

introduction to particle physics, he devotes about a third of the book to relativistic quantum mechanics and the quantum theory of noninteracting fields. The next third of the book treats interacting fields; it includes a discussion of phase shifts, of the S matrix and covariant perturbation theory, of the symmetries of interacting fields, and of dispersion relations and Regge poles (though little is said about the bootstrap program—perhaps, because it is still a program rather than a theory). The rest of the book deals, in order, with electromagnetic, weak, and strong interactions, and includes an explanation of the SU_3 multiplet scheme and mass formula. Time, probably, did not permit any discussion of the “larger” unitary groups, and most of the work on combining internal and Poincaré groups has been published too recently to be included.

The high price is regrettable but, perhaps, unavoidable. However, it is not reflected in the inadequate job of proof-reading and the failure to eliminate dangling gerunds; nor do the bibliographic references cite pages of the text as one might expect. Despite these flaws, both graduate students and senior physicists should find the book a valuable summary of the state of particle physics as it was early in 1964.

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March 8, 1966

About the Reviewer: Professor Bloch has been a member of the Department of Physics and Astronomy, Vanderbilt University, since 1948, with research interests in the quantum theory of measurements and the theory of particles. His formal academic training was at Harvard and The University of Chicago. Immediately following World War II, during which he served the Manhattan Project and the Technical Manpower Training Program, the reviewer was an associate of Professor Gregory Breit at Wisconsin University and at Yale.

Personnel Dosimetry for Radiation Accidents. Proceedings of a Symposium, Vienna, March 8-12, 1965. Published by the International Atomic Energy Agency (1965). 698 pp. \$14.00.

This publication contains the proceedings of a symposium on the title subject, organized jointly by the International Atomic Energy Agency and the World Health Organization and held in Vienna in March 1965. The volume contains 50 papers (32 in English, 16 in French, and 2 in Russian) with abstracts in the four languages of the IAEA and discussions in English following individual papers. The range of subjects covered includes the role of dosimetry in the medical management of accident cases, measurement techniques for high-level doses, internal contamination, the assessment of dose itself, and the exchange of information about actual accidents and procedures used at a number of installations. Approximately one-half of the papers are devoted to measurement techniques, which include not only those for criticality accidents but also for high-level exposures from outer sources of radiation, such as accelerators.

This reviewer considers the publication of these proceedings to be a timely and valuable addition to existing literature on personnel dosimetry for two reasons. First, and foremost, contributions were made by persons who

have devoted years to the problems discussed and who possess from firsthand experience a large share of what is known about accidents involving high-level exposure. Second, the volume represents a comprehensive state-of-the-art survey of accident dosimetry backed up by considerable detailed technical information. One finds papers on nuclear accident dosimeters, including various threshold detectors, on films, induced radioactivity in the body, phosphate glass, chemical systems, polymerization techniques, and thermoluminescent systems, as well as on new ideas such as the use of the diode radiation element. The papers appear to give a critical evaluation of the use and limitations of these systems. The state-of-the-art survey includes not only these technical subjects of dosimetry, but also such subjects as decontamination of patients and wounds and the administrative management of accident cases.

To this reviewer's knowledge, *Personnel Dosimetry for Radiation Accidents* stands alone as a sourcebook of information on the subject. Collected into one volume are descriptions and evaluations of the major accident systems, accident procedures in effect at various installations, and summaries of practical experience under actual conditions involving injury and loss of life. References cited in the papers give sources of additional information. The book is certainly to be recommended to anyone having a responsibility for or interest in radiation accidents. The participants should be congratulated, together with the IAEA and WHO, who recognized the need and sponsored the conference, for contributing an important addition to the literature on personnel dosimetry.

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About the Reviewer: Dr. J. E. Turner has been with the Health Physics Division of ORNL since 1962. Following completion of his graduate studies at Vanderbilt University, he taught physics at Yale and was with the Atomic Energy Commission's Division of Biology and Medicine prior to coming to Oak Ridge. His interests, in addition to radiation dosimetry, have been in the interaction of radiation with matter and in the attachment of electrons to molecules.

Management of Radioactive Wastes. By C. A. Mawson, Van Nostrand Nuclear Science Series, D. Van Nostrand Company, Princeton, New Jersey (1965). 196 pages, 51 figures. \$6.95.

