

ivations for allowed transitions, calculation of matrix elements based on a single particle model, beta decay of polarized nuclei, and muon decay.

The authors have provided a very excellent summary and review for those interested in the weak interactions; it is reading to be well recommended.

*Theodore B. Novey is a Senior Physicist in the High Energy Physics Division of Argonne National Laboratory. He was a member of the Manhattan Project (1942-1946) at the University of Chicago and Oak Ridge, an NSF Postdoctoral fellow to the Institute of Physics, Swiss Federal Institute of Technology in Zurich (1952-53), and a Guggenheim fellow to CERN (1961-62). His PhD is in Physical Chemistry, from the University of Chicago (1948).*

## THORIUM UTILIZATION

*Title* Utilization of Thorium in Power Reactors

*Publisher* International Atomic Energy Agency, 1966

*Pages* iv + 376

*Price* \$8.00

*Reviewer* J. H. Kittel

This book contains the Proceedings of a Panel on the Utilization of Thorium in Power Reactors. The panel was convened by the International Atomic Energy Agency in June 1966, in Vienna. The Proceedings consist of 23 summary papers and a section entitled "Summary Report and Recommendations." The summary papers include contributions from Australia, Brazil, Canada, France, Germany, India, Italy, Japan, the Netherlands, Sweden, the UAR, the USA, and the USSR. As might be expected, the subject matter of the papers varied according to the interests of the countries represented. These interests range from extensive effort to assess thorium ore reserves, to detailed studies of both thermal and fast converter-breeder fuel cycles.

The principal US effort on thorium

utilization is at ORNL. This is reflected by the fact that the six US papers given at the Conference were prepared by ORNL authors. The US papers provide a comprehensive survey of developments in thorium technology at Oak Ridge, and also include discussions of several thorium converter reactor designs. On the other hand, relatively little information appears in the US papers regarding advancements in thorium technology at sites other than ORNL. Also, this reviewer could find no discussion of mixed fuel cycles, or mention of US studies on the use of thorium in large fast reactors to maintain negative sodium void coefficients.

The "Summary Report" that appears at the beginning of the book is an excellent review of the present state of development of thorium utilization in power reactors. This section should be read by all who are interested in learning where and how thorium is being introduced into the world's power reactor economy.

*J. Howard Kittel is a Senior Metallurgical Engineer at Argonne National Laboratory. For the past nine years he has been Leader of the Engineering Irradiation Group in the Metallurgy Division at Argonne. His principle involvement is in the development of materials for fast breeder reactors. Prior to joining Argonne in 1947, he was at the Lewis Research Laboratory in Cleveland in the High Temperature Materials Section. He received his BS degree in Metallurgical Engineering from Washington State University in 1943.*

## AN ORGANIZED, INTELLIGENT APPROACH

*Title* Radioactivity and Human Diet

*Editor* R. Scott Russell

*Publisher* Pergamon Press, 1966

*Pages* xi + 552

*Price* \$15.00

*Reviewer* Stanton H. Cohn

It has become commonplace to state that the problem of the radio-

active hazard currently facing mankind is new only with respect to degree, inasmuch as man has always existed in a radioactive environment. This point of view fails to emphasize that man's awareness of this aspect of his environment is only recent, and further, that concomitant with this awakening interest there is a significant potential increase in the amount of radioactivity in the environment. While current production and testing of weapons utilizing radioactive materials have added small amounts of activity to the total quantity of radiation in the earth and its atmosphere, the prospect of harnessing energy from radioactive sources for fulfilling the power requirements of future generations points to the prospect of a manifold increase in the concentration of radioactivity about us in the near future.

Radioactivity in the environment can affect man in three ways: radiation from external sources can penetrate the body; radioactive material can be inhaled; or it can be ingested where it subjects the body to chronic radiation until eliminated. Of the three, ingestion of radioactively contaminated food represents the greatest potential radiation hazard in respect to worldwide fallout.

*Radioactivity and Human Diet* deals with assessing the hazard to man resulting from current levels of radioactive fallout in our environment. Specifically, the data on the transport and movement of radionuclides from the atmosphere to soil and up through plants to animals and finally to man are reviewed. Each phase of the movement of the major radionuclides through the terrestrial food chain and aquatic food chain is considered separately. While much of this material has been presented in the report of the UN Scientific Committee and reports of National committees both in the United States and the United Kingdom, this book represents an attempt to collect all the pertinent background data under one cover.

