second, methods for increasing critical heat flux for a boiling system. Multicomponent boiling and condensation, an enormous subject worthy of a book of its own, is examined briefly in the last chapter. Process industry engineers who struggle with multicomponent systems and mass-rate dependent evaporation will think this chapter is unsatisfactory and cursory. The readers of *Nuclear Technology* will find here a sufficient introduction to a peripheral subject.

All engineers in the power, petroleum, and process industries should have this book available, and each should try to read it. Whether each can master the material in a lifetime, and whether he can retain even a tenth of it is questionable. Luckily the author has provided a complete index that will relieve and refresh the memory.

*M. R. Bottaccini, a professor of mechanical engineering at the University of Arizona for 23 years, is currently a professor at the University of Wisconsin-Platteville. A graduate of the Iowa Institute of Hydraulic Research, Dr. Bottaccini is a specialist in mechanical measurements with special emphasis on fluid and thermal processes in biology and is recognized as an expert on the fluid mechanics of the human body. He is the author or coauthor of more than 100 professional articles and of 7 books. Currently, he is engaged in the writing of a book on the hydromechanics of the lower urinary tract scheduled to appear in the spring of 1983.*

### Hazardous Waste Processing Technology

*Authors* Yen-Hsiung Kiang and Amir A. Metry

*Publisher* Butterworths, Woburn, Massachusetts (1982)

*Pages* 549

*Price* $44.95

*Reviewer* B. L. Cohen

Following a brief introduction, this book is divided into two parts: 320 pages on thermal processing technologies and 200 pages on treatment technologies. Most of the thermal processing part deals with incineration, including a review of the fundamentals, descriptions of the various types of equipment—multiple hearth, fluidized bed, liquid injection, rotary kiln, cyclonic, auger combustor, multiple chamber, and fume incinerators—their peripheral systems, and miscellaneous topics; it also gives brief discussions of several other thermal processing technologies, like catalytic and oxygen incineration, pyrolysis, calcination, wet air oxidation, etc. The part on treatment technologies contains chapters on physical treatment including adsorption, centrifugation, dialysis, electrodialysis, electrolysis, electrophoresis, filtration, flocculation, flotation, freeze crystallization, freeze drying, suspension freezing, high-gradient magnetic separation, reverse osmosis, air stripping, ultrafiltration, and zone refining; there are also chapters on chemical and biological treatment with similar breadth of coverage.

As evidenced by the above lists given as examples, the coverage is very broad. The descriptions are clear and concise, aided by hundreds of figures. There is a reasonable amount of technical detail, including many tables, but not enough to make the reading slow or uninteresting. Environmental aspects, economics, advantages versus disadvantages, and range of applications are also considered.

The principal shortcoming for nuclear technologists is that there is very little material applicable to radioactive waste management. According to the biographical material on the authors, neither is experienced in that field, and there is no mention of the special problems involved in handling radioactivity. There is no discussion of encapsulation, solidification with cement, bitumen, or urea formaldehyde, or any of the other packaging techniques used or proposed for nuclear waste.

In summary, this book provides an excellent summary of nonnuclear waste management technologies, but not a great deal of direct applicability in the nuclear field.

*Bernard L. Cohen is a professor of physics at the University of Pittsburgh, former director of its Scaife Nuclear Physics Laboratory (1965–1978), past chairman of the American Physical Society (APS) Division of Nuclear Physics (1974–1975), and 1981 recipient of the APS Bonner Prize for research in nuclear physics. For the past eight years he has specialized in environmental aspects of nuclear energy with special emphasis on waste management, radon problems, health effects of radiation, and risk and risk aversion. He was 1980–1981 chairman of the American Nuclear Society's Division of Environmental Sciences.*

### Thermal Energy Storage and Regeneration

*Author* Frank W. Schmidt and A. John Willmott

*Publisher* Hemisphere Publishing Corporation, Washington, D.C. (1981).

*Pages* 352

*Price* $35.50

*Reviewer* Ozer A. Arnas

This book discusses a topic that has become important once again due to the challenges of the ENERGY AGE. Though not an academic textbook, it nevertheless has a number of example problems distributed throughout. These give credibility to the theory as well as the results of the various computer approaches taken in the text.

The book is original in the sense that it brings together a number of related topics in the context of storage and regeneration. Although well organized and technically sound, it does suffer from the difficulties of American/British choice of terminology, nomenclature, and pedagogy.

