No power of persuasion

Alan Cottrell

Nuclear Power Technology (in three volumes). Edited by W. Marshall. *Oxford University Press: 1984. Vol.1* Reactor Technology, *pp.503; Vol.2* Fuel Cycle, *pp.456; Vol.3* Nuclear Radiation, *pp.363. Each volume £35, $65.*

WITHIN this work is an honest tale, plainly told. Therein lies both its strength and weakness. Its strength is that of the scientific tradition for unvarnished presentations of facts, letting them speak for themselves uncoloured by rhetoric, unstrained by advocacy, unheated by passion, unbiased by prejudice. For those raised in the scientific culture this is the natural, indeed the inevitable, mode of expression; the anvil on which every scientific deduction can be mounted and exposed to the hammer of critical analysis. Its weakness is that the scientific culture is a minority one. The great world which fashions public opinion — the world of hyperbole and shock-horror, of the self-inflated politician, bombastic trades union leader, committed journalist, trendy teleperson — resonates to a different sound. The anti-nuclear lobby know this full well. They are at home in this world and play its tunes as captivatingly as any Pied Piper.

Thus there is the extraordinary position today — nearly a third of a century after Calder Hall first brought nuclear electricity to Britain, a period in which the nuclear industry has gained a brilliant achievement in supplying cheap power, reliably and safely — that the nuclear industry is on the defensive, trying to justify itself to the general public in the only way it knows, with the quiet voice of scientific reason. For, as Sir Walter Marshall says in his preface to the three volumes, the aim was to prepare a work on nuclear power orientated towards increasing public knowledge and for the public interest. The project was conceived at a time when the United Kingdom Atomic Energy Authority, of which the then Dr Walter Marshall was Chairman, was approaching its twenty-fifth anniversary (in 1979). This event could have justified a little trumpet-blowing, but instead the decision was to review the state of nuclear science and technology in the classical scientific manner.

This is done in 24 chapters, each by different authors who come almost without exception from within the UKAEA. Such a division of the labours is probably the only way to deal comprehensively and authoritatively with such a huge and wide-ranging subject. It has of course the usual advantages and disadvantages. On the merit side each individual topic is given a chapter and author(s) to itself, and so enjoys a reasonably self-contained exposition which can be read separately from the rest of the contents; against this, there is inevitably some repetition of underlying points that are common to more than one chapter.

The eight chapters in Vol.1 deal with nuclear reactors. After two introductory contributions, which outline the underlying physics and assess the current status of thermal and fast reactors — and go surprisingly far into the mathematics of neutron physics, in a work intended for the public — the various main reactor types are described, namely gas-cooled, light water, fast and heavy water. Two final chapters deal with novel reactor concepts, for example fluid-fuel reactors, and briefly with prospects for fusion power. Volume 2 covers the various aspects of the fuel cycle — occurrence, supply and enrichment of uranium, fuel design and fabrication, reprocessing, waste management, decommissioning, thorium fuel cycles — in similar style. Volume 3, which is perhaps of greatest interest to the general public, deals with various aspects of nuclear radiation — biological, detection, environmental, risk assessment, medical radioisotopes. Radioactive dating is also covered, although surprisingly there is no chapter on the use of gamma radiation in industry or on non-medical applications of radioisotopes.

These three volumes give a splendid *tour d'horizon* of the science and technology of nuclear power. Not surprisingly, given their provenance, the expositions centre round British experience and points of view. Nevertheless much of the treatment is sufficiently general as to be of interest to readers in other nations, especially in countries having light-water reactors, for these are dealt with almost as fully as gas-cooled reactors. The treatment of fast reactors is also detailed. Perhaps, if only in fairness to the outstanding Canadian effort, there might have been a little more about the excellent CANDU reactors.

Finally, however, the questions which began this review raise themselves once more. I am sure that many people within the nuclear industry, as well as some scientists and engineers outside it, will read these books with both pleasure and profit. But will the general public and all those publicity-seeking pundits who pronounce so readily and volubly on all matters nuclear? I doubt it. The first group probably does not have the time to digest all the facts so fully gathered together here. The second bask in their unfettered imaginations and have no need of facts. The best response I can make to this work is to thank the authors for a noble effort, which has produced a fine work of science, and to tell them that something entirely different is needed to win the hearts and minds of the great majority in the non-scientific culture. □

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Day of confidence — Wednesday 17 October, 1956, and the Queen opens Calder Hall, the first full-scale nuclear power station.