

# BOOK REVIEWS

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



## Peaceful Uses of Atomic Energy

Volume 2: Performance of Nuclear Plants; Costing of Nuclear Plants; Fuel Management

*Editors* International Atomic Energy Agency; United Nations

*Publisher* Unipub (1972)

*Pages* 660

*Price* \$14.00

*Reviewer* James M. Duncan

This is Vol. 2 of the 15 volumes which contain all of the 514 papers presented at the Fourth International Conference on Peaceful Uses of Atomic Energy held at Geneva during September 1971. One of the objectives of this conference was to present papers of interest to public officials, economists, and planners, as well as to the scientists and technologists who were the principal audience at the preceding conferences. Many of the papers in this volume, particularly those presenting broad summaries of operating experience, costing methods and costs, and fuel management problems, meet this objective.

The papers are printed in English, French, Russian, and Spanish, with abstracts in all four languages. English translations of the French language and Russian language papers are available from the International Atomic Energy Agency. The distribution by language of the 42 papers authored by representatives of 15 countries, covering the three topical areas, is shown in Table I. This represents 24% of the papers and 26% of

the total 660 pages published in other than the English language. Since translations were available for the French and Russian presentations, it is unfortunate that the single Spanish paper was not translated and that all the papers were not published in English.

The section covering performance of nuclear power plants contains 26

articles, with 13 reporting countries represented. The 423 pages of this section review the operating experience of 56 nuclear plants distributed by country and reactor type, as shown in Table II. This probably represents the broadest coverage of up-to-date operating experience for nuclear power reactors to be found under a single cover. The specific topics

TABLE I  
Distribution by Language

	English	French	Russian	Spanish
Performance	18	3	4	1
Cost	5			
Fuel	<u>9</u>	<u>2</u>	—	—
	32	5	4	1

TABLE II  
Type of Nuclear Power Plants

Reporting Country	Number of Plants	Reactor Type			
		BWR	PWR	Graphite or Gas	HW
United States	19	10	8	1	
United Kingdom	8			7	1
Canada	7				7
Japan	4	2	1	1	
Federal Republic of Germany	3	2	1		
Italy	3	1	1	1	
France	2		1	1	
Russia	2		1	1	
Spain	2	1	1		
Sweden	2	1			1
Switzerland	2	1	1		
India	1	1			
Norway	<u>1</u>	—	—	—	<u>1</u>
	56	19	15	12	10

touched upon include planning, installation, operating problems, shutdowns and availability, equipment decontamination, postaccident component verification, failures and reliability, staffing, use of on-line computers, physics experiments, regulation and commissioning, and development of prestressed concrete pressure vessels. One of the outstanding papers in this section is "United States Light-Water Reactors: Present Status and Future Prospects" by W. K. Davis et al.; this paper gives a very good bird's-eye view of the light water reactor field.

The section on techniques for costing nuclear power plants and recent cost trends contains only five papers and 66 pages. Two of the papers are by U.S. authors and one each from Canada, the United Kingdom, and India. The U.S. papers provide insight into capital cost factors and historical cost trends for light water reactors and some of the economic pressures that led to selection of the Liquid Metal Fast Breeder Reactor for development as the reactor of the future. The other papers in this section tend to be less detailed, but point up the difficulty of obtaining benefit from consolidated worldwide cost data due to differences in reactor type, labor conditions, industrial advancement, costing methods, and monetary systems.

The section on fuel management contains, in its 11 articles and 163 pages, discussions of in-reactor fuel management, out-of-reactor fuel supply management and processing, transport of irradiated fuels, and problems of refueling scheduling with a highly seasonal power demand. Six of the papers presented by the United States, the United Kingdom, the Federal Republic of Germany, Belgium, Sweden, and Norway discuss in-core fuel manipulation and the large computer programs required to achieve economical optimization in fuel management. Of particular interest are the discussions of "Optimized Fuel Management in Nuclear Power Stations," by H. Schenk of the Federal Republic of Germany and "A Multi-level Data-Based Computer Code System for In-Core Fuel Management in Light-Water Reactors," by T. O. Savar et al. of Norway. Another outstanding paper by C. W. Smith et al. of the United States gives an excellent overview of the problems facing

the nuclear power industry as the need for shipment of irradiated fuel increases.

In summary, this book contains something for nearly everyone in the nuclear power industry. Although it will not serve as a textbook for any of the subject areas covered, it meets its objective of providing a broad view of performance of the world's nuclear power plants and the present state-of-the-art in nuclear plant costing and fuel management.

*James M. Duncan, a principal engineer with Holmes & Narver, Inc. of Anaheim, California, began his career in nuclear energy at Oak Ridge National Laboratory in 1944, where he worked in uranium recovery processing. He has degrees in chemical engineering from the University of Florida (BChE) and the University of Wisconsin (MS), is an alumnus of UCLA (Management), a 1955 graduate of the Oak Ridge School of Reactor Technology, and a registered professional engineer. His activities include installation and initial startup of several research reactors, reviews of reactor operating experience, economic feasibility and siting studies, and most recently, preliminary activities related to licensing of the Liquid Metal Fast Breeder Reactor Demonstration Plant.*

### Radioactive Tracers in Hydrology

<i>Author</i>	E. Gaspar and M. Oncescu (This is the revised version of <i>Introducere in Radiohidrologie</i> , translated from Romanian by Magdalena Marinesca.)
<i>Publisher</i>	American Elsevier Publishing Company (1972)
<i>Pages</i>	342
<i>Price</i>	\$18.95
<i>Reviewer</i>	David D. Rabb

The aim of *Radioactive Tracers in Hydrology* is not stated in an introduction, but the book appears to be a compendium of loosely related arti-

cles or series of lecture notes on two different but associated subjects: radioactivity and hydrology. Each of the 14 chapters essentially stands by itself with little or no continuity between chapters.

From a cursory study of the references, it appears that Oncescu is the radiologist and Gaspar, the hydrologist. Evidently neither author has been a prolific writer although they have collaborated on two other papers on the same subjects.

The first five chapters deal with characteristics and principles of radiometry and properties of tracers, and the choice of detection radioactive tracers used in hydrology; the chapters emphasize protective measures [including a discourse on maximum permissible concentrations (MPC)]. No factual MPC are listed, however.

The next seven chapters are essentially concerned with hydrology and theoretical hydraulic engineering: flow velocities and parameters affecting aquifers, flow-rate measurement, sediment transport, sewage disposal, detection of fluid losses, and the employment of radioactive tracers in such operations.

The final two chapters cover the age-dating of ground water and water purification by nuclear radiation.

Three appendixes cover the following: (a) the calculation of the counting rate of a detector immersed in a radioactive liquid, (b) the deduction by integration methods of the relationship used to estimate flow rates, and (c) the disintegration schemes of 31 selected radionuclides which may be utilized in radiohydrology.

The lack of introductions in all chapters results in some confusion as to the context of the subject. The authors assume that the user of this book has more than an elementary knowledge of radioactivity and hydrology. They profess their faith in quantitative measurements by presenting, particularly in the sections on hydrology, detailed formulas which stress the importance of mathematical derivations, without explanations of the why and how of the problems.

The book is well produced, with an attractive cover. There is no full index, but each chapter has a detailed table of contents and also italicized paragraph subheadings. Some chapters on radioactivity do not have a