are also tabulated. Naturally, the author has described current systems and equipment and this will tend to date his book, as improvements and new equipment are constantly being developed.

Interspersed throughout, the author describes various incidents or problems of which he has had practical experience and the measures he has suggested to prevent a recurrence. He tends to incline towards the use of undercover agents to detect where losses are occurring but does admit that their introduction into a building is sometimes difficult to achieve.

Despite the minute detail which appears in some parts, the book makes for fairly easy reading and covers a lot of ground in security aspects of all kinds. Much can be learnt and it provokes thoughts and ideas which sometimes are not always apparent even to the professional security or police officer. For those persons who do not have access to a security adviser and who have some responsibility for looking after their employers' interests and property, some of the precautions that can be taken are found within the book, which contains an adequate index.

The author is not known in this country, but his American publishers have the following to say about him:

"Walter M. Strobl is President of Strobl Security Service, Inc. in Memphis, Tennessee. A retired US Army Officer, he has been active in the field of security for 20 years. In addition to lecturing at colleges and universities, he is a member of a team that conducts executive protection seminars for multinational and international companies. He is the author of one previous book, three security officer training courses, and 35 magazine articles. Mr. Strobl was among the first group of professionals to be certified by the Professional Certification Board of the American Society for Industrial Security as a Certified Protection Professional. Until recently he was a member of the Environmental Security Committee of the Private Security Advisory Council. He is a member of the National Crime Prevention Association, the American Society for Industrial Security, the International Association of Hospital Security, the National Association of School Security Directors, and the National Fire Protection Association".

F.W. BUXTON

Radioactive Waste in Geologic Storage, Sherman Fried, (Ed.), ACS Symposium Series 100, vii + 344 pp., American Chemical Society, Washington, D.C., 1979, $29.50.

The title of this book refers to geological "storage" of radioactive waste while the subject matter is clearly concerned with its disposal. This is unfortunate since it not only misrepresents the content of a most useful book but also compounds the confusion over storage and disposal which tends to arise in discussion or radioactive waste management. The content of the book is

based on a symposium sponsored by the Division of Nuclear Chemistry and Technology of the American Chemical Society and, with the exception of a report on Swedish work, is limited to description of US work on the subject. It covers some recent radioactive waste disposal concepts and proposals as well as experiments carried out to quantify the most important parameters. The first few chapters deal with the general geological and hydro-geological considerations involved in establishing the feasibility of deep geological disposal of radioactive waste. The following four chapters examine the leaching characteristics of possible waste forms. The remaining nine chapters discuss the sorption behaviour of various radionuclides on different geological media in relation to migration of activity and its return to man's environment. These chapters are clearly based closely on individual symposium papers, even to the extent of having a type-face which differs from paper to paper. However this does not detract from overall clarity of presentation and readability. The book also contains a comprehensive, twenty-page index which considerably enhances its value as a reference text.

Being the proceedings of a symposium, it is not an introductory or briefing text and will be of greatest value to the specialist in the field. Only in chapter 3 does one find an acceptable statement of the objectives of radioactive waste disposal and only passing reference is made to issues of risk, safety and the need for optimisation of waste disposal strategy. However, the book can not be criticised for this since that was not its purpose.

On points of detail, chapter 1 gives a good overview of the US Department of Energy programme in radioactive waste management, describing the multiple barrier concept of waste containment and noting that the US programme has to take account of the fact that waste could be in the form of spent, unreprocessed fuel elements or of solidified high-level reprocessing waste. Chapter 2 gives a useful account of the latest position at the Waste Isolation Pilot Plant in a salt bed and chapter 4 reviews, in some detail, chemical aspects of the Swedish work on waste disposal in granite. This latter paper concludes with the unadorned statement that the geological barrier must be able, by itself, to prevent migration of activity giving rise to unacceptable doses to any critical group in the future. This would be ideal, of course, but it may be too long before the hydro-geology of low-permeability systems is understood well enough to support a convincing case for this ideal and we may have to examine the feasibility of providing additional long-term barriers by man-made means.

In the context of hydro-geology, which is a major factor in assessing activity migration rates, it is disappointing that the book contains only one chapter entirely devoted to the subject. However, this chapter sounds a clear warning on the state of knowledge of low-permeability hydro-geology and reports the difference of opinion on how to model ground-water flow in fractured media. The chapters concerned with leaching studies provide useful data on different waste forms, but none seems to address the question of what leach-resistance is required of the waste form. One of these papers also describes an

interesting process for waste fixation based on the use of sodium zirconate which has been prepared from zircaloy fuel cladding thereby solving two problems simultaneously.

Of those chapters which deal with the radionuclide sorption on geological media, two depart from conventional study of equilibrium distribution coefficients and are concerned with the kinetics of adsorption and desorption which are shown to be of importance in assessing activity migration. One of these two papers attempts to simulate sorption in a fissure. This is a most welcome development which points the way for future studies of waste disposal in fractured media. A final comment concerns the inclusion of a paper describing the sorption characteristics of the abyssal red clays. These are in the form of sediments, saturated with seawater, and are relevant to studies of radioactive waste disposal to the ocean-bed. Insofar as geological and deep ocean disposal are complementary disposal routes, this paper will be of interest to the reader, but there is no introductory discussion of the unique problems of the latter route. For this reason the paper is somewhat misplaced in an otherwise valuable contribution to the literature on geological disposal of radioactive waste.

ALLAN DUNCAN

Highly Hazardous Material Spills and Engineering Emergency Plans by J.E. Zajic and W.A. Himmelman, Marcel Dekker, New York (1978) $24.50.

This book can lay claim to two important firsts: (1) It is the first book in Dekker's new series on "Hazardous and Toxic Substances", and (2) it is the first book to be published dealing solely with hazardous materials spills. This in itself, makes the book an important contribution to the field.

The book encompasses seven chapters and five appendices covering 225 pages of very useful material. Being Canadian, the authors have used examples and data from Canada and, in appendix 6, report in detail on the laws governing spills in Canada. Unfortunately, for readers in the U.S. and other countries, the same cannot be said since U.S. Public Law 92-500, the Federal Water Quality Act Amendments of 1972 are not even discussed and so we miss out in all aspects of the important section 311 of that Act that governs U.S. spill regulations.

Perhaps the most useful section of the book is Chapter 1 with its detailed classification of hazardous chemicals. Several excellent tables are given to allow the reader to quantify risk. The extensive tables covering 18 pages report the hazards (health, flammability, reactivity) of many chemicals as well as toxicity physical-chemical properties (detection limits and water solubility).

The second chapter reports on the environmental effects of spills. Included, is a discussion of spills that cause air pollution problems with appropriate equations supplied, so that one can calculate the downwind concentration of volatile compounds. One table gives precalculated data on safe initial evacu-