- Physical properties
- Packaging and transportation by road, sea and air
- Manufacture (processes)
- Uses
- Chemical hazards
- Biological hazards
- First aid
- Handling and storage
- Disposal
- Fire precautions
- Further reading
- References

GARY F. BENNETT

*Contamination of Groundwater: Prevention, Assessment, Restoration*, by M. Barcelona, J.F. Keely, A. Wehermann and W.A. Pettyjohn, Noyes Data Development Corp., Park Ridge, NJ, 1990, ISBN 0-8155-1243-0, 211 pp., $ 45.00.

Groundwater provides the basic water supply for over half the US population. Yet its quality is increasingly threatened by chemical emissions. It's estimated that approximately 1% of the economically producible groundwaters in the United States are already contaminated—and the presence of 170 organics and 50 organic contaminants has been confirmed; many of these chemicals have been introduced by industrial activities. However, the full scope of the problem is not yet understood. For example, it has been estimated that it will take 4 to 5 years to complete one round of organic testing of the 3400 public water supplies in the State of Illinois alone, given the present sampling and analytical capabilities that exist. Not included in this time estimate is analysis of the estimated one half million private wells in the state.

The impact of natural groundwater recharge and discharge processes on distribution of chemical constituents is understood for only a few types of chemical species. Also these processes may be modified by both natural phenomena and Man's activities so as to further complicate apparent climatic, demographic and hydrogeologic factors which may vary from place to place, or even small areas within specific sites. There can be no single 'standard approach for assessing and protecting the quality of groundwater, that will be applicable in all cases'.

Despite these uncertainties, investigations are underway which will be used as a basis for making decisions about the need for and the usefulness of the

alternative corrective and preventive actions. Decision-makers, therefore, need some assurance that elements of uncertainty are minimized and that hydrogeological investigations provide reliable results.

The purpose of the book (really a report of the U.S. Environment Protection Agency—(U.S. EPA) is to discuss the measures that can be taken to ensure that uncertainties do not undermine our ability to make reliable predictions about the response to contamination of various corrective or preventive measures. To this end, the author has written the following chapters:

- Framework for Protecting Groundwater Resources
  - Groundwater contamination
  - Groundwater quality investigation
  - Groundwater restoration
- Scientific and Technical Background for Assessing and Protecting the Quality of Groundwater Resources
  - Basic hydrogeology
  - Monitoring well design and construction
  - Groundwater sampling
  - Groundwater tracers
  - The use of models in managing groundwater protection programs
  - Basic geology

A further goal of the report is to bring together available technical information for groundwater personnel working for the U.S. EPA and for personnel working for state and local governments on whom the U.S. EPA ultimately depends for proper groundwater management.

It appears that the authors have met their goal of information gathering and transmission. And from an examination of the peer-review panel U.S. EPA put together to scrutinize this report, one can be assured it's of the highest quality.

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*Detection of Subsurface Hazardous Waste Containers by Nondestrucive Techniques*, by A.E. Lord Jr. and R.M. Koerner, Noyes Data Corp., Park Ridge, NJ, 1990, ISBN 0-8155-1244-4, 83 pp., $ 39.00.

The authors of the book are well-recognized experts in the area of subsurface detection having conducted research on the topic under US Environmental Protection Agency (U.S. EPA) sponsorship for a number of years. Papers on this topic have been published in the *Journal of Hazardous Materials* and the second author (Koerner) serves on its advisory board.

This book really is a project report to the U.S. EPA on the author's research carried out with U.S. EPA funds. The project's goal was to identify and