

transfer is likely to be of little interest to chemical engineers. Chapters 4 and 5 do contain some useful discussions of numerical solutions of boundary layer problems. However, there are no example problems or computer programs.

The major contribution of this book would appear to lie in Chapters 6 through 9, on turbulence modeling, which constitute more than half the length of the book. This material includes a useful historical perspective and spans the complete range of engineering approaches in this area up to the present time. The chronological discussion of work in turbulence modeling beginning with early mixing-length theory and progressing up to algebraic and various partial differential equation models should be of interest and value to chemical engineering. This discussion also integrates well the contributions to modeling from both experimental and theory.

In summary, the present book seems somewhat disappointing in its treatment of laminar boundary layers, but in contrast it contains material on turbulent momentum transfer which should be of interest to chemical engineers. In this context the book can be recommended as a useful reference. □

## **INDUSTRIAL HYGIENE ASPECTS OF PLANT OPERATIONS**

*by L. J. Cralley, L. V. Cralley, and J. E. Mutchler  
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This is the second volume of a new three-volume series that is being prepared to provide recognition, measurement, and control of potential hazards normally present in various industrial plant operations. The first volume covered process flows while the third volume will treat equipment selection, layout and building design.

This volume, divided into two major sections of unit operations and product fabrication, encompasses a broad range of industries with authoritative information contributed by specialists from these industries. In the first section twenty-three contributors discuss unit operations as distinct entities along an industry-wide concept. Some of the unit operations considered include filtration, clarification, mixing, blending, grind-

ing, and spray, vacuum, freeze and fluidized bed drying. The second section includes thirteen contributions which cover the operations and procedures for assembling parts and materials into final products. The industries considered in this latter survey range from such basic industries as storage battery and tire manufacturing to the high technology industries of semiconductor and liquid scintillation counter manufacturing. One may argue with the manufacturing processes that were selected by the editors; however, the breadth of the selected processes and the hazards associated with these processes should provide a good introduction to the hazards associated with those manufacturing processes that were not included.

Even though most contributors to this second volume have adequately described each step in the unit operations and product fabrication flow of a specific manufacturing process and have included a discussion of the various health hazards that may be encountered with suggestions for their monitoring and control, many engineering readers will be disappointed by the qualitative approach taken by the contributors to this important subject. Only a few of the chapters in the volume have included quantitative information that would be necessary in the design and construction of process equipment that minimizes or eliminates identified industrial hygiene hazards. Where such quantitative information is included, it is generally quite sketchy and incomplete forcing the design engineer to consult other literature sources. Unfortunately, no guidance to such quantitative data is included by any of the contributors. Chemical engineers will also be somewhat disappointed in this volume because the "unit operations" portion of the title implies that some of the contributions will examine the conventional unit operations associated with heat, mass and momentum transfer. However, many of the key unit operations such as distillation, absorption, extraction, evaporation, heat transmission, etc. found in most typical petroleum and chemical processing plants have not been included.

Nevertheless, this volume does manage to bring together a wealth of experience in a broad range of industries and will aid engineers, managers, and industrial hygienists to more fully recognize potential hazards of industrial processes. This, in turn, will permit these professionals to evaluate such hazards and take the necessary steps to effectively control the problem. □