Appropriately the book begins with a discussion of the regulations governing the cleanup of petroleum-contaminated sites: CERCLA; SARA; Safe Drinking Water Act; RCRA; Underground Injection Control Program; air, water, fire, health and safety regulations; and construction and operating permits are all covered. Then, the author moves to a general discussion (introduction/overview) of cleanup strategies, corrective action plans, contracting (and contractor management), remedial design:

- incineration
- pump-and-treat
- reinjection
- soil washing
- vapor stripping
- air stripping
- carbon adsorption/vapor incineration of emitted organics
- chemical treatment
- ion exchange

Chapter 2 discusses data required for site cleanup planning. In that chapter, the author notes that the most important task in the development of a site assessment remedial plan is the collection and analysis of accurate data on the geology, hydrology, area extent of contamination and identification and measurement of concentration of contaminants.

Chapter 3, is the core of the book as it discusses the selection of remedial options, based on the data obtained. Chapter 3 also discusses the installation of trenches or drains, wells, waste treatment systems, incineration, soil washing, bioremediation, and solidification containment.

I cannot attest to the accuracy of the data but Chapter 4, Costs of Remedial Action, appears to be one of the most informative chapters of the text. Good cost data in general are hard to find in engineering texts. Russell gives over 50 pages of tabulated and plotted cost data covering all aspects of the remediation process from initial exploration through laboratory analysis. The book contains no index but has an excellent, detailed table of contents.

My overall assessment is that this is a very good book and should be on the shelf of anyone interested in site cleanup.

GARY F. BENNETT

Groundwater Modelling Utilities, by William C. Walton, Lewis Publishers, 121 South Main Street, Chelsea, MI, 48118, 1992, L679, ISBN 0-87371-679-5, 629 pp., $95.

This book was written to assist the groundwater modeler in applying a subset of models on microcomputer platforms. The author notes that while models are being used at an increasing rate, transfer of codes from the mainframe to microcomputer stations has not been accompanied with a commensurate level

of reference manuals and documents, user guides, read-me files, and/or help screens that are sufficiently user friendly to accommodate new or infrequent users. To remedy the situation, this book offers:

1. Operation and logic reference supplements to selected groundwater model, pre-processor, post-processor, geostatistics, graphics, CAD, and word processing software supporting documents (references to further information sources are extensive).
2. Selected model operation practice exercises with extensive step-by-step input/output prompt and response documentation.
3. Six model database manipulation utility programs stored on diskettes in the back of the book.

The book is oriented to finite difference numerical model codes in the public domain. Most of the codes are those applied by the U.S.G.S. and include MODFLOW, MODPATH, MOC, and SUTRA. Materials on MODFLOW, MODPATH and associated utilities are particularly strong.

Introductory materials contain a brief description of applications of each of the subject codes. This is followed by a description of the modeling process progressing from development of a conceptual model and selection of model software through preparation of the model database to model calibration. Subsequent chapters describe pre-processor, program, utility program and post-processor operation for each of the highlighted software packages. Exercises are provided to allow the reader to verify that operation has been mastered. Additional chapters address operation of GEOPACK (geostatistical software), commercial graphics software, CAD software, commercial word processor software, commercial compiler software, and utility programs. Utility programs discussed address:

- Lagrange Curvilinear Interpolation
- Lagrange Interpolating Function
- Triangulation Interpolation Technique
- Calculation of Area Enclosed in a Polygon
- Equivalent Well Block Radius
- Well Partial Penetration Impacts.

Appended materials (nearly 75 percent of the book) provide source codes for utility programs, Instructions for use of diskettes provided with the book, exercise exhibits, and a listing of software distributors. The book has a number of helpful items for novices or more seasoned modelers who do not routinely use some of the software packages. It is recommended to anyone fitting those categories contemplating work with MODFLOW, MOC, SUTRA or MODPATH. Readers need to be mindful that the rapidly evolving field has already rendered some aspects of the book out of date, e.g., the U.S.G.S. parameter estimation code for MODFLOW (MODFLOW) is not mentioned and the MT3D code (Papadopoulos & Associates) has replaced MOC model as the preferred transport code. Recognizing these dynamics, periodic updates would greatly extend the utility of the book.

GAYNOR W. DAWSON