VOLCANIC-ASSOCIATED MASSIVE SULFIDE DEPOSITS: PROCESSES AND EXAMPLES IN MODERN AND ANCIENT SETTINGS

in cooperation with the Mineral Deposits Division (MDD) of the Geological Association of Canada (GAC)

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SOCIETY OF ECONOMIC GEOLOGISTS, INC.
Reviews in Economic Geology, Vol. 8

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C.T. Barrie and M.D. Hannington, Editors

Additional copies of this publication can be obtained from

Society of Economic Geologists, Inc.
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Volcanic-associated massive sulfide (VMS) deposits are predominantly stratiform accumulations of sulfide minerals that precipitate from hydrothermal fluids at or below the sea floor in a wide range of ancient and modern geological settings. They occur within volcano-sedimentary stratigraphic successions, and are commonly coeval and coincident with volcanic rocks.

The understanding of ancient, land-based VMS deposits has been heavily influenced by the discovery and study of active, metal-precipitating hydrothermal vents on the sea floor. During the last three decades, excellent descriptions of sea-floor sulfides and related vent fluids and hydrothermal plumes have provided modern analogs for the land-based VMS deposits. Conversely, the geology and mineralogy of land-based deposits have provided insight into the plumbing systems and sulfide mineral paragenesis of sulfide deposits relevant to sea-floor hydrothermal systems. This volume capitalizes on the complementary nature of ancient, land-based VMS deposits and active, metal-precipitating hydrothermal systems on the sea floor, and draws equally from land-based and sea-floor VMS research.

The volume attempts to provide a balanced view of VMS systems, with descriptions of the processes involved in VMS formation and important examples representing a variety of VMS deposits and districts in modern and ancient settings. The contributions are divided into two parts, with a classification scheme given as an Introduction. In Part I, reviews of the most significant geological, physical, and chemical processes involved in the formation of land-based and sea-floor VMS deposits are presented. It is not meant to be a comprehensive review; rather, it presents a spectrum of current ideas based on research over the last 20 years. The papers have been written to be understood by a fourth-year undergraduate or graduate student, and will be a valuable reference for the practicing mineral deposits economic geologist.

The papers presented here stem from a short course held May 17–18, 1997, at Carleton University, Ottawa, Canada. The volume is co-sponsored by the Mineral Deposits Subdivision (MDD) of the Geological Association of Canada and the Society of Economic Geologists (SEG).

We thank the following scientists who have reviewed one or more of the manuscripts in this volume: Jean Bedard, Larry Cathles, Ron Cook, Brian Cousens, Al Coutts, Earl Davis, Udo Fehn, Al Galley, Katherine Gillis, Wayne Goodfellow, Peter Herzig, Dave Huston, Ian Jonasson, Maurice Lambert, Craig Leitch, Dave Lentz, John Lydon, Curtis Manley, Suzanne Paradis, Jan Peter, Mark Reed, Gwilliam Roberts, Steve Scott, Tom Setterfield, John Slack, Ed Spooner, Geoff Thurlow, Bob Turner, John Valley, Robert Varga, Anthony Williams-Jones. A number of other individuals have been helpful in the production of this volume, including Hannah Barrie, Alice Bouley, Dick Brown, Bob Cathro, Louise Corriveau, Al Galley, Steven and Daniel Hannington, Anne Labelle, Rachelle Lacroix, Lisa Laird, Mike Lesher, Dave Moore, Patsy Muntean, Kim Nguyen, Jennifer Shaw, John Thoms, Gary Sidder, Scott Swinden, and Dave Watkinson.
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