BOOK REVIEWS

Concerns About Risk

Public Reactions to Nuclear Waste. Citizens' Views of Repository Siting. RILEY E. DUNLAP, MICHAEL E. KRAFT, and EUGENE A. ROSA, Eds. Duke University Press, Durham, NC, 1993. xvi, 332 pp., illus. $49.95; paper, $24.95. Based on a symposium, San Francisco, CA, 1989.

For many scientists, engineers, and regulators, the public controversy over siting a repository for high-level nuclear wastes exemplifies the clash between rational scientific judgment and irrational public attitudes. Even many who are more sympathetic to public concerns about risk and management believe the controversy is exacerbated by incompatibilities between good science and public participation in regulatory decision-making. Understanding the incompatibilities, however, is crucial to managing science and technology in a democratic society and provides an important motivation to study the relationship between public opinion and nuclear waste policy. In this book, Dunlap and his colleagues present a solid base of empirical research on the subject, and the strength of the collection is the careful unraveling of social factors and context to explain the overwhelmingly negative public view of nuclear waste and its management.

What can we expect to learn from a deeper understanding of public views about nuclear waste policy? One expectation, possibly held by those who hope to move the process forward, is that we might uncover insights to help "repair" the current U.S. approach to nuclear waste management and eventually complete the siting of a long-term repository in Yucca Mountain, Nevada. Taken as a whole, the studies give little reason to expect that the existing conflict can be resolved consensually. Public sentiment across many sociological and political boundaries is strongly against a repository. Reasons for this view cannot be explained by simple models of self-interest, not-in-my-backyard (NIMBY) irrationality, deficiencies in technical expertise, or visceral reactions to the term "waste." Unacceptability of the repository is most significantly related to strong concerns about risk (health and environmental) and lack of trust in those who will manage the facility (most notably the Department of Energy). Options for waste management in this case seem limited to (i) stop the current plans and completely rethink the approach; (ii) determine whether there are socially acceptable bribes at local and national levels; or (iii) decide to override the democratic process.

The book presents many perspectives on the "publics" involved in the debate. The contributions report empirical analysis of local, rural, urban, site-specific, touristic, and national opinions on nuclear waste management. Not included in the book is an analysis of the technical and regulatory communities and their own beliefs about the efficacy of the current management approach. Empirical analysis of the non-technical concerns of scientists, engineers, and regulators, particularly a better understanding of their perceptions of the social and political dimensions, would be enlightening in the context of citizens' views and the nuclear waste debate.

An important but far more subtle lesson of the book has to do with the kinds of science and methods the national state brings to bear on a problem that generates significant public controversy. In this case, we have to question to what extent the U.S. management approach for nuclear waste unintentionally "engineered" the current environment of animosity by responding to an inherently political problem with an inappropriate technocratic decision process. Would a management strategy based on a deeper understanding of and respect for democratic processes have resulted in less social conflict? Dunlap and his colleagues cannot answer this question, but their historical analysis of nuclear waste reveals a management process for incorporating public input that was dismally unscientific and unbalanced in its treatment of technical and social data.

The concluding chapter summarizes the individual empirical studies and presents the cumulative wisdom. It then considers currently suggested technological, judicial/legislative, and knowledge fixes for the waste management program in the light of the cumulative wisdom. Advocates of the current plans for Yucca Mountain will not find this discussion particularly encouraging. Notably, some issues it raises demand much more study and analysis, especially if we hope to integrate insights from social science with the traditional technocratic approach. Two immediate examples come to mind: how the site-selection criteria might be modified to recognize social and political factors explicitly, and the extent to which public distrust in a managing organization should elicit major changes in program authority and responsibilities. More generally, the book underscores that these issues call for rigorous natural and social science consideration of how technology and its management can best meet the demands of our democratic society.

Robin Cantor
Division of Social, Behavioral, and Economic Research, National Science Foundation, Arlington, VA 22230, USA

Magnetics for Chemists

Molecular Magnetism. OLIVIER KAHN. VCH, New York, 1993. xvi, 380 pp., illus. $95.

The title of this book begs several questions. Is there such a thing as molecular magnetism, distinguishable from other kinds that have different adjectives attached (such as personal magnetism or animal magnetism)? Is "magnetism" to be construed as a property of a molecule, or is it inherently a property of an ensemble? The questions are important because the central theme, unstated at the outset but becoming ever more evident as the book proceeds, is to establish principles that will enable chemists (and the book is addressed principally to chemists) to assemble clusters or arrays of molecules whose collective properties are governed by interactions between the constituents and then to rationalize these properties through fundamental theories. The principal interaction mechanism considered is magnetic exchange, of course, and the microscopic mechanisms of superexchange and double exchange are exhaustively gone into. However, other, less well known sources of cooperativity also receive attention, such as the way in which the change of metal-ligand bond length accompanying a high-spin to low-spin transition on one molecule transmits its effect to its neighbors.

The starting point, though, is the individual molecule, almost exclusively in the form of the classical Werner-type of coordination complex in which a transition metal or lanthanide ion is embedded in a coating of organic ligands but in which the unpaired *d*- or *f*-electrons are only modestly delocalized away from the central metal. The magnetic behavior of crystals made up from such molecules, considered in the first