part IV [they] outline various emerging technologies, such as beneficial uses of closed landfills,

recycling, bioreactors, and in situ capping subaquatic waste sediments."

The final section of the text contains some very up-to-date material with chapters entitled: Beneficial use of waste materials; recycling, end uses of closed landfills, bioreactor landfills and subaquatic sediment waste; in situ capping. I note that the last chapter on sediment waste is a very recent topic covered in the literature. Indeed, I very recently reviewed for the *Journal of Hazardous Materials* a Battelle Conference on the remediation of contaminated sediments.

Reviewing an almost 1000-page text is a daunting task, especially for a "general" environmental engineer who is familiar with but not an expert on geotechnical issues. I was, however, able to read and reasonably understand the material in the text even on topics unfamiliar to me. That is much to the credit of the authors' writing.

Each chapter I noted above ends with a relatively extensive list of questions and problems for student use. Readers of these reviews will know that is an inclusion I look for. Also, I note that the Table of Contents is very well developed. Covering 12 pages, the authors list, the titles of all sections, and subsections in the book.

I conclude the review with apologies to the authors for not being more specific about the contents. However, my evaluation is that this is an excellent text that may very well dominate this field for several years.

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Lawrence K. Wang, Norman C. Pereira, Yung-Tse Hung (Eds.), Air Pollution Control Engineering, Humana Press, Totowa, NJ, 2004, ISBN 1-59259-778-5, 521 pp., US\$ 175.00.

This book is the first of three to be published in a series entitled *Handbook of Environmental Engineering* whose goal is "... (1) to cover the entire range of environmental fields, including air and noise pollution control, solid waste processing and resource recovery, biological treatment processes, water resources, natural control processes, radioactive waste disposal, thermal pollution control, and physicochemical treatment processes; (2) to employ a multithematic approach to environmental pollution control since air, water, land, and energy are interrelated." I have not seen the other