

effort put into the treatment of the chosen topics, the volume provides an index to the character of current research on nodules and reveals important perception and detail on a wide variety of highly specialized material. The synthesis and relevance of much of this specialized work for answering basic questions pertinent to successful mining of manganese nodules is to a great extent left to the reader. The book provides a review and clear perspective of the content of a voluminous literature but presents little new data that was not published during the period of its preparation. The detailed treatment of the mineralogy of manganese nodules is of special scientific interest. The urgent and critical need for devising a geological model that integrates and defines the role of the wide variety of parameters influential in the formation of manganese-iron nodules is still a challenge for further interdisciplinary collaboration.

It is readily apparent from this index work that sample sites and specific data on nodule composition are extremely sparse and widespread considering the vast area of ocean floor where nodules occur. The authors, like other investigators in the field, are forced to extrapolate and project their concepts and conclusions about nodule character, composition, formation and distribution far beyond the limits of the local geological environments properly represented by sample sites. The book indicates the very limited data on nodule distribution, composition and abundance on which resource estimates must be based. It is doubtful whether a satisfactory and dependable geological model for guiding nodule mining and utilization can be devised until such time as adequate and more systematic sample data are available. The authors have demonstrated that parts of the geological model for manganese nodule formation are being clearly and sometimes elaborately defined but the interrelationship of these geological parameters has not been demonstrated.

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## Exploration and Mining Geology

By William C. Peters  
*John Wiley and Sons, 696 p., 1978*  
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The dullest dust-jacket in recent memory conceals a first-class textbook for practicing economic geologists. Nowhere else are the many disciplines and techniques of this complex trade so well presented.

Peters is a former mining industry geologist, now teaching. His long experience of mineral deposits is combined with an understanding of the latest concepts, and his lively wisdom lightens every chapter of this weighty text.

Can applied geology be learned from books? Even McKinstry wrote one. His, like Forrester's, is out of print and its details though not its principles are dated; Lahee's is not an economic text. Peter fills a gap with his comprehensive guide to a modernised profession.

He does not provide exhaustive coverage of every topic or give detailed how-to-do-it descriptions of exploration practice. That would be impossible in a single book and misleading in a continuously evolving profession. Instead he identifies the principles of each subject and indicates its problems, conveying a point of view rather than operating instructions, with reminders for seasoned professionals and truly excellent references for further study. The technique is effective and respects the intelligence and individualism of his prospective readers.

After a concise historical perspective, Part One reviews the elements of mineral deposit occurrence and weathering, and of metallogeny. A recurring problem in synoptic works is to decide how much background to include. Peters treats us to an idiosyncratic but stimulating tour of the major items in a working geologist's

warehouse of facts and ideas, while also using the review to relate theory to practical application by citing examples. Sacred cows are few – traditional western U.S. preoccupations with "plumbing" and gossans are kept under control – and exploration appears as the lively art it should be.

Part Two covers engineering and mining in sufficient detail to permit a geologist to work effectively with his colleagues; Three provides a framework of economics, including mineral policies, law, taxation, and financial evaluation methods.

Part Four (one third of the book) carries the reader through every step of the mineral exploration process: data evaluation, reconnaissance, mapping (surface and underground), geophysics, geochemistry, drilling, sampling, and reporting. It is sound, clear, practical, thorough, and supported throughout by references and common sense: "We often drown in data, seldom in information, never in facts".

Part Five reviews the geologist's role in exploration and mining, emphasizing his economic functions not merely in property evaluation but in interpreting for management the geological probabilities, the balance between opportunity and risk: geology as the *business* of resource development.

Peters closes with eight appendices (abbreviations, symbols; data sources; reporting format; geologic time; SI units; environmental guidelines; index maps), 35 pages of references, and a good index.

This book will remind you of principles, refresh your knowledge of techniques, and leave you new ideas to exploit. Wiley's usual quality is evident throughout (except for a whopping transposition on the title page). The illustrations, mainly line drawings, amplify rather than merely decorate. For students and others Peters is the ideal introduction to mining industry geology; for professionals his work will be a valued reference for everything from field sampling to operations research.

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