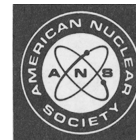


BOOK REVIEWS

Selection of books for review is based on the editor's opinions regarding possible reader interest and on the availability of the book to the editor. Occasional selections may include books on topics somewhat peripheral to the subject matter ordinarily considered acceptable.



Reactor Core Fuel Management

Author P. Silvennoinen
Publisher Pergamon Press Ltd.
Pages 257
Price Hardcover \$17;
Flexicover \$11
Reviewer Alexander Sesonske

There has been a need for some time for a book on nuclear fuel management. In this book, reactor core fuel management is defined as those aspects of fuel composition and loading, whether related to physics, engineering, or economic decisions, that are relevant to optimal fuel utilization within the design limits imposed on the reactor core. If we consider nuclear fuel management as involving strategies for the entire fuel cycle, then reactor core fuel management covers a more limited activity. However, loading strategies do depend to some extent on fuel cycle parameters, so only limited decoupling is possible. Definitive coverage of even core fuel management therefore represents a major challenge.

This is a short book, based on lectures given in Finland, but is intended to cover the subject from the electric utility viewpoint. Although the book is interesting and contains a good deal of useful information, it does not adequately cover the subject.

The first two chapters review reactor physics topics, although the reader is assumed to have an introduction. A subsequent 16-page

chapter on core heat transfer serves to remind the reader of the role of thermal-hydraulic constraints but provides little basic background. Short chapters devoted to reactivity and reactor operation considerations are good. In these and other chapters, a narrative style of presentation unencumbered with many equations tends to emphasize the desired ideas but often also results in rambling generalities.

The heart of the book is a section on core analysis, introduced by a chapter on core management strategies that is much too brief, and followed by a chapter devoted to computer code modules, which is over one-third of the entire book. Since the author intended this to be the only comprehensive chapter, the worth of the book depends upon it. Unfortunately, the reader is not led through the calculational steps required for multigroup core analysis in a lucid manner. Those generally familiar with analysis procedures will find some useful suggestions, but the beginner will need guidance from elsewhere. More use of specific codes as examples would have made the treatment more meaningful.

Instructors are not likely to consider the book suitable as a text but might find it useful as a supplement to other material. Practicing engineers concerned with fuel management should examine the book to determine if they should add it to their libraries. The needed definitive coverage of core fuel management has not yet arrived.

Alexander Sesonske is professor of nuclear engineering at Purdue

University. He is widely known as the co-author with Samuel Glasstone, of Nuclear Reactor Engineering, and as the author of Nuclear Power Plant Design Analysis. He has made many contributions to the development of fuel management strategies.

Environmental Aspects of Nuclear Power

Author G. G. Eichholz
Publisher Ann Arbor Science Publishers, Inc.
(1976)
Pages 657
Price \$29.50
Reviewer Milton E. McLain, Jr.

Environmental Aspects of Nuclear Power is intended as a reference volume for all facets of the nuclear power community. As stated by the publisher, "Professionals responsible for formulating nuclear policy, developing nuclear power as an alternative energy source or monitoring its environmental effects require comprehensive and objective resource material." This is a difficult objective in light of the technically diverse nature of the nuclear industry, but the author has, in this rather comprehensive volume, done well in meeting these claims.

The book's introduction deals with the world need for electric power, the alternate sources of this power, and the resources available. The environmental aspects (land use, esthetic values, air and water pollution)

of alternate power sources are examined and quantitatively compared.

The dynamic factors of environmental protection for nuclear power plants are treated in some detail, with discussions of transport in surface waters as well as groundwater movement of radionuclides. Atmospheric transport is also discussed in considerable detail. The basic mathematical expressions describing hydraulic and atmospheric transport are given and discussed.

A well-written primer in biological radiation effects is presented that should enable those readers unfamiliar with this field to gain an appreciation for the real problems and to identify the emotional aspects of nuclear power radiation exposure risks.

The book contains a brief discussion and descriptions of nuclear power plant types in current use. The problems associated with waste heat dissipation are addressed, with ample comparison between nuclear and fossil-fueled power plants. The potential uses of waste heat are also outlined. Alternate methods for waste heat removal are critically examined.

The treatment of radioactive waste streams in the power plant, cost-benefit considerations, and other aspects of on-site waste handling are thoroughly described and evaluated.

The commitments to environmental surveillance around a nuclear power plant due to the dispersion of radioactive effluents are described, with specific attention to areas such as transport models, exposure pathways, design of surveillance programs, specific measurement methods, and overall philosophy.

Less lengthy but accurate and useful technical discussions are given for other parts of the nuclear power cycle, such as power plant siting, transportation of nuclear materials, the fuel cycle industries, and the status of high-level waste disposal.

The final topic in the book is "Technological Assessment," which deals with such more intransitive subjects as cost-benefit optimization, risk-benefit assessment, and environmental impact statements.

This new volume should prove most useful as a working reference to those persons involved in the nuclear industry in a technical ca-

capacity, as well as to provide an accurate, up-to-date source of information to those not so directly connected with the industry, as was the intention of the author. This well-illustrated book is replete with timely references and should be appreciated by its intended audience.

M. E. McLain is an associate professor of mechanical engineering in the Nuclear Engineering Program at the University of Arkansas. He also serves as the radiological safety officer for the University. He obtained his PhD degree in nuclear engineering from the Georgia Institute of Technology in 1972, after receiving undergraduate and MS degrees in chemistry from Emory University and the University of Idaho, respectively. He has worked in several areas of the nuclear industry for 20 years and is certified by the American Board of Health Physics. He joined the faculty in Arkansas in 1974. His current research interests include nuclear power plant environmental monitoring, fission gas measurement methods, industrial isotope applications, and ²⁵²Cf applications.