

# BOOK REVIEWS

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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.



**Management of Low- and Intermediate-Level Radioactive Wastes**  
(Proceedings of a Symposium, Aix-en-Provence, 1970)

<i>Editors</i>	IAEA Staff
<i>Publisher</i>	International Atomic Energy Agency, Vienna, Austria (1970)
<i>Pages</i>	814
<i>Price</i>	\$22.00
<i>Reviewer</i>	C. E. Stevenson

This volume consists of texts of the 53 papers presented at the symposium, of which 17 are in French, 7 in Russian, and one is in Spanish, together with brief and generally uninformative abstracts (in English as well as other languages) of all the papers. The liquid and solid radwaste management efforts of 19 countries are, for the most part, well covered here. Gaseous wastes are generally not discussed. The sources of the papers include all the nuclear weapons states (except China), perhaps half of those with power reactors, and a representative sampling of those almost solely concerned with research reactors and medical uses of isotopes (Chile, Yugoslavia, Hungary, etc.). There are a few papers dealing with radwaste management policy and its development (a particularly good one from the UK by Kenny and Mitchell). The overall practices of about a dozen countries are presented, and 10 papers are devoted to facilities and

experiences of major research centers (Fontenay, Aldermaston, Harwell, Karlsruhe, Jülich, Ispra, Mol, Kidrich Institute, Chalk River, JAERI, and Trombay). The latter group is of particular interest in that it reveals the trial-and-error nature of the way in which present practices came into being, not so much through logical development as through the use of methods inherited from sanitary and industrial waste practice, in the absence of a proven technology.

Many of the papers are characterized by a defensive attitude that reflects current concerns over environmental matters. There is also a general note of caution, however, in the application of the methods used, and an avoidance of claims that complete long range solutions have been developed. For many countries it is indicated that "final" decisions have not been made regarding storage methods and sites. Within Europe the limited availability of acceptable sites for surface and subsurface storage of solid wastes, and the international nature of major rivers and other bodies of water, brought forth proposals in several papers for international agreements on practices, and for proposals for commonly shared waste disposal areas. Deep sea disposal of carefully prepared solids continues to be of interest.

Perhaps a third of the papers describes and illustrates various types of storage facilities for packaged and, in some cases, shielded solid wastes. These include the use of the surface area over an old uranium mine in France, of an abandoned salt mine in Germany, and of the very extensive adapted liquid waste stor-

age tank farm at Hanford, as well as above ground concrete cells and silos, and pads, pits, and ditches. For some of these sites, considerable information on their geological and hydrological characteristics, and on monitoring methods, is given.

If there is a trend toward newer methods apparent in these papers, it is embodied in bitumenization techniques. Eight countries either describe experimental work in this field or indicate that they are now using or plan to use these methods. French, German, and USSR facilities are described in some detail. Also of interest are two papers from the USSR on studies and tests related to an experimental deep well for low level liquid waste disposal at Melekess. There are a number of other papers on specific developmental projects, but no other significant new directions are evident.

The U.S. contributions to the symposium, contrary to those of other major nuclear countries, to this reader provided a rather inadequate perspective of the radwaste situation in this country. There is little discussion of policy and its basis, and practices are covered in some detail only for power reactors and commercial solid waste disposal.

This suggests that during the rapid development of a commercially viable nuclear power industry in the U.S. during the past decade, the area of radioactive wastes has been rather neglected. This has been made apparent by an awakened consciousness of a potential for environmental impact in the long-range view, and there remains a need for full resolution of the questions which have been raised.

C. E. Stevenson (PhD, organic chemistry, Pennsylvania State, 1941) has been associated with research and development efforts on nuclear fuel reprocessing, and on related waste disposal problems, for the past 25 years. As associate director of the Chemical Engineering Division at Argonne, he was concerned for 6 years with the Redox, Purex, and fluoride volatility processes, following which he was for 6 years technical director for the Idaho Chemical Processing Plant, operated by Phillips Petroleum Company. The fluid bed calcination process for ICPP high level wastes was developed under his supervision during this period. He returned to Argonne in Idaho in 1960 as manager of the Fuel Cycle Facility, in which pyrometallurgical reprocessing and remote refabrication of EBR-II fuel was carried out, and in 1969 rejoined the ANL Chemical Engineering Division. He presently serves the American Nuclear Society as chairman of the Critical Reviews Committee and as an ICONS technical advisor, and is chairman of the American National Standards Institute committee N101, concerned with standards for atomic industry facilities other than power reactors.