This book, by C. A. Mawson, Head, Environmental Research Branch, Atomic Energy of Canada, Limited, is one of the second generation of books¹ devoted to the subject. Those of the first generation (1958-1961)⁽²⁻⁵⁾ were all by

¹C. P. STRAUB, “Low-Level Radioactive Wastes—Their Treatment, Handling, and Disposal,” U. S. Government Printing Office, Washington, D. C. (1964).

²K. SADDINGTON and W. L. TEMPLETON, *Disposal of Radioactive Waste*, George Newnes, Ltd., London (1958).

³J. C. COLLINS (ed.), *Radioactive Wastes: Their Treatment and Disposal*, E. and F. N. Spon, Ltd., London (1960).

⁴E. GLUECKAUF (ed.), *Atomic Energy Waste. Its Nature, Use, and Disposal*, Interscience Publishers, Inc., New York; Butterworth & Co., Ltd., London (1961).

⁵C. B. AMPHLETT, *Treatment and Disposal of Radioactive Wastes*, Pergamon Press, New York (1961).

English authors. Since that time a better perspective has been obtained of the true dimensions of the radioactive-waste-disposal problem.

Dr. Mawson has been one of the leading international figures in helping to define the magnitude of the waste problem. In this volume he has attempted to "describe, as far as possible in nontechnical language, the routine of the waste-management problem to show how this problem is being met at the present time, and to indicate the lines of development most likely to be followed in the future," and "provide information suitable for preparing students for entry into an interesting and rewarding profession" (that is, radioactive-waste management). He notes, however, that "some of the detail and many of the references given in these pages are directed more to the specialist than to the public or the student. . ."

The excellent introductory chapter on general principles of waste management and the concise summary statements at the end of each chapter should satisfy the first audience. The student should be satisfied by the well-rounded picture of waste management, but the specialist will be a bit disappointed at the relatively few references to the specialized conferences under the auspices of the International Atomic Energy Agency and the almost total lack of references to the Proceedings of the Third International Conference on the Peaceful Uses of Atomic Energy. Though the preface is dated January, 1965, the first chapter states: ". . . references in this book have been made, wherever possible, to papers in these four publications" (reports of meetings held 1955 to 1959).

The outline follows the standard format of discussion of sources of wastes, treatment of wastes, storage and disposal of wastes, and, finally, monitoring and control, and political and legal considerations involved in waste management. The book provides a good picture of waste-disposal procedures, but with particular emphasis on Canadian methodology. For example, the section on Disposal into Sea, Lakes, and Rivers gives a resume of Canadian experiences only in discharging wastes to rivers. The more extensive studies on the Columbia River (Hanford) and the Clinch River below Oak Ridge, and the river work done in France, the United Kingdom, and the Soviet Union are not mentioned. There is, however, a reference to the IAEA panel report on Disposal into Fresh Water which discusses, in detail, discharges from some of these sites. The effect of discharges from nuclear power plants to rivers would also be of interest.

The extent of treatment of subject matter varies considerably; for example, methods of operating specific pieces of Canadian equipment for sampling soil are given more space than either discharges into rivers or sea disposal.

For didactic purposes in the early chapters, particularly on sources and volumes of wastes and waste management, there is some repetition. As in all books, there are a number of errors and omissions. For example, the Oak Ridge self-sintering project has been abandoned for over 5 years, but is still described in the text as about to begin. Among the topics omitted are proposed methods of fuel element reprocessing which may eliminate aqueous high-activity wastes and some of the hazards of high-activity tank storage; transport problems of waste and the IAEA regulations pertaining to them; hazard or safety analyses in waste management operations; geologic, hydrologic, and climatological requirements for ground disposal; reconcentration in the environment; and tritium as a fission product.

It might also have been helpful to list in the "Selected References" some of the journals especially concerned with waste management problems. These include *Health Physics*, *Nuclear Safety*, and *Reactor Fuel Processing*.

The book does serve to update some of the previous books on this subject and will be helpful to those who use its summary sections for quick briefing, to the student who wishes a first introduction, and to the scientist who wishes a check list of topics and references to be considered in a waste-management scheme.

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*Operated by Union Carbide Corporation for the USAEC.