the quantitative aspects of the displacement of atoms and the stable configurations such defects take in crystalline solids. These two topics occupy one-half of the book, all other aspects of the topic being crowded into the remainder. As he makes perfectly clear, the author is not interested in setting forth in detail the behavior of various types of solids during, or subsequent to, irradiation. Instead, he is quite content to emphasize the concepts and mechanisms of defect creation by the incident radiation, touching only the high spots of the actual radiation response as reflected in altered physical properties. Only those aspects of the topic that are common to radiation effects in a wide variety of materials are treated in any degree of detail. One chapter is devoted to annealing of damage, and a description of recently developed techniques for direct observation of lattice damage is included. Obviously, in a work of this size much of the detail must be left out, and it is largely a matter of taste as to what is included and what is excluded.

Kelly has given us a very thorough treatment of the quantitative theory of the displacement of atoms in solids. Most of the attention is focused upon what is now called simple damage theory in which the number of defects created in a displacement cascade are estimated without reference to the ordered arrangement of atoms on a lattice. Refinements required to allow for extraneous losses such as those due to ionization induced by the primary recoil are clearly set forth near the end of the chapter. Those mechanisms such as focusing and channeling which take account of the crystalline lattice are briefly treated. In view of the recent rapid progress in channeling studies and the importance which replacement sequences (focusing) have assumed in the interpretation of radiation damage in ionic crystals, this emphasis rather dates the book. It is unfortunate that some of the experimental channeling results obtained over the last several years could not have been mentioned. In addition, recent experimental results of the quantitative aspects of damage production strongly suggest that the criteria employed in setting the ionization limit L_c employed by the simple theory may be much too naive to be effective. Hence, these recent developments tend to undermine the quantitative results of the simple theory. This point could have been stressed more strongly in the book. Another difficulty is the lack of a clear-cut confrontation of theory with experimental results in these quantitative estimates of defect yields.

Aside from this deficiency, the book should be a valuable one to the uninitiated; in particular, the young reactor engineer, since it presents in a concise way those factors necessary for a quick assessment of the radiation response of the more common metals and alloys. The last chapter in particular should be consulted by those who use reactors to carry out radiation damage experiments. If such a reasoned discussion of the neutron spectra and damaging flux had been carefully studied and digested over the past decade, much of the confusion and apparent inconsistencies among results that have plagued neutron bombardment experiments could have been avoided.

Since February, J. H. Crawford has been chairman of the Physics Department of the University of North Carolina at Chapel Hill. Prior to that time, for a period of 18 years, he conducted and directed research at Oak Ridge National Laboratory in the field of radiation damage in solids with major emphasis upon semiconductors and insulators. He received his PhD in Physical Chemistry from the University of North Carolina in 1949.

CAPABLY EDITED

Title Clinical Uses of Whole-Body Counting

Editor Stanton H. Cohn

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Reviewer C. R. Richmond

This book is from the *Panel Proceedings Series* of the International Atomic Energy Agency (IAEA). It represents the combined efforts of a panel of physicists and clinicians from six countries who convened in Vienna from June 28 to July 2, 1965, at the invitation of the IAEA. Two general goals of the meeting are apparent: a consideration by the physicists of optimal physical requirements of whole-body counters for metabolic tracer studies, and an evaluation by the clinicians of medical experience gained from whole-body counters. This volume updates the state-of-the-art for instrument development and clinical applications since the IAEA-sponsored Symposium on Whole-Body Counting held in Vienna in 1961. The duality of interests is very significant, as efficient design, operation, and utilization of a clinical whole-body measuring facility are virtually impossible without close cooperation among and communication between physicists and clinicians. Although the book acknowledges no individual authors or editors, the discussion sections were capably edited by Dr. Stanton H. Cohn of the Brookhaven National Laboratory.

