

World Mineral Supplies Assessment and Perspective

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Book Reviews

Porphyry Deposits of the Canadian Cordillera

Edited by A. Sutherland Brown
Canadian Institute of Mining and Metallurgy Special Volume 15,
510 pages, 1976.
\$15 00

Reviewed by J. M. Allan
Cominco Ltd.
200 Granville Square
Vancouver, B.C. V6C 2R2

Production from porphyry deposits in the Canadian Cordillera has been and will continue to be an important part of the Canadian metal industry. Until now there has been no single reference which adequately described these deposits. This volume fills this need admirably. All of the important deposits and prospects in the Cordillera are described in a consistent and logical way that makes comparison simple. The dedication to Charles S. Ney is entirely appropriate for he was associated with the discovery of some of the prospects described.

The book is divided into five sections. Section A deals with general characteristics and settings of Cordilleran porphyries, providing a framework for the description of individual deposits which follows in parts B, C, and D. Part B deals with porphyry deposits of the calc-alkaline suite, e.g., Bethlehem, Lornex, Valley Copper, in which molybdenum may be an important constituent as well as copper. Part C deals with deposits of the alkaline suite, e.g., Copper Mountain, Afton, Galore Creek, in which gold rather than Mo is the coproduct. Section C describes porphyry molybdenum deposits, e.g., Endako, Boss Mountain, Glacier Gulch,

in which Mo is the only significant metal. Part D is a review of recent developments relating to the genesis, localization and emplacement of porphyry deposits. A geological map of the Cordillera is included as well as an overlay showing faults, porphyry deposits and showings, and tectonic belts. Two tables listing pertinent characteristics of the Cordilleran deposits are also included.

The literature on porphyries is extensive but the bulk of it deals with the American and South American deposits. Perusal of this volume shows that Cordilleran deposits are in many ways similar, e.g., alteration facies, mineralogy, host rocks, but also that there are significant differences. Deposits in Highland Valley for example are centrally located within a batholith, a mode of occurrence that is rare elsewhere. The alkaline suite porphyries are also a rarity in other parts of the world and perhaps they are genetically different. Other differences include a generally lower copper grade, i.e., 0.5 Cu vs. 0.6-0.7, the lack of an enriched zone in the Cordilleran porphyries (even Afton which is in large part supergene ore is not enriched), the frequency of relatively old (200 Ma) deposits and the dominant structural control of mineralization. These differences as well as the many similarities, the wealth of data presented and the consistent format adopted make it easy for the reader to make many and useful comparisons.

The topics discussed include all of the current methods of porphyry evaluation, e.g., isotope studies, fluid inclusion work, and show that the study of porphyries in the Cordillera is as advanced as it is anywhere. Classification of porphyries is also at an advanced stage, particularly so when one sees that the phallic porphyry model of Sutherland Brown has in this volume been mated with the

vaginal alteration model of Lowell and Guilbert.

The editors of this volume are to be congratulated for providing a well organized thorough description of Cordilleran porphyries. It is a must for anyone interested in porphyries and is a real bargain as well.

MS received June 2, 1977

World Mineral Supplies Assessment and Perspective

Edited by G. J. S. Govett and M. H. Govett
Elsevier Scientific Publishing Company,
472 p., 1976.
Dfl. 90.00 (U.S. \$34.75).

Reviewed by J. V. Guy-Bray
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This third book in Elsevier's "Developments in Economic Geology" series assembles contributions by government and university authors chosen by the Govetts to provide "a sober appraisal of the problems of, and possible solutions to, the present mineral resource situation." It addresses "those who are presently trying to arrive at reserve and resource estimates . . . to frame national or international policy toward resource development".

By the very nature of the mineral industry, outlined in A. L. McAllister's excellent chapter, resource data are always obsolescent and therefore hazardous to extrapolate into the future, as the confusion of the "Limits to Growth" debate showed. For the short term, however, the first part of the book

provides, in almost excessive detail, support for the industry's often-repeated view that no real shortage of non-fuel minerals prevails and that price and technology, aided by substitution and recycling, will ensure their continuing supply.

Ample mineral resources exist, but the long term view is clouded by doubt about their availability. The reader is left to reach his own appreciation of the radical differences between the problems of short and long term supply. The editors' contributions and choice of authors and topics imply reliance on a technological "fix"; serious questions are nevertheless raised about environmental constraints and the world economy's ability to pay. E. Just's exceptionally gloomy article anticipates economic failure by the year 2000.

