The Accident Hazards of Nuclear Power Plants


Nuclear power plants in the U. S. A. supply about 10% of the nation's electrical energy and, in view of the soaring costs of fuel and its finite availability, expansion of the nuclear industry appears imminent. However, there are aspects in nuclear technology that are widely questioned in terms of safety and security. Specifically, I am referring to (1) mechanical failure which can result in the release to the environment of massive amounts of radioactive materials, and (2) possession of plutonium, which is a key ingredient in atomic weapons, by irrational people. This book examines the accident hazards of nuclear reactors in the U. S. in all of their essential aspects.

The author, a nuclear research engineer, offers a synopsis of his research findings and analysis of water-cooled reactors (PRW), boiling water reactors (BWR), and gas-cooled reactors (LMFR = liquid metal-cooled, fast breeder reactor). In addition, he reviews the recent reactor studies of the ERDA (Rasmussen Report), the American Physical Society, and the WASH-740 report (Theoretical Possibilities and Consequences of Major Accidents in Large Nuclear Power Plants).

To better equip the readers, the general description and principles of operation of the present nuclear plants along with the accident fundamentals are discussed at the beginning of the book. Terminologies used are simple and a knowledge of the basic chemical and/or physical sciences can suffice for optimum understanding. A knowledge of basic environmental or ecological science would be desirable to be able to compare pollutants from nuclear power plants with other environmental pollutants such as smog, heavy metals, etc., and how they affect the environment and its biota. The next chapters discuss the reactor potentials of the PWR, BWR, and the LMFR. The book culminates with a few remarks concerning sabotage, nuclear energy centers, underground placement of reactors, and alternate reactors.

This book, in general, emphasizes the disorders in nuclear reactors, does not analyze in detail their possible consequences. Rather, the focus is on the potential for, and possibilities of, massive releases of radioactivity as a result of reactor accidents, since such releases would appear to be capable of causing immeasurable damage. Examples of accidents in nuclear reactors, here and abroad, are presented. The main conclusion offered by the author is that the full accident hazard of each type of reactor has not been scientifically established, even for the serious accidents of highest probability. In addition, the theory upon which the industry's safety calculations was based has not been experimentally verified.

The book ends with an interesting chapter entitled "Who Should Decide?", i.e., who should decide whether nuclear reactors are safe? This particular chapter may influence the reader's thinking on such critical issues as to whether to (1) proceed with the nuclear energy program and accept the risk; (2) postpone the development and use of nuclear reactors and conduct further hazard research, deferring a final decision until the results are evaluated; or (3) reject the use of nuclear energy. Thus, I would recommend reading this short paper (206 pages of text) to anyone interested in assessing nuclear reactors as a source of energy. With a few hours of your time, it may influence your thinking about this important issue.--D. C. DIONIAR O, Savannah River Ecology Laboratory, (Institute of Ecology, University of Georgia), P. O. Drawer E, Aiken, SC 29801.