presents an interesting model for evaluating the effects of the explosion of vapor clouds.

Siting of Nuclear Facilities, as a symposium report, suffers from the lack of continuity and organization in the manner in which the various topics are presented. There is also repetition stemming from the fact that, by and large, most countries use similar techniques and criteria to site nuclear plants. The book is valuable, however, as it portrays at a particular point in time the efforts made and techniques being used by the nations of the world to address the question of nuclear plant siting—an endeavor complicated by conflicting, often nebulous, requirements and generally unfavorable public attitudes. The question sessions after most papers add a personal touch, which allows the reader who did not attend the symposium to get something of the feel of the sessions. While the book could hardly serve as a textbook, it would be a valuable addition to the library of any school or industrial organization working in the nuclear field.

W. Reed Johnson received his DSc from the University of Virginia in 1962 and has served on the nuclear engineering faculty there since 1964. Prior to that, he worked as a shielding engineer for the Electric Boat Division of General Dynamics, and for Alco Products Company on the design and operations of the Army Package Power Reactor. In 1962 he headed a cooperative project between the University of Virginia and the Philippine Atomic Energy Commission. In 1969 he spent a sabbatical year with the U.S. Atomic Energy Commission Directorate of Licensing. He has served on nuclear safety review committees for Babcock & Wilcox and the Virginia Electric & Power Company. In 1974 he was nominated to the Atomic Safety and Licensing Appeal Panel, and he continues to serve as a half-time member of that body.

Thorium: Physico-Chemical Properties of Its Compounds and Alloys

Editor	O. Kubaschewski
Authors	M. H. Rand, O. von Goldbeck, R. Ferro, K. Girgis, and A. L. Dragoo
Publisher	International Atomic Energy Agency, Vienna, 1975, and Unipub, Inc.
Price	$15.00
Pages	241
Reviewer	J. Fuger

This book is part of a series of monographs (published by the International Atomic Energy Agency, Vienna) dealing with the physicochemical properties of some metals important in reactor technology, together with their alloys and compounds. Previous issues covered plutonium, niobium, tantalum, and beryllium and were concerned as the present one with thermochemical properties, phase diagrams, crystal structure and density data, and diffusion rates. Such publications go much further than providing an up-to-date review of the field since they present the essential advantage of furnishing a consistent set of data that were selected after a careful and critical assessment. This aspect is particularly important in the case of the thermochemical properties and related phase boundaries. All the authors of the present book have acquired a very high international standing in their respective fields, and this, by itself, is a criterion of the quality of the selected data.

The chapter on thermochemical properties (M. H. Rand) covers the metal, the ions in aqueous media (excluding complex species), binary and quasi-binary compounds, alloys, and miscellaneous compounds (nitrates, sulphates . . .). The material is presented in an extremely orderly and critical fashion, the author invariably justifying his choice for a selected value. At the end of the chapter, thermodynamic quantities tabulated as a function of temperature will be particularly handy for the user.

The phase diagram data (O. von Goldbeck) also yield an excellent synthetic view of a vast field in which the experimental results are sometimes fragmentary. Areas where the existing data are inconsistent are clearly outlined, and here again due consideration is given to the choice of the best values.

The next chapter, on crystal structures and densities (R. Ferro and K. Girgis), is a comprehensive compilation of data and also constitutes a priceless source of information. One may somewhat regret, however, that uncertainty limits are absent from the values reported in the first part of this chapter (R. Ferro).

Although covering adequately the existing data, the last chapter (A. L. Dragoo), devoted to diffusion rates in the metal and the dioxide, is very limited in length (three pages), thus reflecting our relative lack of information in this technologically important field.

In summary, this book is indispensable for all the scientists and engineers interested in the development of the uses of thorium as fertile material in breeder reactors or more simply in the knowledge of the properties of thorium and its compounds.

J. Fuger is presently associate professor at the University of Liège (Belgium), where he teaches nuclear chemistry and microchemical techniques. His research field is concerned with the physico-chemical properties of the actinides and their compounds, more particularly thermodynamic and structural data. He has been associated for various periods of time with the Lawrence Berkeley Laboratory of the University of California, Oak Ridge National Laboratory, and Argonne National Laboratory, and has lectured in many American and European institutions. He is serving now as director of the U.S. Calorimetry Conference for the period 1975-1977.

Advances in Nuclear Science and Technology, Volume 8

Editors	Ernest J. Henley and Jeffery Lewins
Publishers	Academic Press, Inc.
Price	$35.00
Pages	349
Reviewer	Bernard I. Spinrad

Nuclear energy does not have adequate review journals. The function

of review has therefore been assigned by default to invited papers presented at symposia. Unfortunately, most such are presented by project managers who have very partisan points of view. The general result is that it is difficult to find summary articles on practical topics in nuclear science and engineering that are complete and professionally unbiased.