Over the whole debate looms the problem of energy supply. M. H. Thomas concludes that coal and nuclear power are at present the only abundant sources, and that environmental and technological problems guarantee an irreversible trend to higher costs. He endorses Hubbert's 1973 assessment of the longer term future: "The real crisis confronting us is . . . not an energy crisis but a cultural crisis."

The two most imaginative and stimulating chapters - by D. B. Brooks on mineral and environmental conservation and H. E. Cohen on extraction and processing technology - look the furthest ahead: taken together they sketch a new mineral economics. Cohen also identifies some novel and attractive research targets.

Elsevier's high technical quality is evident, and apart from several slips by M. H. Govett there appear to be remarkably few errors in a work heavy with statistics. There is some duplication and much unevenness: contributions range from primers (G. J. S. Govett, F. M. Vokes) to outlines for advanced studies (L. S. Collett, H. E. Cohen). The scanty attention paid to the crucial influence of politics on exploration and mining investments is disappointing. Moreover, although the U.N.'s role in exploration is copiously documented, the significance and future evolution of the immeasurably larger private sector programs and expenditures are only briefly discussed. For those who believe that industry remains the most effective tool for identifying and developing

mineral resources, this is a serious defect. The Sino-Soviet countries receive less attention than their resources might merit.

The book may provide some references for university mineral economics courses, but few of its chapters will interest people in the industry, and although it assembles much otherwise unfamiliar and dispersed information it is too flawed to be recommended to bureaucratic policy makers, and also too technical for their political masters.

MS received February 28, 1977

Geology of Greenland

Arthur Escher and W. Stuart Watt
*Grønlands Geologiske Undersøgelse
Geological Survey of Greenland
Oster Voldgade 10, DK-1350
Copenhagen K,
Denmark, 1976, 603 p.
DKr 195 including postage.*

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Greenland is a geologically unique region of the crust, with a wealth of rock-types and a chronological record spanning almost 4000 m.y. of Earth history. Vestiges of this record, continuously exposed along an extensive deeply embayed coastline, offer almost limitless opportunities to observe geological relations between major crustal units. Therefore, whether it is in the Archean, Proterozoic or Phanerozoic record, significant conclusions can be drawn concerning the processes which shaped the Earth's crust through geological time. This impressive volume provides a concise and authoritative introduction to practically every aspect of the geology of Greenland. It is the result of more than 30 years field and laboratory research and is a fitting testament to the fact that the Greenland Geological Survey has mastered the logistical problems of working efficiently in an exposed and potentially hostile area.

The book comprises 21 chapters and was written by 29 authors with first hand experience in Greenland who are either staff members of the Geological Survey of Greenland, faculty members of universities in Denmark, Switzerland, Britain, Eire, and Canada, or employed by an exploration company with interests in Greenland. It is lavishly illustrated with 472 text figures, including some 258 plates and 126 maps, which occur either within the text or as fold-outs. The individual chapters, range in length from 10 to 119 pages and describe specific areas or particular aspects of the geology of Greenland maintaining a consistently high standard of lucidity and scientific content. They are well documented and references are included at the end of each chapter. The book is well cross referenced and contains an extensive index.

For a number of years we have been witnessing an overall decline in the quality of presentation in scientific publications due principally to increasing publication costs. This has commonly resulted in a reduction of plate quality; in many cases failing to show the features which they were intended to depict. Such is not the case with this book. It serves as a good example for other larger and richer geological surveys, of the type of publication that is possible and desirable.

The book is influenced to a considerable degree by the geological architecture of Greenland. Perhaps in no area of the world, with the possible exception of coastal Labrador and Baffin Island, are Precambrian gneisses as well exposed as they are along the coast of Greenland. Therefore, following a short resume of the geological framework and economic potential of Greenland by the editors, the succeeding five chapters emphasize the Precambrian shield of Greenland and the geology of the main structural provinces recognised therein.

In view of the current interest in the structural and geochemical evolution of the Earth's early crust, discoveries in Greenland during the last decade are of considerable significance. The review by Bridgwater *et al.* of the Archean gneiss complex presents the reader with a concise description of the lithological units comprising it, starting with the earliest rocks (the pre-3600 m.y. Isua supracrustals and the Amitsoq