

Book Reviews

SAFETY FIRST

Perils of the Peaceful Atom

The Myth of Safe Nuclear Power Plants. By Richard Curtis and Elizabeth Hogan. Pp. xiv + 274. (Gollancz: London, March 1970.) 52s.

In the *Perils of the Peaceful Atom*, Richard Curtis extends his range of satire, fiction and non-fiction and, with co-author Elizabeth Hogan, sets out to show that atomic energy presents to man new and horrific dangers, and that government agencies and others in the United States have developed atomic energy unnecessarily, too fast and at too great a cost. Many of the issues raised are particular to the United States, but the general claim of horrific danger, if true, would demand the urgent attention of all nations.

The case unfolds in the following way. First, and the main theme, a pen picture of the unknown and terrible dangers of radioactivity. This is followed by a number of sections describing briefly some accidents, problems of waste storage and transport, a reference to insurance, the heavy demand on cheap uranium supplies, much about the frailty of man and a special disparagement of US administration. The story concludes with the authors' solution to the world power demand of the future, as magnetohydrodynamics, magnetoplasmodynamics, electrogasdynamics, fuel cells, hydroelectric plants, tidal power, geothermal energy and solar energy. "As for clouds, a number of means are being developed for storage of collected solar energy, so that reserves can be built up, literally, for a rainy day."

Because the case rests on many quotations or statements attributed to others, it is important to examine their validity. It is said of the accident at Windscale in 1957 that "authorities had to seize all milk and growing food-stuffs in a four-hundred-square-mile area". In fact, milk was controlled but there was no seizure of any food-stuffs or limitation of its use. This is followed by, "According to Sir John Cockcroft . . . considerably more radioactivity was released at Windscale than is released during an explosion of a Hiroshima-type atom bomb". This statement was not made by Sir John Cockcroft but appeared in 1958 as an erroneous deduction by a science correspondent. The radioactivity released, as compared with the bomb, was less than 1 per cent in terms of iodine and less than 10^{-4} of total gamma activity (measured at one day).

The authors describe the accident to the FERMI reactor in 1966 as an "event as close to Armageddon as this country (USA) has ever known". The International Commission on Radiological Protection has published its evaluation of risks from radiation. Using these and other data, it can be shown that the release of all radioactive material contained in the reactor on that occasion, if carried in the direction of Detroit, a city of 1.5 million, might have led to a risk of about 3×10^{-5} per person that some effect from radiation might appear within twenty years. This is not Armageddon. A similar use of a warlike comparison appears later in the suggestion that a nuclear accident may "wreak death and harm on a level potentially surpassing Hiroshima and Nagasaki". This comparison is not valid. The radiation harm was the result of the

direct and intense radiation from the weapon; this does not occur in a reactor accident.

The nuclear industry recognizes the long-term problem involved in the storage of concentrated fission products. There are means for rendering these wastes into insoluble agglomerates of a glass-like material which would make them reasonably secure even against violent upheavals of nature. It may be questioned whether enough effort is invested in solving future problems, but the authors' case is not improved by using language intentionally distorting facts such as, "at present the solutions are stored in tanks whose seams groan under strains metal was never meant to bear".

The authors' treatment of the effluent problems of the industry is confusing. They quote an increase in radioactivity of plankton, fish and ducks as being a thousand to a million times greater. But greater than what? Also that humans in the Columbia area may have more than 4,000 picocuries of zinc-65; this is only a thousandth part of the permitted body burden and is only one thirtieth of the radioactive potassium carried by all men.

The many inaccuracies and distortions detract from the value of the book. This is a pity because the subject is important and deserves more rigorous selection and checking of the material used. The exaggerated charges made could set back any move towards an open discussion of safety problems. The authors claim that "many AEC pamphlets present over-simplified pictures, almost word cartoons that insult the adult mentality". If so, perhaps these pictures and the attempt to show by over-simplification that the maximum credible accident will cause no harm may be techniques developed, perhaps unwisely, by an industry fearing that any recognition of risk could lead to exaggerated distortions as in the present book.

Although the evidence presented is often erroneous or highly distorted, a rebuttal of the charges made in the book does not imply that there is no need for constant vigilance in determining and applying adequate safety criteria at all stages of an atomic energy programme. A more general form of the authors' argument appears in their foreword: "We are convinced that those who favor our present commercial nuclear power program do not recognize how far we are in actual practice from the high standards and ideal conditions which even the most enthusiastic proponents acknowledge to be essential to public health and safety". Without sharing their conviction expressed in such extreme terms, I accept that no technologically based industry can afford to be complacent about safety. The book may serve a purpose in helping to underline, if rather hysterically, the high standards of engineering, operation and technical assessment required.

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COMMUNICATION AND INFORMATION

Information, Mechanism and Meaning

By Donald M. MacKay. Pp. iv + 196. (The MIT Press: Cambridge, Massachusetts, and London, February 1970.) 65s.

From time to time, but too seldom, a scientist looks up from his bench or his desk and talks to the educated layman in non-technical terms. Professor MacKay's book records a number of such informal exchanges with the intelligent public. It is a collection of papers, articles and broadcasts, bound together by an introduction and marginal notes, on communication and information. In a book of this kind there is bound to be a certain amount of repetition and even of inconsistency, but this adds verisimilitude to an intellectual autobiography.

To me, the questions raised by the author are often more interesting than his answers. One such question arises from the fact that orthodox information theory, as