(About the Reviewer. L. J. Vortman has been associated with the Nuclear Burst Physics Department at Sandia Corporation, Albuquerque, New Mexico, since 1949. There, he has accumulated experience in weapon effects with emphasis on air blast loading and underground phenomena, especially explosive cratering. Since 1955, he has directed Program 34 of the AEC's Civil Effects Test Group at the Nevada Test Site. He is currently a member of the Subcommittee on Protective Structures of the National Academy of Sciences.)

Treatment and Disposal of Radioactive Wastes. By C. B. AMPHLETT. Pergamon Press, New York, 1961. 289 + viii pp. $12.00.

As the preface of this book points out, the field of radioactive waste treatment has recently been undergoing considerable development. In the early stages of nuclear energy, the emphasis was entirely on rapid production and the waste which could not be dispersed to the environment was simply stored; concentration by evaporation was almost the only treatment used.

Recently many new processes have been investigated, most in the laboratory but some on a field scale. Dr. Amphlett, of the Chemistry Division at Harwell, has written this book with the intention of describing these developments, from both the fundamental and applied viewpoints. He has succeeded admirably and his book will be of great importance, not only to those directly concerned with treating radioactive wastes, but also to a great many in the nuclear industry and in fields connected with public health.

The book begins with a discussion of the origin and nature of radioactive wastes, considering quantities, radiochemical properties, behavior in the environment, legal and economic factors, and the relative hazards of various types. This is followed by three chapters on the treatment of high level wastes, including chemical separation, evaporation, and fixation as a solid. In each of these chapters the approach is to describe first the theoretical basis, then the existing practice, and finally new methods which are still experimental. There follows a chapter on disposal of solid wastes including incineration and burial or storage.

A long chapter on the chemical and biological treatment of wastes containing low and medium activity levels follows. The treatment here is historical and very complete, possibly too complete. Some of the early work in this field might well have been passed over.

The next chapter covers disposal to the environment, including discharge into the ground, into rivers, and into the sea. Here again for each of these methods of discharge, the author has considered the principles involved, and then the actual operating procedures. Both American and British practices are given, the differences in attitude often being very interesting. Treatment and disposal of gaseous wastes, both particulate and vapor, is next presented, followed by chapters on minor waste problems such as isotope users, and on the future in waste treatment and disposal.

Dr. Amphlett has done a remarkable job of covering the many diverse aspects of radioactive wastes. He appears equally conversant with all these aspects, and his coverage is both thorough and clear. Bibliographies at the end of each chapter are extensive, covering the literature generally into 1959 and including the large volume of information presented at the Second Geneva Conference on the Peaceful Uses of Atomic Energy in 1958.

Taken all in all, this book is a must for anybody seriously interested in the problems associated with radioactive wastes. The only serious fault I can find with it is that the price of $12.00 will make it inaccessible to many individuals who will unfortunately have to rely on library copies.

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(About the Reviewer: Abraham S. Goldin has specialized in environmental radionuclide analysis, radioactive pollution, and radioactive wastes. He received his Ph.D. degree from the University of Tennessee. From 1943 to 1950 he worked for the Manhattan District, first at Columbia University and later at the Gaseous Diffusion Plant at Oak Ridge. Following this he spent nine years at the U. S. Public Health Service in Cincinnati as Chief Radiochemist. After serving for a time as Chemical Director of the Atomic Energy Commission's Winchester Laboratory and as an Associate Professor of Industrial Medicine at New York University he has just become Deputy Officer-in-Charge of the Northeastern Radiological Health Laboratory, U. S. Public Health Service.)

Criticality Control in Chemical and Metallurgical Plant. (Proceedings of the Karlsruhe Symposium, 1961, sponsored by the Organization for Economic Co-Operation and Development of the European Nuclear Energy Agency.) (About 90% of the book is in English, and the remainder in French.) 1961. 622 pp. $10.00.

This compilation of the papers and discussions given by many of the leaders in the field of criticality control (nuclear safety), succeeds very well in covering the entire subject from its theoretical and experimental aspects to its practical applications and even some administrative methods currently in use. The summarized discussions following the various papers are of particular note, and rather complete bibliographies are given for each subject. The printing and binding are excellent.

For obvious reasons, the book does not have the continuity and conciseness of a single-author document, and there is some repetitiveness and apparent minor contradictions in the different sections. Indications of personal preference of the various authors are usually handled with restraint, although there are some instances in which what is identified as an over-all summary or review of a given subject is treated somewhat as would be a research-type paper given at a professional meeting to present an apparently recently developed theory or interpretation.

The book does not have a preface indicating clearly its purpose, nor a simple summary of the basic principles upon which practical criticality is based, but these factors are covered by indirection in the various sections as well as in the bibliographical references and discussions.

The excellent and up-to-date summaries given of experimental data now available from various laboratories are especially noteworthy, and these sections provide what are probably the most valuable single contribution of the volume.

The presentations of theoretical methods are individually well handled and summarized. However, correlations between theory and experiment and their application to practical problems are not as well treated as might be desirable. Thus, the theoretical methods are presented in some

papers more in the way of mathematical exercises than as useful methods for criticality control, the types of systems for which the various theories have proven most successful are not always identified, and it is sometimes difficult to determine if a "critical" curve is experimental, theoretical, or an empirical extrapolation of data. In addition, the rather considerable difficulties frequently encountered in making theory applicable to practice are not usually discussed, theoretical predictions are not always compared with experiment, even where this is possible, and estimates are not always made of the extent of possible errors in the predictions, although such information is sometimes given.

The practical sections are well presented and generally cover their subjects rather well. However, a reader should recognize that these sections will unavoidably reflect the experience of the authors. For example, this reviewer believes that the descriptions of organizations assume more responsibility for the staff criticality control group than his own experience has indicated may be necessary, and the analyses given for some of the specific problems apparently lean more heavily on detailed theoretical treatments than may be necessary. In general, there also appears little recognition in the formal papers that rather detailed calculations frequently can give no more useful results for actual plant problems than do much simpler determinations, although this is implied in some of the discussions. It is particularly unfortunate that the section on interaction gives an inadequate and partially incorrect review of the solid angle method of spacing determination; such information is available in K-1335 and K-1478, in addition to the documents quoted.

It is the reviewer's opinion that this book, in reflecting the conference reports, summarizes very well the present state of the art, is the currently most complete summary of this field, and is highly recommended for all having an interest in the subject, especially those given the responsibility for establishing nuclear safety in production operations. It should be considered as a guide, however, and not necessarily a handbook or detailed reference.

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(About the Reviewer: Hugh F. Henry is currently Chairman of the Department of Physics at DePauw University. From 1949 to 1961 he was responsible for criticality control (nuclear safety) at the Oak Ridge Gaseous Diffusion Plant. Among the many authoritative documents he has written on the subject are included "Criticality Data and Nuclear Safety Guide Applicable to the Oak Ridge Gaseous Diffusion Plant," K-1019, and "Studies in Nuclear Safety," K-1380. He continues active in many phases of health physics and criticality control.)