

revised and finally accepting 62 diverse manuscripts. They are to be commended on the quality of each. I found none wanting in quality and the quantity is almost overwhelming.

The series covers all media: air, water and soil/sediment. I will cite just three papers, one to illustrate each major area.

Air: Biodegradation of Vapor-Phase Contaminants.

Water: Biotreatment of Aqueous Wastes from Pesticide Manufacture Using Sequencing Batch Reactors (SBR) with PAC.

Soil/Sediment: Surfactant-Enhanced Aquifer Remediation: Fundamental Processes and Practical Applications.

In all, there are 62 papers by an estimated 200 contributors to a 3-volume series containing 2155 pages. As I said, a monumental effort and one, I believe, very worthwhile.

To do the series justice, I should really list the titles of all the papers. Space does not permit, but they run the gamut from how the law drives site cleanup to basic equations of flow and transport in porous media. The latter paper is an example of the basic theory found in many of the papers. Others, however (for example a paper on the Lasagna process) are quite practical, but practical papers are fewer in number than theoretical papers.

While the total price of three books may deter individuals from buying them, major corporations and University libraries should not be without this series. It will be cited for years to come.

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PII: S0304-3894(98)00230-1

Environmental Remediation Costs—A Compendium of Three Books and Computer Programs, R.S. Means Company, Inc., Kingston, MA. 1. *Environmental Remediation Estimating Methods*, Richard R. Rast, 1998, \$99.95, 594 pp., ISBN: 0-87629-461-1; 2. *Environmental Remediation Cost Data—Unit Price*, 4th ed., 1998, \$149.95, 325 pp., ISBN: 0-87629-493-X; 3. *Environmental Remediation Cost Data—Assemblies*, 4th ed., 1998, \$149.95, 300pp., ISBN: 0-87629-494-8; 4. *Computer Disks from Above Books: Six floppies, Echo's Softbook*, 1998, Delta Technologies Group, Englewood, CO.

The purpose of the three-book package and the companion computer disks is to provide information to allow engineers to develop as accurate-as-possible estimates for remediation (site cleanup) projects. All three books are designed to be used together.

The first book provides general information in its first seven sections that is relevant to most types of remediation projects—a daunting task with much area to cover. To do this task effectively, the author (Rast) has had to write concisely on a wide variety of topics and, indeed, he has, covering 59 different technologies in less than 566 pages. Needless to say, no topic was treated in depth, but the topics I reviewed were covered reasonably adequately, often with diagrams of equipment and plots of performance data.

The focus, however, is not on performance; it is on providing a technical base prior to calculating costs.

The author states, “The purpose of the book is to provide a comprehensive reference that can be used by site owners, environmental consultants, engineers, construction managers, and other interested parties to:

- Prepare preliminary budget estimates;
- Develop more detailed engineering estimates;
- Compare the cost of different remedial action alternatives to select the most cost effective solutions;
- Estimate the financial liability associated with remedial action requirements on a site or group of sites;
- Review estimates prepared by others (e.g. an owner may want to review the reasonableness of an estimate provided by a contractor prior to negotiation of the contract);
- Negotiate reasonable settlements in insurance cost recovery cases;
- Consult as a resource for other related applications.”

Section 2 (Part 1) of the first book is again a concise but, in my evaluation, good review of U.S. Environmental Laws and Regulations that control (or drive) environmental remediation. Rast, in turn, discusses CERCLA and RCRA in some detail; following this discussion is a single paragraph describing the Sanitary Food Transportation Act (refers to garbage), the Clean Air Act (Amendments of 1990 pertaining to incinerators), and the Pollution Prevention Act of 1990.

In Section 3 of Book 1, the author outlines the seven basic steps for creating a cost estimate for a multi-stage project:

- Develop the project description;
- Classify project sites;
- Identify the technologies and treatment trains to be used;
- Estimate the quantity of work and direct cost of each technology;
- Estimate sampling and analysis and professional labor costs required to support the project;
- Identify miscellaneous direct costs required to complete the project;
- Estimate indirect costs, general conditions, overhead and profit.

In Section 7 of Book 1, Rast discusses worker safety levels because they have a significant impact on labor and productivity—which may be much reduced by safety gear and working time limits imposed by OSHA.

Part II comprises the major section of Book 1. A total of 51 sections are devoted to cleanup technology from air sparging to underground storage tank closure. Needless to say, I did not read all of the material, but I did the sections where I have the most knowledge. Generally, the sections I read were very good. I was surprised, however, that in the dewatering discussion, vacuum filtration was the main unit reviewed, while neither plate-and-frame filter presses nor belt filters were discussed.

The second book, *Environmental Remediation Cost Data—Unit Price*, provides the reader “with the detailed line items, component costs, forms, instruction, and guidelines needed to prepare or verify cost estimates for almost any type of environmental remediation project, ranging from simple underground storage tank removals to complex

hazardous waste sites. The detailed breakdown of line item costs includes the crew, the hourly output, adjustment factors, the labor cost, the equipment cost, and the material cost organized in a work breakdown structure designed for environmental remediation work.”

Details are voluminous. For example, costs are given for 21 different size (5–200) KW of a high intensity ultraviolet oxidation system. The smallest unit costs \$51 000 and the largest one is priced at \$358 000. The Modification section for geography is given by Zip Codes with Toledo (Zip 43606 and home of the reviewer) being 0.87. New York (Zip 11300) is 1.30.

The third book, *Environmental Remediation Cost Data—Assemblies*, “provides a systematic menu of costs for each type of remediation technology. Each assembly cost is broken out into five additional cost levels that have decreasing productivities to compensate for increasing safety levels established by OSHA. Containing over 4,000 assembly cost items organized by treatment train, this publication is a cost source book for environmental restoration activities beginning with initial site investigation and continuing through studies, design, remediation, and long term monitoring and operation.”

Each technology topic begins with a diagram of the process considered and a general discussion of the process. For example, under solidification/stabilization operations, the cost of a Bobcat with a Backhoe is given (at \$1500/month). On the same page one finds the cost of a dump truck rental. Each cost is also given by safety level.

Finally comes Echo’s Softbook User Guide that gives details step by step information on how to install and use the cost estimating programs (six floppy disks). In addition to cost data, treatment/process descriptives, treatment train consideration, common cost elements and other cost considerations are given.

Reviewing the package was a challenge. First, the data are voluminous. Second, the information is much different from the technical books I normally review.

I am far from a cost estimation engineer, but I am well aware of the importance of project cost, especially in the hazardous waste site remediation area where costs often get ‘carried away.’ Personally, I cannot believe someone in the field could do without this or a similar package. I believe it is invaluable.

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Air Quality Control Handbook, E. Robert Alley & Associates, Inc., McGraw-Hill, New York, 1998, 845 pp., ISBN: 0-07-001411-6

Alley and coworkers at his consulting firm have authored this handbook to give industrial, governmental and consulting engineers a quick reference to the major areas of pollution control-theory, characterization, regulation, management, and implementation. That they accomplish in 26 chapters followed by 17 appendices.

The main body of the book has five parts (if one does not count the introductory section on the history of air pollution and background of air quality regulations).