

BOOK REVIEW

WILLS' MINERAL PROCESSING TECHNOLOGY: AN INTRODUCTION TO THE PRACTICAL ASPECTS OF ORE TREATMENT AND MINERAL RECOVERY, Seventh edition, by B.A. Wills and T.J. Napier-Munn. (2006) Butterworth-Heinemann (Elsevier), Burlington, Massachusetts. 456 p. ISBN: 978-0-7506-4450-1. \$59.95.

Wills' Mineral Processing Technology compiles the major aspects of ore processing and segregation, from the influence of ore mineralogy to engineering and financial factors, as well as environmental concerns, into one source. Impressively, it largely succeeds in this aim, providing a fairly complete exposition of techniques and practices used in the ore processing industry to convert the raw ore feed to concentrate. It is unavoidably too brief in some aspects, but in general it provides a good introduction for students and others interested in the field of ore processing. Given that many of the techniques described are also in use in geology and related fields albeit on a laboratory scale, the book will appeal to a much wider audience.

The present book is the seventh edition of this work with a new editor (T.J. Napier-Munn) and extended set of contributing authors, with the aim of bringing the text up to date with current techniques and practices. Although largely successful in this aim, the editor decided to preserve as much as possible of the original, thereby restricting the scope of the revisions. This is unfortunate, as it has resulted in some lack of coherence in the book. Where several chapters are concise and well presented, others are wordy and contain minor typographic errors. Some chapters also dwell excessively on classical techniques, while only briefly describing their current (and future) implementation. Although the classical implementations generally provide the best insights in a technique and should therefore be included, in many cases this could be shortened. The quality of illustrations is also variable; several badly reproduced photographs (e.g., Figure 6.29) are offset by excellent schematic cross sections. Captions are too concise and many of the schematic drawings could do with additional annotations in the figure. Some chapters are further aimed clearly at the classroom with example calculations included (Chapter 3); whereas, this didactic aspect is conspicuously absent in others (Chapters 4, 8, 9). A more rigorous revision and stricter editing would have made the book more consistent.

The book consists of four main sections, preceded by a brief introduction. This introduction presents various aspects of ore handling and mineral recovery, as well as positioning these in the broader context of mineralogy, economics, and accounting. It does somewhat jump from one subject to the next, but overall it gives a clear picture of how ore processing links to these fields. I did find the introduction brief, especially concerning the links

with mineralogy, even though the authors concede that proper knowledge of mineralogy and textures is crucial for optimum recovery of valuables from an ore. However, the included references provide sufficient starting points to look at these aspects in more detail. In the remaining chapters, the references consist of a useful mixture of works giving a general overview and specific applications and their issues/solutions.

The first part of the book, Chapters 3 and 4, deals with the important aspect of sampling and characterization of ore and other materials in the various steps of ore treatment and separation. Chapter 3 gives a detailed and extensive overview of sampling strategies and the parameters that are important in taking a representative sample from a mineralogically and texturally heterogeneous rock mixture. These issues are clearly not restricted to ores, so this chapter is of interest to people well outside the intended readership. The chapter not only discusses issues of sampling, but also gives calculation examples to highlight these factors. Furthermore, it introduces the statistical techniques devised to deal with heterogeneity and, gives the relevant statistical and mathematical background and provides examples. This approach of using examples is also present in later chapters when dealing with screening and particle settling and is one of the main strengths of the book. It allows direct appreciation of the usefulness of these techniques as applied to the problem at hand without the need to go to a specialized text. Coupled with the spreadsheets provided online, this is a very powerful teaching approach.

In Chapters 5 to 9, techniques are described to prepare the raw ore feed for eventual separation into concentrate and tailings material. Chapter 2, dealing with ore handling, is also part of this section and it would therefore be more appropriately positioned after chapter four. The main subject of this section is the liberation of ore constituents from their gangue using an assortment of crushing and grinding equipment. Screening and classification techniques are subsequently discussed in their role as controlling the in- and output of the comminution circuits.

In the third part of the book, the authors introduce the wide range of techniques used in separation of the ore feed into concentrate and tailings. The main techniques discussed are separation based on specific gravity, susceptibility to magnetic and electric fields, optic sorting, and froth flotation. The latter is the most widely used technique in industry at present and it is understandable that it is discussed in great detail. However, the current chapter is too long and would have better been subdivided. The wealth of detail swamps the general principles, which left me confused about the major controlling parameters. The exposition of various industry implementation of froth flotation, the problems encountered, and their solutions is very informa-

tive. Such a section would be a great addition to the discussion of other separation techniques in the preceding chapters.

The final chapters on dewatering and tailings disposal are not part of the main theme of the book, and are therefore justly concise and introductory. Their inclusion does round off the book, as these processes are clearly an important part of any industrial ore processing operation.

The appendices on mineral properties are useful as a quick reference. However, these tables lack many properties that are applicable to the mineral recovery. For example, magnetic susceptibility and specific gravity, which are not included, are essential to the some of the described mineral recovery techniques.

Overall, *Wills' Mineral Processing Technology* is an interesting and entertaining read on the various aspects of ore processing from raw feed to concentrate. It gives a broad overview of current

practices and techniques, thus providing a good introduction into the subject. This is, however, also the main drawback of the book, in that it does not explore directions for future developments in any detail. This is unfortunate and would also have made a good concluding chapter to the book.

In its present design, the book will appeal to both people interested in the field of ore processing and researchers applying these techniques on a laboratory scale.

VINCENT J. VAN HINSBERG
Department of Earth & Planetary Sciences
McGill University
3450 University Street
Montreal, Quebec
H3A 2A7, Canada



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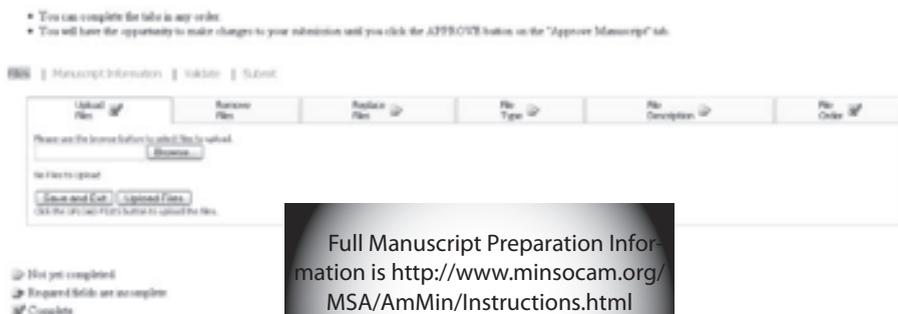
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