The format comprises eight chapters under the general heading of "Physical Aspects of Whole-Body Radioactivity Counters," and six chapters under "Clinical Applications of Whole-Body Radioactivity Counting." Dr. E. Oberhausen of the Federal Republic of Germany provides a sound introduction to liquid scintillation counters by discussing the Los Alamos 4π models (HUMCO-I and HUMCO-II) and the Landstuhl 2π counter. Problems of energy calibration and counting geometry are introduced in an understandable form for the nonexpert. Liquid scintillator systems are compared with NaI (Tl) crystal systems as to relative geometry and efficiency. An important point introduced at the onset is that isotope identification is rarely important in clinical applications and, therefore, the system that is most efficient and less dependent upon counting geometry is the system of choice. However, this does not consider those cases in which spatial localization of the activity is of importance to the clinician. Also covered in the first section are plastic scintillation counters, analytical methods, counting geometries, calibration problems for NaI (Tl) systems,

design criteria, assessment of efficiency and geometry characteristics, and multiple crystal systems. The chapter on a localizing plastic scintillator whole-body counter is very valuable, as it represents a system that is intermediate between the liquid scintillator counters of high efficiency and good geometry, and the usually heavily collimated NaI (Tl) detectors characterized by relatively poor geometry and efficiency but good spatial resolution. Those faced with the prospects of development of a counting facility will profit from the chapter on design criteria. Although something of economics is mentioned in this chapter, the general problems of cost are not adequately covered by the book. Much of the information on counting efficiency and geometrical considerations is treated rather rigorously and is definitely not for the uninitiated.

The second section of the book deals with the application of whole-body counters for measuring electrolyte metabolism, alkaline earth elements in bone diseases, protein metabolism using ^{131}I-labeled proteins, radioiodine, and the absorption and excretion of ^{60}Co-labeled vitamin B_{12} and ^{59}Fe. Under electrolyte metabolism, particular emphasis is given to the study of obesity and to muscle diseases such as dystrophy. Considerable emphasis is placed on compartmental theory and parameters required to estimate exchangeable pools and accretion rates in the chapter on bone diseases. Advantages of whole-body counting techniques for measuring protein turnover (^{131}I-labeled) in patients with neoplastic diseases, as compared with methods based on serum and urinary excretion measurements, are well presented. Much of this portion of the book is indicative of how information gained by whole-body counting systems can supplement information obtained by more conventional methods. There is little question that this technique is a valuable adjunct to other tools available to the clinician. In some instances, it provides a rather unique tool; for example, blood levels of Na^+ and K^+ are not always reliable indicators of entire body pools. In such cases, whole-body counting provides a facile means of determining exchangeable body pool sizes rapidly and accurately.

In summary, this book suffers little from the discontinuity in presentation and style often encountered in works by multiple authors. It is a specialized treatment of the subject and contains a wealth of information for those concerned with either the physical or biological aspects of whole-body counting.

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A CURSORY SURVEY

Title Legal Considerations of Ionizing Radiation

Author Gerald L. Hutton

Publisher Charles C. Thomas

Pages vii + 93

Price $5.50

Reviewer N. P. Rathvon, Jr.

Even in the atomic age, legal principles display their common-law ancestry. Negligence remains negligence though the x ray be substituted for the scalpel. Too many legal writers fail to recognize that a discussion of radiation injury cases may contribute nothing to legal knowledge.

In the main, Mr. Hutton avoids this mistake by limiting his citations to a few well-chosen illustrative cases. The early chapters of *Legal Considerations on Ionizing Radiation* constitute a commendably simple introduction to radionuclides, their uses and dangers. The chapter "Proof of Actionable Radiation Injury," clearly the most valuable in the book, contains many useful warnings of some of the weaknesses, exploitable by litigants, in personnel monitoring systems.

However, the book is too cursory a survey to be of great value. There are important omissions, such as a discussion of "informed consent," and of Section 170 d (Price-Anderson) of the Atomic Energy Act, which is of paramount importance to manufacturers of reactor components and supplies. The distinction between recoveries at law and those under Workmen's Compensation Statutes is not clearly drawn. In the latter, negligence is not an issue, and in a growing number of jurisdictions the Statutes of Limitation have ceased to be a problem (eg: Sec. 28 N.Y.W.C.L.).

Although willing to accept its various responsibilities to its employees, its customers, and third parties, management still needs counsel in establishing procedures and maintaining records that form a legally sound defense against unfounded claims. It is disappointing that Mr. Hutton did not make more of his valuable experience available by discussion of such topics as pre-assignment training, site measurements, documenting enforcement of safety rules, and retention of records.

The book can be warmly recommended for plaintiffs' attorneys with no prior experience in radiation cases, but technical and administrative personnel and their counsel can find more valuable additions to their libraries.

N. Peter Rathvon, Jr. is a member of the New York Bar and has been engaged in the practice of corporate law for 18 years. For the past 10 years he has been Resident Legal Counsel at Brookhaven National Laboratory.