

Book Reviews

Ground Water Pollution Control, by Larry W. Canter and Robert C. Knox (Eds.), Lewis Publishers, Inc., 121 South Main Street, Chelsea, MI 48118, U.S.A., 1985, ISBN 0-87371-014-2, 529 pages, \$49.95.

This very timely book summarizes a tremendous amount of relevant information with little duplication and few omissions. Most technical alternatives for ground-water pollution control and aquifer restoration at SUPERFUND sites are described. Sufficient details are included such that most concepts as presented provide a workable outline for structuring activities or evaluating designs. Comprehensive lists of references provide the reader with information needed to pursue these concepts in detail.

A brief well-written introduction (Chapter 1) sets the stage for the three major subsections; Technologies, Decision-Making and Case Studies. It is the manner in which the authors devote over 35% of the text to this second topic, Decision-Making, that makes use of this book almost mandatory to anyone involved with selecting alternatives regarding abatement or restoration actions focused on a ground-water pollution problem.

Chapter 2, Physical Control Measures, outlines technologies that modify ground-water flow or contaminant mobility. The authors include very complete discussions of costs, as well as advantages and disadvantages, of the numerous technologies studied. Discussion of contaminant mobility is restricted to stabilization at the time of disposal and does not include in-situ methods as they might be used to retard the movement of pollution already in the ground. The authors make good use of schematics to illustrate key features of hydraulic control (pumping and injection) methods, but large (11 pages total) technical tables (Tables 2.3 and 2.4) contribute little. Symbols used in the equations and diagrams in these tables are not defined, and the descriptions of boundary conditions under which a specific "analytical solution" is applicable are much too brief for the non-specialist. In some equations, symbols were not completely reproduced by the publishing process.

Chapter 3, Treatment of Ground Water (by D.F. Kincannon and E.L. Stover), discusses methods and costs for removing most common contaminants from water by means of surface treatment plants, a technique that is coming into widespread use. The discussion is concise and includes not only a brief description of the principles of each method, but also tables listing the applications of the various techniques to many contaminants. Schematics of treatment plants, examples of treatment results and cost analyses are excellent. Some terms commonly used by hydrologists (BOD, COD, TOC) are not defined.

Chapter 4 on In-Situ Technologies (by C.H. Ward and M.D. Lee) is the weakest chapter in the book. Numerous in-situ methods available and under

consideration for use at some sites (vitrification, in-situ chemical fixation, soil washing) are not even mentioned. This chapter would be better titled "In-Situ Biological Control of Hydrocarbon Contamination", as it deals largely with the use of microbes to remove organics from aquifers. Cost analyses are not included, although there is sufficient discussion of limitations of this method.

Chapters 5 and 6, on the Protocol and Techniques for Decision-Making, are outstanding. This is perhaps the greatest challenge facing the multidisciplinary team charged with solving a complex ground-water contamination problem. These chapters suggest structures and constraints that can lead to a logical and comprehensive plan for screening and selecting among technical alternatives.

Chapter 7 on Risk Assessments and Chapter 8 on Public Participation outline how to evaluate hazards and include public input in the decision-making process. Public involvement in SUPERFUND projects is a reality; many of the highly ranked sites currently under investigation were brought to the attention of the E.P.A. by citizen activists who maintain an intense interest in the resolution of their problem.

The Case Studies and Applications section provides, first, three examples of aquifer restoration projects. These case studies illustrate not only technologies at work but also elements of the decision-making process that resulted in selection of specific technologies. Abstracts of restoration projects in New Jersey and of biological restoration outline actions taken in 13 additional cases of ground-water pollution. Finally, an annotated bibliography contains abstracts of 225 references on ground-water pollution treatment and control. These references resulted from a computer search, and the most recent year listed is 1983. The authors should have included information on how the reader might access the data bases for up-to-date literature.

The book is somewhat fuzzy on data needs; which and how much information is required in order to make the decisions necessary for a successful, cost-effective restoration program? That topic, however, would require a book in itself.

This book is essential to managers and regulators responsible for aquifer restoration, to students and scientists involved in ground-water contamination studies, and to citizens who require technical information on ground-water restoration technology.

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