Book Reviews

Nuclear Energy Technology. By Ronald Allen Knief, McGraw-Hill Book Company, New York (1981). 605 pp. $27.95.

Everything you wanted to know about nuclear technology—and much much more. Ronald Knief has covered, if not smothered, the subject of commercial nuclear power. It is all there; from nuclear physics and reactor core physics to risk assessment and Three Mile Island (TMI) with all bases touched in between. The exceptionally broad coverage implies some superficiality and dullness (it's a little like reading the Handbook of Chemistry and Physics), but it is enormously informative.

This is a reference, not a text, and it can profitably be consulted by any literate person. This is a source for facts, not a well-spring for understanding. The facts include (among others): Nuclear Physics, Reactor Physics, Reactor Kinetics, Fuel Management, Reprocessing and Waste Management, Thermal and Fast Reactors, Breeders and Convertors, Safety and Risk Assessment, TMI, the Regulatory Process, and Nuclear Safeguards. There is also a chapter on Nuclear Fusion.

The assertion above that this is not a text, but a reference, is of course based on personal opinion. It is contrary to the author's opinion and experience as outlined in his Preface. I suppose this difference in opinion reflects some sort of difference in pedagogical philosophy that deserves no further elaboration here.

Nuclear technology is viewed from the points of view of science, engineering, economics, politics, and sociology. The author is carefully nonopinionated and he provides thorough documentation. The book supplies a fine grist for all parties to the nuclear controversy. The recitation of facts is enlivened and enriched by many pictures, figures, graphs, and tables.

The author has performed a service in bringing this mass of material together between two covers. I anticipate appealing to it with some frequency in the future.

The book is organized into six chapters. The first of these is devoted to the introduction of concepts and terminology. The second is the most technical of all six. It provides a fast overview of the relevant nuclear physics and fission reactor core physics. Symbolic language is necessarily, but minimally, resorted to and I believe the bulk of its content can be appreciated by interested, but nontechnical, readers. Chapter 3 is devoted to the fission reactor fuel cycle—uranium processing, fuel assembly design and fabrication, reprocessing, wastes, and waste management. In Chap. 4, the principal types of commercial power reactors are described. These descriptions are rather complete; including details of core design, heat transfer systems, and steam generation. Chapter 5 deals with fission reactor safety and nuclear safeguards. The consequences of fission reactor accidents, the assessment of the risk of such accidents, the TMI accident, the regulatory process, and the safeguarding of special nuclear materials are discussed in considerable detail. Finally, Chap. 6 presents a summary of the current status of research aimed at the realization of controlled thermonuclear fusion as an energy resource. Both magnetic and inertial confinement systems are discussed.

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About the Reviewer: Dick Osborn has been a member of the faculty of the University of Michigan for nearly a quarter of a century and is now professor of nuclear engineering with special interests in nuclear and plasma physics. Following Dr. Osborn's graduate studies at Michigan State and at Case he was located at the Oak Ridge National Laboratory.

Economic and Environmental Impacts of a U.S. Nuclear Moratorium, 1985-2010. By Charles E. Whittle et al., The MIT Press, Cambridge, Massachusetts (1979). 381 pp. $22.50.

This book offers excellent insights into the potential economic and environmental impacts of a nuclear moratorium in the U.S. The bottom line of the authors' analysis is that these impacts are neither dramatic nor unbearable. This book is basically a defense of nuclear option by acknowledged nuclear proponents.

The book contains unusually rich technical information. It will be an excellent reference book for analyzing important economic and environmental impacts of alternative energy systems. The authors clearly recognize the need to develop a credible base scenario for any impact analysis. Thus, they make considerable effort to analyze the key factors for determining economic growth, which, in turn, affects the nation's energy needs. These detailed quantitative analyses are important features of the book, distinguishing it from other popular books such as Harvard Business School's *Energy Future* and the Resources for the Future's *Energy: The Next Twenty Years*. In this book, the authors developed their own economic and energy projections with rigorous quantitative analysis of important determinants and do not rely on other projections.

This book also makes a contribution in the realm of methodology. The study relies on an explicit and precise quantification of the impacts of a nuclear moratorium. To do so, the analysis deals with primarily quantifiable variables. Such an approach avoids, to the extent possible, making judgments on emotional, human, societal, and institutional factors. I prefer this approach because I know precisely how the authors draw their conclusions, with which I may or may not agree. Even though a U.S. nuclear moratorium may not be a probable scenario under the current political environment, the methodology can be applied to other situations dealing