The series of *Advances* was started with the avowed intention of filling this functional gap. At first it did not do so. Earlier volumes were flawed by articles whose chief value lay in official sponsorship of the topics presented, or by articles that presented topics of parochial interest. The series has now grown up.

It is a pleasure to report that this volume of review articles is a worthy addition to the professional literature of nuclear energy. The articles are of uniformly high quality and, for the most part, are timely. They will be treated one at a time in the review that follows.

The first article, "Quasi-Exponential Decay of Neutron Fields" by Noel Corngold, is definitive of its topic. Corngold's papers are always clear and complete, and this is no exception. I can pick one bone, only, with it. The topic of neutron pulses and neutron waves, with which this paper is concerned, has actually been a rather sterile one as to its practical contribution to nuclear energy. I hope that the fact that not everything is yet understood about it is not taken as an invitation to continued concentrated effort on this subject, an effort that the paper's epilogue seems to encourage.

The second paper, "Integral Experiments in Fast Zero Power Facilities" by Edgar Kiefhaber, is a comprehensive summary of both experiments and their interpretation by one of the leading physicists of the Karlsruhe group. The 167 references are a comprehensive checklist of the important material on the subject, and the conclusion that future experiments will be justified on technical rather than scientific grounds is supported by the text material.

"Evaluated Nuclear Data Files" by S. Pearlstein is less a review than it is an introduction to the topic. The author, a leader of the Brookhaven group, has chosen to describe rather than to evaluate the various compilation activities throughout the world. The chief virtue of the article is in its references to the documentation that accompanies each of the data files covered.

"The Management of Fission Products and Long-Lived Alpha Wastes" is by J. P. Olivier of the OECD Nuclear Energy Agency. It is basically a summary report, with some interpretation, on the Paris Symposium on Management of Radioactive Wastes from Fuel Reprocessing held in Paris in 1972. The status of the topic as reported then was, and remains now, "scientifically under control, some experiments needed, no surprises expected." This article is recommended for study by nuclear engineers who wish to respond to the waste management "issue." This red herring has been cynically publicized by scientists opposed to nuclear energy who have deliberately obfuscated the scientific facts involved.

"Finite Element Methods in Reactor Physics Analysis" by K. R. Hansen and C. M. Kang of the Massachusetts Institute of Technology is a good presentation of an important topic. As an empirical theorist, I discovered on reading the article that I have been using the finite element throughout my career without realizing it! The article is long and makes up for a somewhat inadequate biblography by treating the topic at several levels: heuristically, by suggestion, by theorem, and by illustration.

The final article, "Coated Nuclear Fuel Particles" by N. Piccinini of the Turin Polytechnic Institute (Italy), is essentially a textbook chapter on the topic. The review is by exhaustive bibliography, while the text is explanation. It is quite possible that this is the preferred way of presenting this subject, since much of the literature is "best-foot-forward" revelation of proprietary data, and basic understanding is the key to its interpretation.

This book is recommended for purchase by any nuclear engineer who has specific interest in the topic of at least one article and general interest in reviewing the status of subjects that are important to the profession as a whole.

B. I. Spinrad (BS, MS, PhD, physical chemistry, Yale University) has worked in the field of nuclear energy since 1946. He has worked at Oak Ridge National Laboratory, Argonne National Laboratory, and with the International Atomic Energy Agency, and has taught at the University of Illinois, the University of Wisconsin at Parkside, and the International Institute of Nuclear Science and Engineering at Argonne, Illinois. Since 1972 he has been professor of nuclear engineering at Oregon State University. Spinrad is the author of more than 70 technical publications, including major works on computing methods, experimental physics simulation of large reactors, fuel lifetime in power reactors, basic reactor physics laws, and novel reactor concepts.

Radioactivity in the Marine Environment

(Panel on Radioactivity in the Marine Environment of the Committee of Oceanography, National Research Council)

Publisher	National Academy of Sciences (1971)
Pages	272
Reviewer	John A. Wethington, Jr.

In trying to review this book, I really was not sure what to do. Its 272 pages—$8\frac{1}{2} \times 11$ in.—contain a wealth of information, and therein lies the trouble. No reviewer can possibly read and understand the entire ten chapters, which were written by 31 persons from 23 organizations.

The flavor of this volume is best understood by presenting the history of the publication. In 1957, the National Academy of Sciences—National Research Council published "Effects of Atomic Radiation on Oceanography and Fisheries," a 137-page report, which summarized knowledge at that time and suggested future research programs. In the late 1960's the now-disbanded U.S. Atomic Energy Commission requested that the Academy undertake a second comprehensive review of this area, and the task was assigned to the Panel of Radioactivity in the Marine Environment of the Committee of Oceanography. Work was started in 1967, and the material was