

Book Review

Nuclear Power and Its Environmental Effects. By Samuel Glasstone and Walter H. Jordan. American Nuclear Society, La Grange Park, Illinois (1980). 395 pp. \$25.95, cloth. \$18.95, paper.

This book provides a lucid, comprehensive, and carefully developed examination of the global question of the benefits and risks of the generation of nuclear power. No detail escapes the thought and concern of the authors. Their writing and their use of tables and figures are models of clarity and succinctness. Their style and development of scientific information do not require a prior knowledge of nuclear physics or nuclear engineering. The book provides information which can dissolve the misinformation, the myths, and the misunderstandings that have besieged the growth of nuclear power. It will be of use to opponents and proponents of nuclear power, to lawyers and clients, to politicians, legislators, and judges, to students and teachers, and to scientists and engineers.

The title belies the scope of this extraordinary book. The chapter on "Fundamental Principles of Nuclear Reactors" combines a brief, clear introduction to the phenomena of the nucleus with the harnessing of its energy in nuclear reactors. A chapter on "Nuclear Reactor Safety" frankly faces the dangers which must be contained and the methods that are in use. The authors do not shirk from the reality of the Three Mile Island accident. Their two and one-half page statement on the sequence of events in that reactor is particularly informative.

The whole matter of risks of human use of ionizing radiation is carefully put in perspective in the chapters on "The Radiation Environment: Natural and Man-Made" and "Biological Effects of Radiation." The nature and sources of natural background radiation are compared and contrasted with human uses since the separation of radium and the invention of the x-ray tube to the present expanding use of radionuclides, nuclear weapons, and nuclear power. A vast amount of data on biological effects on all forms of life is made readily available.

The chapters on "Radioactivity in Reactor Fuel Production" and "Radioactive Effluents from Nuclear Facilities" follow the nuclear fuel cycle from the mines to spent fuel processing. The material includes clear explanations of the technology that has evolved, adding greatly to the reader's understanding of nuclear practices. The episodes of careless use of uranium mine and mill tailings and the potential consequences among exposed people are stated. The very important distinctions between low-level and high-level wastes from nuclear power reactors are made by treatment of these in separate chapters. The alternative means for preparing high-level wastes from processed spent fuel rods for some interim storage or final disposal are given. Only the status of waste handling in the U.S. is noted. The authors chose not to report on methods in other countries that process spent fuel rods and store the high-level wastes.

There are chapters that deal with regulatory procedures that pertain to licensing of nuclear power plants, transportation and safeguarding nuclear materials, and assessing potential plant sites. These are not wholly regulatory in content, adding to our understanding of the management of nuclear materials. The thermal effects of condenser water heat on aquatic life are treated in detail. It is, of course, pointed out that warm condenser water is not unique to nuclear power plants. There is somewhat more of it than in comparable fossil-fueled plants. In a complementary chapter, the alternatives to once-through condenser water flows are well presented by wet, dry, wet/dry, mechanical draft, and natural draft cooling towers.

The bibliographies at the end of each chapter are heavily weighted with official documents. Those who view establishment statements with suspicion may be led to the same view of the book's text. That would be most unfortunate, for the authors have given a dispassionate clarification of what is known, with the objective of reaching reasoned decisions on the management and use of nuclear energy for generating electricity. In one parenthetical sentence in the review of the Three Mile Island accident the authors disclose (p. 107) that there is more than the expected: "At most, one or two additional delayed cancer deaths over a period of years and perhaps the same number of genetic defects in the next generation in a population of about 2 million. (The emotional disturbances arising from fear of the unknown may be much more serious.)" The thorough-going scholarly work which has produced this splendid book will do much to allay the fears of any thoughtful person who uses it.

Emil T. Chanlett

University of North Carolina
Professor of Sanitary Engineering
Chapel Hill, North Carolina 27514

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About the Reviewer: Emil Chanlett is professor of sanitary engineering at the University of North Carolina where he has been a faculty member since 1946. Professor Chanlett has had extensive experience in the disciplines that can now be collected into a broad category as environmental protection. This experience has been both domestic, with the U.S. Public Health Service, and international as teacher and advisor in South America. In collaboration with the late Newton Underwood, an earlier contributor to these columns, he developed a program of radiation hygiene at Carolina and served as its director. His current interests bring the protection of the environment to undergraduate students and again extend to international assignment. Professor Chanlett received his academic training at the College of the City of New York, and at Columbia and North Carolina universities.