The primary emphasis of the book is on quantifying the incorporation of  $^{90}\text{Sr}$ ,  $^{131}\text{I}$ , and  $^{137}\text{Cs}$  into food and their subsequent uptake by man. Strontium-90 is the fission product of greatest potential hazard to man, followed by the iodine radioisotopes and  $^{137}\text{Cs}$ . While emphasis is placed on presenting existing data on all

three of these isotopes, other fission products and naturally occurring radionuclides are considered briefly.

For the novice in this field, an excellent introduction is presented on both the nature of the internal radiation hazard in terms of the biological effects and on the criteria for evaluating radiation hazards. For the health physicist and the medical personnel who have the responsibility of dealing with the problem of a population exposed to radioactive contamination, there is a wealth of useful information collated in this book. The final section on remedial measures summarizes the present state of knowledge or ignorance on how to minimize this new hazard to the population. Most of the book deals with the assessment of this hazard. It is clear that, to date, relatively little progress has been made on techniques for dealing effectively with this problem. A great deal more research needs to be carried out in this important field. The subject matter of this book represents one of the newer interdisciplinary fields where active collaboration among biologists, chemists, physicists, nutritionists,

agriculturists, medical people, health physicists, and others is required. Certainly the data so effectively presented in *Radioactivity and Human Diet* go a long way to provide the background for an organized, intelligent approach to how to live in what will surely be an increasingly radioactive environment.

*About the Reviewer: Stanton H. Cohn joined the staff of the Medical Physics Division at Brookhaven National Laboratory in 1958, where he has worked in the fields of chemical dynamics of the mineral metabolism of bone, and the distribution and biological effects of internally deposited radioisotopes. In March 1954, he was a member of the US Navy Medical Team which provided medical treatment for the Marshallese accidentally exposed to fallout. He has been associated with surveys of these islands since, particularly with assessing the internal radiation hazard from ingestion of contaminated food. His PhD in physiology and radiobiology is from the University of California (1952).*

## BOOK ANNOUNCEMENTS

Although the following books will not be reviewed, they may be of interest to some of our readers:

*Reliability Handbook*, W. Grant Ireson, ed., McGraw-Hill, 1966, 720 pp, \$22.50

*Particle Waves and Deformation in Crystalline Solids*, Edwin R. Fitzgerald, John Wiley & Sons, 1966, 249 pp, \$11.95

*Radioisotope Instruments in Industry and Geophysics*, International Atomic Energy Agency, 1966, Vol. I, 577 pp, \$12.00; Vol. II, 477 pp, \$10.00

Of all these books  
The one called *Grooks*  
By Piet Hein,  
That poet fine,  
We like the best  
(From the MIT Press).

## Corrigendum

Seymour Lieblein and James H. Diedrich, "Material and Geometry Aspects of Space Radiators," *Nucl. Appl.*, 3, 82 (1967).

The labels on the diagram in Fig. 2, Page 83 were to appear as shown at right:

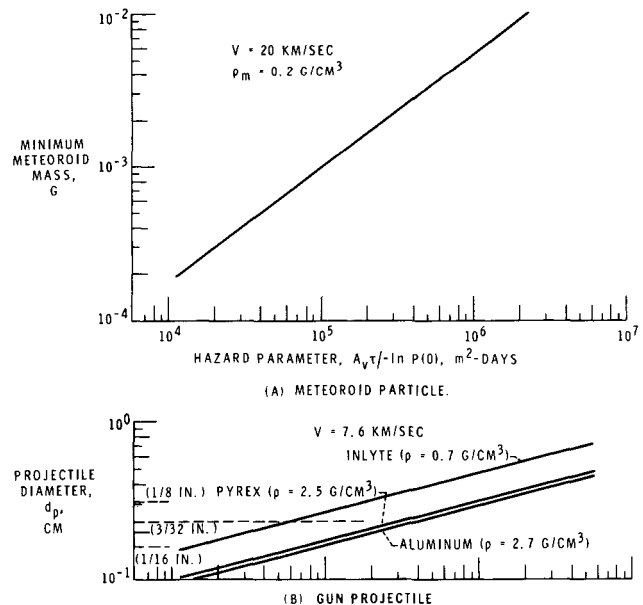


Fig. 2. Meteoroid and projectile-particle variation for equal kinetic energy. (a) meteoroid particle (b) gun projectile.