RADIOACTIVE WASTE DISPOSAL

Atomic Energy Waste

Its Nature, Use and Disposal. Edited by E. Glueckauf. Pp. xi+420+4 plates. (New York: Interscience Publishers, Inc.; London: Butterworth and Co. (Publishers), Ltd., 1961.) 95*s*.

THE days are long past when industrial wastes could be discharged uncontrolled to the environment, and the new atomic energy industry has developed in a period which has seen new legislation introduced generally for the control of environmental pollution and specifically for radioactive discharges. Strict legislation (described in one of the articles in the book), a very sensitive public awareness and an exceptional concern with health hazards within the industry have stimulated a considerable amount of research on radioactive wastes.

A considerable part of the research is reviewed in this book. It is concerned primarily with the fission products separated as waste in the processing of nuclear fuels, which are regarded as the source of ionizing radiations to be used for man's benefit. It develops in more detail, and indeed in considerable detail, some of the views presented by the editor in a paper to the Second International Conference on the Peaceful Uses of Atomic Energy, wherein the fission products were seen as a source of radiations, of rare and precious elements and of specific radionuclides available for peaceful uses of atomic energy.

The book concentrates on the utilization of the liquid fission product waste as a source of ionizing radiations. It is not a general text on radioactive waste disposal. The small-scale use of radionuclides and the wastes arising are deliberately excluded; there is no account of the wastes arising at nuclear power stations; and although one good chapter is devoted to dispersion of activity from chimney stacks, there is no account of the treatment of solid and gaseous radioactive wastes.

The book consists of seventeen separate articles. The first, nearly a quarter of the book, describes the fission process and the fission products, nearly half of it in tabular and graphical form. This article and one on radiation chemistry, though good in themselves, go into far more detail than is required for the discussion of radioactive waste disposal. By contrast, the articles on α-emitters in reactor wastes, effects of radiation on living cells, movement of radioactive substances in food chains and radiation protection present the broad aspects and concentrate on the essentials.

While the first half of the book, the introductory or background part, is somewhat uneven in its treatment of the topics covered, the second half contains good review articles of the processes and operations used in the treatment of liquid radioactive wastes, the design of irradiation units using packaged sources and the uses of ionizing radiations for agricultural research, food preservation and induction of chemical reactions.

The treatment, perhaps naturally, leans towards British practices. Space might have been found for a more detailed discussion of wastes from fuel processing in other countries and of wastes from the processing of fuel elements made from stainless steels and zirconium alloys. The work carried out in the United States on disposal in salt formations and by deep-well injection might also have been described. The therapeutic use of ionizing radiations is a less easily understood omission. Some comparison of radiations from nuclides and radiations from machines, particularly in food preservation, would have been valuable.

Only a few errors were noted. The last entry on p. 251, referring to the allowed discharge from the Atomic Energy Research Establishment, Harwell, should be 20, not "2". On p. 227, what is referred to as slow sand-filtration, a method of treatment of drinking water, is really the trickling filter process for sewage purification. In the glossary, the 'rad', a unit of absorbed dose, is defined as a unit of amount of radiation.

The book is authoritatively and well written and well produced. It should, as the editor intends, illuminate "the background from which future developments can emerge".

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AN AMERICAN TAPESTRY OF STATISTICS

Contributions to Probability and Statistics

Essays in Honor of Harold Hotelling. Edited by Ingram Olkin, S. G. Ghurye, Wassily Hoeffding, William G. Madow and Henry B. Mann. (Stanford Studies in Mathematics and Statistics, No. 2.) Pp. x+517. (Stanford, Calif.: Stanford University Press; London: Oxford University Press, 1960.) 52*s*. net.

THE name of Prof. Harold Hotelling is chiefly familiar to English students of statistics as one of the founding fathers of that branch of their subject known as multivariate analysis. His share in the foundations was laid in half a dozen outstanding papers of the early 1930's, and the bibliography given here shows that this period saw his major contribution to theoretical statistics and that later he has been more concerned with applications, chiefly to economics. It might seem strange, on the face of it, therefore, to find a volume of 38 papers offered to him on his sixty-fifth birthday by statisticians for the most part very much of the mathematical variety. But Prof. Jerzy Neyman's introductory article shows clearly that Hotelling has been a powerful formative influence in American statistics and provided it with much of the dynamic which got it really under way. Not only did his papers help, at a crucial time, to demonstrate to the American mathematical and statistical worlds that statistics could be, simultaneously, both scientifically useful and mathematically rigorous but, over and above this, he seems also to have had a talent, akin to genius, for picking students and staff of outstanding ability and firing their enthusiasm for statistics. The list of thirty such men (some no longer living) which Neyman gives is extremely impressive and of these about a score contribute to the *Festschrift*.

The papers included are all on topical problems of theoretical statistics; and it is not untoward that only a minority refer to Hotelling's own work, since, as has been said, his major theoretical contributions are now embodied in the corpus of statistical classics. There is no unifying theme here. The topic treated by any given author could have been predicted from his own previous publications with some accuracy. The only obvious difference between this collection and, say, the last volume of the *J. Roy. Stat. Soc.* (B) is that the papers here are slightly shorter on average. This reflects the fact that though the papers here tend to be more fluent and essay-like than a