

on preferential media. This study has provided an invaluable amount of data for comparative purposes, evaluating future trends in air toxics and new study designs.

Major chapters of the book are:

1. The airborne toxic elements and organic substance study design.
2. Chemical composition of inhalable particulate matter – seasonal and intersite comparison.
3. Volatile organic compounds at urban sites in New Jersey.
4. Analysis of polycyclic hydrocarbons.
5. Mutagenicity of inhalable particulate matter at four sites in New Jersey.
6. Air pollution episodes during the ATEOS – their nature and significance.
7. Inhalable particulate matter and extractable organic matter.
8. Receptor source apportionment models for ATEOS urban sites.
9. The New Jersey ATEOS project: an overview of its importance and health/regulating implications.

GARY F. BENNETT

Hazardous Waste Management Engineering, by E.J. Martin and J.H. Johnson, Jr., Van Nostrand Reinhold, New York, NY 1986, ISBN 0-442-24439-8, 520 pages, \$67.95.

In the foreword to this book, Leon Weinberger, writes:

“The management of hazardous wastes requires an understanding of technical regulatory, economic, permitting, institutional, and public policy issues. The Resource Conservation and Recovery Act (1976) and the Comprehensive Environmental Response, Compensation and Liability Act (1980) at the federal level, along with equivalent state with the problems of hazardous wastes.

The editors have assembled a group of knowledgeable authors who have first hand experience in hazardous waste management. They have prepared a useful, comprehensive text, particularly for engineers. The text provide a single source reference of environmental legislation; technical alternatives for storage, treatment, and disposal; risk analysis; and siting of hazardous waste facilities”.

I agree completely with Weinberger's analysis. This is one of the best hazardous waste books I have seen to date. It is well written and is as thoroughly comprehensive as a single book of moderate length can be. Appropriately, Chapter 1 starts with a review of the law that governs hazardous wastes and toxic substances. The second chapter on risk assessment, is no less appropriately placed for risk analysis is a topic of very great interest in the United States for assessing the effects of exposure of individuals to toxic and hazard-

ous chemical by diverse routes. The author of the chapter has done an excellent job defining the sources and rates of emission of hazardous chemicals from TSD (treatment, storage and disposal) facilities. The very latest, most accurate and accepted models are cited. The author briefly examines response and human health effects to complete his risk analysis.

Chapter 3, co-authored by one of the book's editors (Martin) discusses the chemical, physical and biological treatment of hazardous waste. Included in this are chapter discussions of the removal of hazardous pollutants from aqueous waste, including removal in conventional wastewater treatment plants (termed POTWs or publicly owned treatment works) and conversely the formation of hazardous compounds such as trichalomethanes in the post-chlorination process. Other processes briefly (perhaps, too briefly) discussed are biological oxidation, coagulation, precipitation, reverse osmosis, ultrafiltration, stripping, solvent extraction, carbon adsorption, resin adsorption and use of miscellaneous adsorbents. Much data are given on the concentrations of priority pollutants in POTW sludges. For more concentrated sludges (the previous processes were aimed at dilute, aqueous materials), wet oxidation and stabilization/fixation/solidification) are described. Many excellent test data (of the products produced by these treatment systems) are given in tabular form for the latter processes (bulk density, unconfined compressive strength, permeability, durability, etc.) for various sludges. Missing, however, was the mix design on proportion of various additives and sludges used to produce the stabilized sludge for which the test data were given.

Incineration is covered in depth in Chapter 4. this technology, that effectively destroys hazardous organic wastes, has emerged as a key element in hazardous waste disposal. Appropriately, almost 100 pages are devoted to the topic, the chapter starts with the principles governing incinerations and goes through types of incinerators and their design, and finally ends with incinerator air pollution and control systems. Covered also are ocean incineration and the use of cement to dispose of hazardous waste.

In chapter 5 the authors describe procedures for locating, sizing, operating and finally closing hazardous waste storage facilities.

Land disposal of hazardous wastes is dealt with in Chapter 6. Land disposal is defined by the authors as placing wastes intentionally on or into the land for purposes of their control in a technically and environmentally sound manner. The design and operation of landfills and land disposal systems are discussed; however the author of the chapter understandably gives more space proportionally to the latter topic in which he is a recognized expert.

The land disposal chapter is logically followed by Chapter 7 which deals with leachate management. It is based on a U.S. EPA report, the authors wrote several years previously on this topic. This chapter is a very thorough treatment of the problem.

Reserved for last in the book is the most difficult of the topics – not techni-

cally but socially – that of hazardous waste facility siting. Although the author has several suggestions for approaching the siting process, his example of a siting process that failed, lends credence to my belief that siting a TSD facility (especially a hazardous waste landfill) is harder than siting a nuclear power plant. Public fears and the NIMBY (not in my back yard) syndrome override reason.

My assessment overall is that this is a very good book and were I to give a course in hazardous waste disposal, *Hazardous Waste Management Engineering*, along with one other book, would be my text. It is not, however, a book of deep technology for the currently involved expert.

GARY F. BENNETT

Engineering Safety Assessment: An Introduction, by J.R. Thomson, Longman group, Essex, United Kingdom, 1987, ISBN 0-470-20712-4 221 pages, £10.95

In assessing industrial plant safety, Thomson has analyzed a number of operations: chemical plants, nuclear reactors, boilers, dams and even transportation. The analysis he did and the book that developed from it is based on a course he teaches. And from my reading of the book, I am sure it is a very good course.

It is clear that major chemical releases at Seveso and Bhopal and the nuclear accident at Chernobyl has increased public awareness of the potential danger of chemicals. Indeed, there has been much regulatory activity in the United States after Bhopal as there was in the United Kingdom after Flixborough. Paralleling the regulatory reaction, professional societies have responded. In the United States, the American Institute of Chemical Engineers has established “The Center for Chemical Plant Process Safety” and encourages chemical engineering faculty members to include process safety in their courses. But perhaps inclusion of safety as a small part of several classes is not enough and a full course such as the one the authors suggest is preferable.

This book, Thomson notes, “is suitable for use as a textbook in senior undergraduate and postgraduate courses in chemical, mechanical and nuclear engineering...”. I agree. the book is well written and contains numerous examples (although some are a little difficult to follow) and questions (or problems) for student homework.

Major chapters include:

- Basic probability
- Systems reliability
- Reliability of metal structures
- Major industrial hazards
- Probability risk assessment

The author notes that “no attempt has been made to cover all aspects of what