#### New Energy Technology—Some Facts and Assessments

*Authors* H. C. Hottel and J. B. Howard  
*Publisher* MIT Press (1971)  
*Pages* 364  
*Price* \$2.95  
*Reviewer* M. R. Bottaccini

The material found in *New Energy Technology* appears in no other single secondary source. Any person who wishes to become familiar with the thinking of the power industry can do no better than read this book. The collection of references at the end of each chapter is worth the price of admission.

Unfortunately one of the least satisfactory parts of the book concerns nuclear power. The authors are chemical engineers and it is obvious that their principal interest is the utilization of fossil fuels. Their estimate of the speed with which nuclear power plants can be built in this nation is overly conservative.

It is the opinion of the reviewer that in the next 30 yr the demand for petrochemicals and coal by the plastic and chemical industry will become so large that it will force up the price of fossil materials. It is likely that atomic energy will rapidly become competitive with other forms of energy so that by the year 2000 the bulk of the power generated in the United States will come from nuclear power plants.

The obligatory discussion of the difficulty of cooling light-water reactor plants is found in a later chapter. Granted that nuclear plants are thermally inefficient, it is also true that no time is spent in the consideration of what to do with the excess heat in place of throwing it away. The possibility of greenhouses for the growth of plants in cold climates, or the piping of hot water into the buildings for heating and into sidewalk pipes for snow removal, is ignored.

It is difficult to write about power consumption in these ecological days without becoming somewhat emotional. The authors of this not exactly compendious volume have avoided the problem by tipping their hats lightly to ecology and social needs here and there, and then proceeding with the standard discussion of the technological and economic substrata of power generation. The result is a loosely organized collection of facts and assessments, tied together by the sort of economic considerations which are the stock in trade of the power companies.

The authors consider such things as cost of materials, labor, taxes, and amortization and then present, what is to them, the best comparative estimate per kWh. The authors are, however, unaware of their unspoken assumption that the power generation systems of the future will continue to be a collection of locally controlled organisms. Actually the trend is away from this. Localism is yielding to power regionalism, and regionalism will eventually be replaced by nationalism. The power system will become an integrated network in which power transmission, power tradeoff, and power costs will be considered on a national level. How long the capitalistically owned local public utilities can last under such conditions one would not hazard to guess.

The second thing which appears to be unnoticed (or at least unmen-

tioned) is that the cost of pollution control equipment should be offset by benefit valuation. It is possible to assign a dollar value to reduced insurance costs, reduced hospital costs, reduced medical costs, and reduced destruction of agricultural products. It is quite possible that tax rebates or government subsidies will be used throughout the nation to generate the socially desirable ecological protection systems.

To speed up communication, the publishers decided to print by offset directly from the authors' manuscript. As a result, this is possibly the most current book on power production. Unfortunately, the haste to make the printed pages available to the public had also prevented editing, and although there are almost no misprints and the tables are well put together, it appears that little thought has been given to the quality of writing. If a second edition is ever to be printed, this reviewer suggests that some attention be paid to the realities of the English language.

*M. R. Bottaccini is a professor at the University of Arizona where he teaches aerospace and mechanical engineering. He is a specialist in mathematical modeling of nonlinear systems. Currently he is working in applications of engineering science to biological systems and in the applications of nonlinear mechanics to modeling and prediction. He is a strong proponent of nuclear power generation and considers himself, in this respect, somewhat of a rarity among the fossil fuel enthusiasts who normally fill the mechanical engineering departments of the nation. He is the author of several books and many articles.*

#### Dynamics of Nuclear Systems

*Editor* David L. Hetrick  
*Publisher* University of Arizona Press (1972)  
*Pages* 606  
*Price* \$14.50  
*Reviewer* George H. Miley

This book is a collection of 33 papers on the dynamics of nuclear