After a brief introduction of thermal energy storage, a detailed presentation of the single-blow operating mode is presented, which leads into a discussion of transient response predictions of heat storage units. The counterflow and parallel-flow regenerators are also given good coverage. The computational methods of regenerators are discussed in a special chapter. Topics of heat storage exchangers, packed beds, and design optimization complete the contribution of the authors. A last chapter on heat transfer and pressure

drop correlations is a summary of existing literature to help solve some of the problems presented in the earlier chapters. In a way, it is misplaced.

In the words of the text cover, "... book will be of interest to students and professionals working in the fields of: ..., waste heat recovery, energy management systems, particulate technologies, ..., metallurgy...."

*Ozer A. Arnas, BS, MS, and PhD in mechanical engineering, has been on the faculty of Louisiana State University since 1962. His areas of interest in teaching and research are thermodynamics, heat transfer, and energy conversion. He has authored ~40 publications nationally and internationally and has been a visiting professor in Costa Rica, Turkey, Belgium, the Netherlands, and at various places in the United States. He has received a number of teaching awards for excellence and has been named a professor for life in the university system of Turkey.*

### International Energy Policy

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| *Author* | Robert M. Lawrence and Martin O. Heisler |
| *Publisher* | Lexington Books, D. C. Heath and Company, Lexington, Massachusetts (1980) |
| *Pages* | 240 |
| *Price* | $23.95 |
| *Reviewer* | Hugh F. Henry |

Identified as one of a Policy Studies Organization Series based on a U.S. Department of Energy sponsored symposium, this book consists of ten separately authored articles divided into two major sections on "The Growing Interdependence of Energy Production and Consumption" and "Comparative Energy Policies." All of the authors are political scientists, and the book, addressing what might be called the political science (as opposed to politics) of energy economics, appears aimed at their professional colleagues. However, it is remarkably free of the "lingo" and other specialized references which so burden so much writing of this type, and the lack of continuity due to multiauthorship is not particularly objectionable. However, there is also no way by which a layman in the field can judge the relation of this material to "mainstream thought"—not that such is of concern to this reviewer.

It is generally observed that the basic international challenge (vintage 1980 and before) to the United States has been the high-level importation of costly oil; the historical material presented is interesting and appears complete. It is also concluded that the energy problems of the future will involve not a lack of fuels but the international interdependence required for their efficient use.

Almost the entire discussion of energy sources concerns oil. Thus, there is little material of direct interest to the nuclear energy field, although mention is made that the knowledge necessary to nuclear energy capability has spread so inexorably that some 53 nations could be engaged therein by about 1992. It is noted that energy from both fission and fusion requires high-technology approaches, and this has introduced some obvious political strains. Perhaps more importantly, it is also recognized that any major use of solar energy, or even speculation related thereto, will also involve high technology; this conclusion, with which this reviewer heartily agrees, is in obvious and correct disagreement with the various "popular" scenarios due to Lovins and his ilk.

In comparing U.S. energy policy to that of other nations, particularly Sweden and the Federal Republic of Germany, it appears that energy consumption is not necessarily a function of overall economic output but also depends on other factors—principally government actions that have both direct and indirect effects. In an interesting summary of recent energy development in the Soviet Union, which is identified as a "success story," the difficulty in obtaining the desired information as well as the obvious political motivation of all energy activities is noted. However, no hint is even given that the success story has had a major dependence on the technology bought or stolen from the West, even to the need for going to those nations today to obtain, install, and finance a major pipeline! In addition to the comparisons noted above, separate chapters are given to Mexican and Canadian policies as oil producers, to Denmark with reportedly little government involvement in energy considerations, and to China as it approaches an industrial society.

Overall, one may quarrel with the decisions of the material to be included and that which is excluded, but the information is interesting and the conclusions persuasive. In general, the book is well written; it has considerable material about which this reviewer (and probably many others outside the political science field) has little knowledge, and it can thus be helpful in interpreting today's occurrences; it may also provide ammunition for a physicist's discussion with the political scientist or economist at the faculty coffee hour. The articles appear remarkably free of major bias and seem to take little side in the government control versus free enterprise approaches to energy policy. Its paucity of material of direct interest to the nuclear field makes it difficult to recommend purchase by one who may have, at best, only a marginal interest in its subject. However, it would make a useful addition to any library associated with activities concerning energy production and consumption at other than a simple consumer level.

*Hugh F. Henry became emeritus professor of physics at DePauw University upon his retirement in 1981 after serving 20 years as department chairman. Prior to coming to DePauw, he supervised the radiation protection and nuclear safety programs at the Oak Ridge Gaseous Diffusion Plant and has published extensively in these fields. He is the author of the book* Fundamentals of Radiation Protection *published by John Wiley and Sons in 1969.*