

Book Reviews

Major Chemical Hazards, by V.C. Marshall, Ellis Horwood Ltd., England, 1987, ISBN 0-85312-969-X, 587 pages, \$59.50.

No book I have reviewed in the past four years has been as interesting, as enjoyable and potentially as useful as this one written by Marshall. Simply stated: it is first rate – of current interest, authoritative and very well written. Flixborough, Seveso and Bhopal are all names that will live on in infamy for the chemical industry because chemical releases at these plants caused untold numbers of deaths and injuries to innocent people (i.e. residents living near the plant). Marshall has well described what happened at each of the three sites, but unlike other reviews of these events, he precedes his description by a discussion of the physical and toxic properties of the chemical involved and supplies the reader with the analysis of what went wrong and why. This analysis, done by a man who is both a chemical engineer and a recognized safety professional, is superbly done.

I very much enjoyed the treatment of certain chemicals: ammonia, chlorine, etc. For example, Marshall analyzed and compared the deaths resulting from chlorine (in WW 1) and bomb density (WW 2); the analysis is intriguing. Marshall also described and analyzed numerous other major accidents, modelling of their gas dispersion characteristics and other impacts. He even includes the Miamisburg, Ohio, phosphorus fire in 1986. The book is exceedingly up-to-date (as evidenced by inclusion of the Miamisburg accident) and to assist in this, Marshall included a final additional chapter to add notes and update the earlier completed manuscript. I found this last section very useful.

Marshall goes well beyond the descriptive process found in most books on chemical spills (i.e. most authors simply report what happened in the accident) and takes a quantitative approach to calculations of gas dispersion, pressures, explosions, mortality indexes, risk (and quantification thereof); but most useful to the design process engineer who will come to an understanding of why and how these accidents occurred and how to avoid them in the future.

Major chapters are devoted to:

- The nature of hazards and risk
- The handling and storage of liquids and gases
- Causes of loss of containment of liquified gases
- The formation and dispersal of vapour clouds
- Catastrophic fires
- Explosions
- Toxic releases
- Methods of control of major chemical hazards
- Quantification of hazards

- Hazard control
 - legislation
 - management's role
 - the role of professional institutions
 - safety professionals and their training
 - research and consultation

In the frontspiece, Marshall quotes from Tennyson's writing: "Oh yet we trust that somehow good will be the final goal of ill". The book serves that purpose well. Marshall has learned much from prior chemical accidents and through this book has made his deep experience available to us. This book should be the key reference for design, safety and process engineers for years to come. Beyond that, it would make a superb text for senior or graduate chemical engineering students.

GARY F. BENNETT

Toxic Air Pollution, by P.J. Liroy and J.G. Darsey (Eds.), Lewis Publishers, Chelsea, MI, 1987, ISBN 0-87371-057-6, 294 pages, \$44.95.

With major criteria air pollutants (SO, NO_x, particulates, CO, O₃ and Pb) coming under control in the United States, the U.S. Environmental Protection Agency (U.S. EPA) has turned its attention to trace toxic elements in the air, and there appears to be reason for concern. A recent U.S. EPA study has shown risks from cancer-causing chemicals are greater than considered acceptable. Moreover, it appears the U.S. government may direct that the U.S. EPA specifically control more than the handful of toxic air pollutants it has promulgated regulations for.

Thus, the appearance of the book is very timely. It provides a wealth of information on many toxics found in the air: metals, zinc and carcinogenic pollutants - I counted nine metals, 50 organics and five conventional pollutants for which there are data.

The book resulted from a comprehensive study of air toxics in New Jersey entitled, appropriately enough, "The Airborne Toxic Element and Organic Substances (ATEOS) Study". This study involved numerous research scientists. Work was carried on from 1981 to 1985.

The bottom line is in the main, good news.

"Generally levels of most types of toxic air pollutants measured (in New Jersey) were low enough to dismiss the motion of a statewide air toxics problem. The problems are probably directed towards situations in which a population subgroup is in close proximity to a source or group of sources (i.e. the local environment close to a small source such as an automobile). The New Jersey Toxics Study group broke, new ground in a number of areas including the monitoring of small discontinuous sources by adsorbing organics