

- Assessment and management of health and environmental risks
- Economics of pollution prevention: toward an environmentally sustainable economy
- Sustainability and sustainable development
- Zero discharge technology
- Technologies for pollution prevention: air
- Technologies for pollution prevention: water
- Technologies for pollution prevention: solid waste
- Minimization of environmental discharge through process integration
- Process pollution prevention in the pulp and paper industry
- Progress toward zero discharge in paper process technologies

The topic of the book will have great interest to practicing environmental engineers and the authors are to be commended for the wide-ranging discussion, but the book suffers from some editing problems. For example, in the chapter entitled "Technologies for pollution prevention: air," there is a discussion of e-beam based oxidation treatment for VOC contaminated aqueous phase waste streams. It is a well-written subchapter, but this example deals with water systems rather than air.

The inclusion problem occurs also in the next chapter, entitled "Technologies for pollution prevention: water." Air emissions from foundries are discussed in some detail in spite of the fact the chapter, as previously noted, is devoted to water. Discussed also are the problems of groundwater quality. Clearly, this topic also is important but should have been included, in my opinion, elsewhere. It is not that the aforementioned topics covered in this chapter are incorrect for inclusion in the book, but that they are out of place. I realize that dealing with a multitude of writers submitting sections for a book like this presents a difficult editing task. It is one that should have been done to better categorize the material.

Strange, in my estimation, is the inclusion of a chapter on risk assessment which, although that is a topic of considerable interest to environmental engineers, it seems strangely out of place in a book dealing with pollution prevention.

Chapter 6, which is entitled "Sustainability and sustainable development," deals with a current "hot topic," and one very suited to this book. In it the author, who is the editor himself, states that:

"This chapter provides a framework within which to measure how well a company is doing in terms of resource consumption and pollution emissions and mitigation while extracting more value from its processes. This framework supports the decision-making process by providing mechanisms for benchmarking performance, tracking improvement over time, evaluating the products and processes involved, and developing strategies for improvement."

I might note that this chapter contains a short discussion of the production of fuels from biobased products. Only five pages are devoted to this very important topic which received much attention at the 2005 Annual Meeting of AIChE.

There is a very interesting section in the chapter on "Technologies for pollution prevention: solid waste." In it, the authors

discuss plastic recycling in a developing country. Interesting as it is, the discussion of a relatively unsophisticated system in a lesser developed country really added very little to the textbook.

The book's final two chapters deal with the pulp and paper industry with which the editor has had much experience. Das authoritatively discusses pollution control in the industry and processes that could lead to zero discharge.

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**B. Beloff, M. Lines, D. Tanzil (Eds.), Transforming Sustainability Strategy into Action: The Chemical Industry, Wiley Interscience, Hoboken, NJ, 2005 (567 pages, US\$ 94.95, ISBN 0-471-64445-5).**

Sustainability as an environmental program has progressed from a purely theoretical concern into an industrially recognized and increasingly discussed mode of action. Indeed, it is important that its underlying principles be adopted for the long-term viability of humanity. The American Institute of Chemical Engineers recognized the importance of the concept when they chartered the Institute for Sustainability in 2000. The Institute's first chair, Earl Beaver, has contributed to the book as have several other chemical engineers. But the source of authors is not surprising as the focus of this book, as the title suggests, is the chemical industry. The goal of the editors in writing this book was to provide "... a framework to enable companies to adopt sustainable business practices".

Fifty-six authors have contributed to the text which has eight long chapters. Each chapter has subsections individually authored. The editors describe the book's contents as follows (the description provided has been reduced in length by my editing):

- Chapter 2: Addressing sustainability in the chemical industry  
This chapter looks at the scope and scale of the chemical industry; the industry's response to formative developments and drivers; and the evolution of its signature program responsible care, with a look at its current role in advancing sustainability as well as future positioning.
- Chapter 3: Views on key issues facing the chemical industry  
This chapter looks at the public's perception of the chemical industry. This chapter highlights key issues, challenges and opportunities for the chemical industry, including the com-

plex process of quantitative risk assessment and limits of this approach.

