

finite difference methods to the subject. Spatial and temporal discretization, implicit and explicit methods, are discussed as well as nonlinearity. Finally, the coupled pressure-velocity system of equations is reviewed and methods to formulate and solve it are presented.

5. "The Computation of Transonic Potential Flow" is the subject of the fifth part of the book and presents the discretization of the potential equation, the iterative algorithms employed, grid generation, and several engineering applications. Viscous flows are discussed here as well as applications of the multigrid method.

6. The last part of the book, "Calculation of Steady Transonic Flow by Euler Equations with Relaxation Methods," basically extends several relaxation methods to solving the Euler equations. This results in a first-order convergence rate and creates the possibility of using this technique in fast algorithms for inviscid transonic flows with rotation.

Overall, the book is very well written by six experts in the field of numerical methods. It appears that it will appeal to scientists and engineers with interest and expertise in the subject. It combines review and new techniques in computational methods; a great deal of the material presented is original and comes with a sufficient number of references. The authors and the editor have done an excellent job in producing a scientific compendium, concise and informative about a field that is rapidly expanding.

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Social and Economic Aspects of Radioactive Waste Disposal: Considerations for Institutional Management

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Reviewer Raymond L. Murray

This book is the latest in a series of studies by the National Research Council on radioactive waste management. They began in 1957 with the recommendation on underground disposal in salt. The present study was sponsored by the U.S. Department of Energy. A panel held nine meetings starting in March 1980, received many briefings, and interviewed ~100 individuals.

In order to assess the relevance of the expertise and possible bias, this reviewer ascertained the professional affiliations of the panel members. It was composed almost entirely of university faculty representing social science, sociology, economics, political science, and law, with a sprinkling of hard scientists or engineers. One person strongly supported nuclear power; several were opposed.

The purpose of the study was to identify major socioeconomic aspects of high-level radioactive waste repositories, assuming that such facilities would be used. The panel soon noted that there are two definitions of "socioeconomic," one related only to measurable effects, the other to a broad spectrum of both tangible and intangible effects, including psychological. The group adopted the latter definition.

The panel extended the study to embrace the topics of transportation and temporary storage. It limited itself, however, to spent fuel management, disregarding reprocessing. It also excluded consideration of low-level waste or defense waste, restricted itself to effects over the next 50 yr, and did not address the general subject of nuclear power and its alternatives.

One of the first observations was that there is little available information among the social sciences relative to impact assessment, but the panel concluded that the study could help relieve that deficiency.

In Chap. 1, a set of questions was posed in four categories: Public Response, The Waste Management Network, Site Effects, and Institutional Issues. Of the 36 questions, only half were addressed, at least in part. At this point in reading the book, some readers who are familiar with the larger subject of nuclear energy will be concerned that some important questions have not been asked, such as,

1. What would be the impact on nuclear power production of failure to establish a viable waste management program?
2. What is the relationship between successful implementation of nuclear power and the social and economic welfare of the public?

Without the perspective provided by answers to these questions, the study may be seen to lack credibility and usefulness to the extent hoped by the panel.

The rest of Chap. 1 lists the 19 major findings, kindly provided at the beginning by the authors. Many of the observations are well known to the nuclear community: that support by the public for nuclear power has declined, in part because of the assumed association with nuclear weapons, in part because of fears about health and safety; that the level of knowledge on the part of laymen is very low and should be improved; that mistrust of government is common; and that public participation in decisionmaking about sites is vital.

Other findings are less obvious. One is that the transportation of spent fuel and/or wastes will apparently involve a very large flow of trucks and rail cars through a large portion of the United States. This conclusion was drawn from a comprehensive study for the panel done by Oak Ridge National Laboratory. The panel notes that a great deal of research is still needed on socioeconomic aspects of this above-ground part of the picture.

The panel states that there is much yet to be done on a programmatic basis related to participation by the public in determining socioeconomic effects and mitigating them,

along with finding ways to compensate the public. This reviewer has long believed that many communities would welcome a repository in their vicinity if there were substantial and assured benefits. The standard reaction, "We don't want wastes dumped in our back yard," may be partly the result of a perceived inequity.

The remaining chapters, 2 through 5, echo the titles of the categories of questions identified in Chap. 1 and provide elaboration and documentation of the findings. Although the description of public concerns is brief, it serves as a good summary of the situation and provides an extensive list of references. One interesting comment is that public opinion polls are of doubtful validity. Results are seen to vary greatly with the way questions are phrased. No discussion is given of the misconception by the public that scientists are generally opposed to nuclear power.

The attention given by the panel to transportation may be the most important contribution of the book, for a peculiar reason. The U.S. Department of Energy does not see the transportation of waste or spent fuel as a particularly difficult or hazardous operation, but the public is very sensitive to the idea that radioactive materials may be passing their homes. Any research that sheds light on how to resolve this difference will be useful. Most books and reports on waste management concentrate on the disposal phase, possibly because it is the more scientifically interesting.

One major question comes to this reviewer's mind: How big is the radioactive waste transportation problem in terms of the movement in the United States of all goods and byproducts? The total capital cost of \$1.2 billion to handle 3000 annual shipments from 128 reactors by the year 2004 does not seem exorbitant when compared with the cost of the nuclear plants and the value of the product, electricity. The book provides maps of the United States that show large arteries and veins of flow of nuclear waste. The maps remind us of those in which the size of one state is greatly exaggerated. Studies that lead to measures that reduce public concern about transportation and as well lead to greater economy and safety are certainly needed. It should be settled whether one site, several, or many is best.

The book ends with a commentary on the implementation of the Nuclear Waste Policy Act of 1982, and reemphasizes the importance of extremely careful attention to two-way communication between agencies and the public. This reviewer accepts the existence of citizens' groups as a fact of life, but wonders why the concept of democratic government has failed and requires supplemental representation in the form of special interest group intervention. An appendix by the one law professor in the panel addresses this subject somewhat, concluding that formal adversarial mechanisms should be established. Clearly this is a controversial matter, because some people believe that the influence of factions already is too great and disrupts the function of duly elected officials.

It was somewhat of a surprise not to see in the book more disclaimers and expressions of alternative opinion, considering the fact that waste disposal is one of the key issues that divide pronuclear and antinuclear forces.

The book is worth reading, both for its content and thought-provoking discussions, in spite of its somewhat limited scope and perspective. Whether its recommendations on continued study of the subject will be heeded remains to be seen.

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