

Book Reviews

Energy From Heaven and Earth. By Edward Teller. W. H. Freeman and Company, Publishers (1979). 233 pp. 59 illustrations. \$15.00.

My favorite Edward Teller story goes back to 1964 when we both served on a National Academy Committee. It was the time when the newspapers were at their peak of anti-Tellerism. At intermission during the first meeting, a biologist who had never met Edward Teller exclaimed to me, "Is that really Edward Teller? He is the most reasonable, as well as brilliant, person in this room!"

This story is an appropriate prelude to a review of Teller's *Energy From Heaven and Earth*, for this book is a delightful display of Edward Teller's calm reason as well as broad knowledge. This contrasts sharply with other, more pretentious books on energy, particularly the Harvard Study Project *Energy Futures*, that serve not to enlighten, but to polarize the debate over nuclear energy. Teller is not blatantly pro-nuclear; he accepts all possible energy sources, and insists that we need all of them. He tends to be optimistic about the technological future. Perhaps best, he concedes, unlike many other energy experts, that some of his previous estimates—for example, the energy demand in 2000—were wrong.

This is not intended as a scholarly work. Instead, it is an elementary, nonmathematical guided tour of energy in all its manifestations. It begins with cosmic energies, then examines each of the energy technologies, and ends with Teller's recipes for a coherent energy policy. The book is in good part based on the 1975 Harvey Prize Lectures Teller delivered at the Technion in Israel. It therefore catches Teller's speaking style very accurately: the short, definite sentences leavened always with appealing humor.

Readers of *Nuclear Science and Engineering* will be fascinated by Teller's account of the origins of the Manhattan Project, and of the Advisory Committee on Reactor Safety. (I wonder if the present generation remembers that it was Edward Teller, more than any other individual, who was responsible for the original concern over reactor safety and who laid the basis for the scientific study of reactor safety.)

The country and the world needs antidotes such as *Energy From Heaven and Earth* to the current spate of anti-rational, let alone anti-nuclear, energy studies. The book would make a great gift for a nonexpert friend.

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About the Reviewer: Alvin Weinberg is presently the director of the Institute of Energy Analysis, a part of the

Oak Ridge Associated Universities, and, additionally, is general editor of the Perspectives in Energy Series published by the MIT Press. Weinberg's broad experience in these and related matters dates back to Met Lab days, followed, of course, by long service as the director of the Oak Ridge National Laboratory.

Nuclear Safeguards Analysis. E. Arnold Hakkila, Ed. American Chemical Society, New York (1978). \$22.00.

In spite of the current unrest among certain segments of the population, based on an aversion to nuclear energy, the present and future needs for electric power almost necessitate the operation of nuclear reactors. This means that safeguards for the control of uranium and plutonium must be considered of the utmost importance. This is not unique to the U.S., since many nations throughout the world obtain power from nuclear reactors. In all instances, uranium and plutonium of various isotopic composition are used or are formed in the power reactors.

The present volume, entitled *Nuclear Safeguards Analysis*, consists of 12 articles and is based on a symposium held in March 1978 at the 175th meeting of the American Chemical Society.

The Division of Technical Information of the Atomic Energy Commission published "Selected Measurements for Plutonium and Uranium in the Nuclear Fuel Cycle" in 1963. It was revised in 1972. The current volume is a compilation of articles on present practices, which updates this previous information.

The first article is an excellent summary on the "Safeguards Needs in the Measurement Area." A survey is made in the "realm of measurements" of the new techniques in chemical analysis as well as nondestructive testing of nuclear materials in the complex nuclear fuel cycle.

In addition to the possibility of terrorist groups obtaining material for a nuclear explosive, the diversion of nuclear materials to foreign countries for the preparation of their own nuclear explosives also has been a possibility. In 1966, Federal regulations were adopted placing a specific obligation on the domestic private industrial sector to safeguard strategic nuclear material.

Because in a plant the diversity of materials to be analyzed in feed, process, product, and waste streams may vary from nearly pure uranium and plutonium solutions to items such as casting crucibles, rubber gloves, floor sweepings, etc., it is necessary to have, in addition to chemical and instrumental methods, other methods that are nondestructive, rapid, and with satisfactory precision and accuracy for the case in point.