- Chapter 4: Planning frameworks for sustainable development  
The planning section of this book offers a range of planning frameworks, from an elaboration on the elements to consider in planning for sustainability and steps to take, to broader conceptual frameworks regarding the systems in which business operates, what constitutes their unsustainability and how to make the systems as well as the companies operating within them more sustainable.
- Chapter 5: Designing for sustainable development  
This chapter provides an overview of approaches to designing for sustainability, details cradle-to-cradle materials assessment and product design, and highlights aspects of more sustainable process design strategies.
- Chapter 6: Implementing sustainable development; decision-support approaches and tools  
This chapter describes some of the approaches and tools that companies use to demonstrate their commitment to sustainability and support decision-making.
- Chapter 7: Future directions of the chemical industry  
The transition to a sustainable chemicals industry requires a thorough reconceptualization of the industry and its products. New directions for this industry are emerging. This chapter takes a broad, futuristic, and macro-view of the chemical industry.
- Chapter 8: The business case for sustainable development  
This chapter is divided into four parts: (1) results from the 2004 Chemical Industry Sustainability Survey and related Focus Groups, developed in a collaboration between the Bridges to Sustainability, PricewaterhouseCooper (PwC), and AIChE, and conducted by PwC for this book; (2) an overview of sustainability and performance, linking the intangibles of sustainability to marked performance; (3) five business cases presented by sustainability managers at companies with significant chemical operations and a major customer of chemicals (Shell, BASF, DuPont, GlaxoSmithKline and 3M); and (4) various other provocative perspectives on the business case for the industry.

It is a daunting, virtually impossible task to do credit to the wide-ranging discussions in this book. There is just too much material on numerous topics going in many directions, authored by a diverse group of authors with a wide range of backgrounds. But, taken together, the contributors give an excellent description of the state of the chemical industry with regard to sustainability and provide the rationale, direction and goals to encourage chemical companies to include sustainability in their goals. One phrase says it all: "The challenge of achieving a sustainable world is huge and daunting, but there is no alternative".

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**J.W. Talley (Ed.), *Bioremediation of Recalcitrant Compounds*, Taylor & Francis/CRC Press, Boca Raton, FL, 2006 (324 pages, US\$ 139.95, ISBN 1-56670-656-4).**

The scope of sites contaminated with industrial, potentially toxic chemicals is vast. For example, the U.S. Department of Defense has more than 21,000 sites that may require some form of remediation. The contaminants on these sites are wide ranging in chemical structure and in hazard potential. Examples of potentially dangerous chemicals found at these sites include TNT, chlorinated solvents, PAHs, and PCBs. Conventional methods of site remediation that have been used in the past include incineration, air stripping, and activated carbon adsorption. Frequently, however, these methods are not cost-effective. Biotreatment, which offers a possible alternative cleanup process, is the theme of this book.

To define the problem facing remediation engineers, Talley writes the following in Chapter 1:

"Bioremediation is defined by the U.S. Environmental Protection Agency (EPA) as a managed or spontaneous process in which microbiological processes are used to degrade or transform contaminants to less toxic or nontoxic forms, thereby remedying or eliminating environmental contamination (EPA, 1994). These microbiological processes may reduce hydrocarbon concentrations in various types of solids and sediments to levels that no longer pose an unacceptable risk to the environment or human health (Linz and Nakles, 1997). However, hydrocarbons that remain in treated soils and sediments still might not meet stringent regulatory levels, even if they represent site-specific, environmentally acceptable endpoints (NRC, 1997). This unresolved issue of the availability of residual hydrocarbon contaminants is the focus of this work."

Given the complexity of the problem, Talley has assembled several key investigators to write chapters for this book that "... provides an authoritative state-of-the-art biotreatment review for three key contaminant groups: chlorinated solvents, polychlorinated biphenyls (PCBs), and polycyclic aromatic hydrocarbons (PAHs). Issues such as availability, toxicity, and treatability are discussed along with a summary of the latest bioremediation technologies. Special innovative research and development projects are presented for each contaminant group". The projects described in this book resulted from the U.S. Government's Strategic Environmental Research Development Program (SERDP) Federal Integrated Biotreatment Research Consortium funded by three U.S. federal agencies.

The results of this research effort are reported in the following eight chapters: