

economic calculations are included as well as a description of the process engineer's role in the execution of a project.

The book avoids sophisticated equations for the calculation of the equipment listed above. However, reading and understanding of the book requires basic knowledge of the related disciplines as no deductions or hints on related standard books are given. On the other hand, the use of the book is facilitated by numerous examples which are calculated to the final result. Moreover, the calculation procedure is described step by step in most cases. Numerous graphs, charts, data tables and figures represent an additional value of the book, but all units are English.

Without exception, the examples are taken from refining technology. Chemical reactors are not touched at all. This leads the author to state that in the material balance the streams of moles coming in equal the streams of moles going out, which is true only if no chemical reactions occur. Missing are modern techniques for the design of heat exchanger networks, as for instance the pinch technique.

The book fulfils its aim to offer the beginner a 'helping hand'. The material is well structured and clearly presented. For the purpose envisaged it can be recommended. However, today's process engineer will most likely apply flow sheet software, which requires a sound understanding of chemical process engineering as well as skills in utilising the related software. In that case the book's recipes may assist in performing plausibility checks.

**Prof. Dr.-Ing. R. Reimert**

*Environmental Impact of Chemicals: Assessment and Control.* M.D. Quint, D. Taylor and R. Purchase, (Eds.), The Royal Society of Chemists, Cambridge, UK, £69.50 (US \$120.00), 1996, 244 pp. ISBN: 0-85404-795-6.

In the preface, the editors state, "There is little doubt that industrial chemicals are capable of causing adverse environmental impacts. These can arise through their deliberate use, as pesticides for example, or due to their planned or unplanned manufacturing processes.

The aim of this book is to provide an insight into a technique that is being used to help predict the environmental impact of chemicals in specific circumstances, namely risk assessment. The tools of environmental risk assessment — toxicology, epidemiology, exposure modelling and analytical chemistry — are outlined, along with the means for applying them within a regulatory framework".

The book contains 16 chapters, which appear to have resulted from papers presented at two symposia held in London in 1994.

The editors outline the scope of their book in the preface: "Following an introduction and overview of the risk assessment process (Chapter 1), the roles of toxicology and epidemiology are discussed (Chapters 2–6), with views from Europe and the United States. Recent environmental legislation in the UK has focused on the need to protect

the environment within reasonable economic constraints; the role of risk assessment in this is examined (Chapters 7–10).

The importance of incorporating site-specific data into risk assessments is described (Chapter 11) along with the collection of information on new and existing chemical substances, with particular regard to recent European Union legislation (Chapters 12–14). The book concludes with a discussion of the interplay between environmental risk assessment and the realities of public perception (Chapters 15 and 16)''.

Needless to say, a review in depth of all 16 papers would be long. Let me cite some of the aspects of the book that caught my attention.

Chapter 1, entitled "Overview of Risk Assessment and Its Application'', is a good place to start. I was intrigued by the examples used as the authors touched on environmental areas of interest to me:

1. A plot of risk vs. exit velocity and stack height for air pollution emissions (and resulting ground level ambient concentration)
2. Assessment of releases from a secondary lead smelter
3. Use of sewage sludge in agriculture as a source of exposure to dioxins and furans
4. Assessment of risks from a closed landfill site

Given the interest in polluted land sites in the United States, that resulted in the passage of Superfund (CERCLA), I read Chapter 8, "Guideline Values for Contaminated Land: Underlying Risk Assessment Concepts'', with interest. Risk-based decisions are now being made more often in the United States, when the US Congress may pass risk-based legislation. But risk, its magnitude and relevance, is not understood by the public which often believes that any externally imposed risk above zero is dangerous and unacceptable.

According to the author, "The main purpose of this chapter is to discuss how scientific and other factors interact in the derivation of standards or guidelines for contaminants in soil. There are two main reasons why such a discussion is important''. The authors nicely outline the basis for their paper by defining the underlying meaning of the terms used: hazard, risk and safety. Next the authors discuss the risk posed by contaminated sites to (1) human health and (2) groundwater and surface water and (3) wider ecosystems, buildings and other structures, or materials. The authors end the chapter by quoting William Ruckelshaus (former USEPA Administrator) who discusses public confidence (or lack thereof) in risk: "To effectively manage the risk, we must seek new ways to involve the public in the decision-making process...For this to happen, scientists must be willing to take a larger role in explaining the risks to the public, including the uncertainties inherent in any risk assessment. Shouldering this burden is the responsibility of all scientists, not just those with a particular policy end in mind''.

Chapter 11, "Site-Specific Considerations in Risk Assessment'', could have been a book in itself. The authors have concisely (and well) reviewed much of the voluminous literature on the topic:

Physico-chemical properties of pollutants with solubility, vapour pressure, Henry's Law constant, octanol water partition coefficient, bioconcentration/biotransfer factor and diffusion coefficient. Both fate and transport of organics in soil and site-specific air data needs are discussed.

An excellent guide (reference) to information sources on the environmental impact of chemicals is found in Chapter 12. At the end of that chapter, the author gives a list (but one I found devoid of completeness) of periodicals dealing with the topic at hand. Given the ever changing nature of publications (both periodicals and books) that quickly go out of date, I'd hesitate to include such a list in a book.

**Gary F. Bennett**

*Environmental Control in Petroleum Engineering.* J.C. Reis, Gulf publishing, Houston, TX, 1996, \$65.00, 274 pages, ISBN: 1-88415-273-1.

Like all manufacturing, the petroleum industry has come under increasing environmental regulation/scrutiny. The goal of this government (and environmental groups) oversight is to minimize the environmental impact of the petroleum industry's operations.

The author's goal in writing this book was to collect, collate and present information on environmental topics affecting petroleum operations. It is written from an academic viewpoint based on the course notes of the author. It is intended for those persons with little or no training in the environmental issues facing the petroleum industry.

The first chapter is an introduction to environmental control in the industry. It contains an overview and discussion of environmental impact, migration management, and management of waste. Site cleanup, environmental regulations and a final section discussing the new 'environmental' attitude complete the chapter.

The second chapter begins at the beginning; Drilling and production Operations. Included is a discussion of the chemistry, physical properties and environmental impact of drilling fluids. Even an emission from internal combustion engines used in the drilling process and fugitive emissions from valves are covered. The third chapter is a further discussion of the environmental impacts of the releases discussed in the prior chapter.

The Environmental Transport of Petroleum Wastes is the fourth (very short) chapter. Discussed are surface, subsurface and atmospheric pathways of transport. Chapter 5 is a forward looking chapter that outlines future plans (or planning) for environmental protection. Topics included here include audits, waste management plans, contingency plans, and employee training.

Waste treatment methods are the focus of chapter 6. Both wastewater treatment and air pollution control techniques are discussed, albeit qualitatively and briefly. Given the topics are a major area of interest to me, its not surprising I found the discussion lacking in detail and not providing numerical information on effluent quality, percent removal of pollutants by various treatment processes and design data.

Waste Disposal Methods (Chapter 7) and Contaminated Site Remediation (Chapter 8) are short. Both are useful but, again, I found them shorter and containing less data than I would have liked. I do, however, commend the author for the latter chapter; he does discuss current remediation methods and pump-and-treat technology, vaporization, soil