
At one time, a contaminant hydrologist could operate effectively with general knowledge of geology, physics, and chemistry and some specific knowledge of the application of these fields to subsurface water flow and solute transport. In the past three decades, the list of requisite scientific skills has grown to include fields as different as microbiology and geophysics. At the same time, contaminant hydrogeologists have had to gain more specific knowledge of the application of scientific disciplines to subsurface flow and transport processes. Currently, investigations at contaminated sites may require the use of advanced numerical and geostatistical analyses of coupled, nonlinear processes based on sparse, indirect measurements. Practitioners in a field that requires such a wide range of expertise to be applied in a cost-effective manner need a concise reference that defines the basic terms used in each subdiscipline, places these fields in a unified practical context, and points to accessible sources of more comprehensive information. The Practical Handbook of Soil, Vadose Zone, and Ground-Water Contamination serves this purpose well.

The handbook is organized into 14 chapters and 6 appendices. Part I (Chapters 1–4) covers the basic concepts of geology, saturated and unsaturated flow, geochemistry and microbiology, and sources and behaviors of contaminants. The material in these chapters is necessarily brief. However, the fundamental concepts of each subject are explained well with clearly written text and useful figures. Many of the figures are from older sources, leading to uneven figure quality, but all are readable as printed. Part I would not be sufficient as a textbook for a college course, but it is a useful resource to explain concepts and terminology. Part II (Chapters 5–10) covers planning strategies for field investigations, geophysical and remote sensing techniques, subsurface hydrologic characterization methods, tracers, contaminant monitoring, and the use of models in contaminant investigations. The first and last chapters of this part provide particularly useful descriptions of the philosophies and approaches to optimal data collection and analyses; they could be reread and reconsidered often. The chapters describing geophysics and tracers provide extensive lists of techniques available. However, the material is not fully current. (For example, there is no mention of the use of gravi-metric techniques for monitoring water storage change or of borehole ground penetrating radar to monitor flow in the vadose zone.) Despite this limitation, the handbook provides one of the most comprehensive lists of potentially useful geophysical methods for hydrologic studies that I have seen. The chapters on subsurface characterization and contaminant monitoring provide more comprehensive discussions of these well-established methods. The material in Part II should be considered a necessary reference for those working in site characterization. Part III (Chapters 11–14) covers contaminant prevention and minimization, remediation planning, and remediation of soils and groundwater. The first of these chapters brings together the concepts presented in Parts I and II in a discussion of the approach to characterizing and treating a contaminated site. This is a necessary and useful discussion, but it is somewhat limited due to a general lack of peer-reviewed investigations of this subject. Similarly, the practical descriptions of remediation methods, while complete, have to rely on conference proceedings and EPA reports due to limited coverage in the scientific literature. In all cases, the authors have done a good job of presenting the material in an objective and informative way to provide a basis for practitioners to select remediation alternatives. In the first three appendices, practitioners and academics will find invaluable lists of methods for site characterization in the laboratory and field and a source for hydrologic parameter estimation from textural information. The fourth appendix provides example worksheets and checklists for wellhead protection investigations. The final appendix provides a very limited set of worked problems.

Practicing hydrologists and academics with a practical emphasis should have a copy of Practical Handbook of Soil, Vadose Zone, and Ground-Water Contamination. Its primary use will be as a convenient and somewhat comprehensive source for references across a broad range of subdisciplines. The handbook would not replace a fundamental text on subsurface hydrology or any related fields for use as a classroom text, but it would likely benefit many students and instructors by providing practical examples of the application of hydrology and by promoting stimulating discussions about the philosophy of the design and interpretation of hydrologic investigations.

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