CONTENTS

"The mining industry is infinitely worse off today than it ever was. We don't have access to land—due to landwithdrawals. We have inadequate financial resources—because of inflation and changes in taxation and price controls. We are cursed by the politicians' failure to recognize that the mining industry is a highly risky business."

James Boyd, 1976

Part I Principles 1

- 1. MINERAL ECONOMICS AND EXPLORATION 3
- 2. BRIEF HISTORY OF THE USE OF MINERALS AND THE DEVELOPMENT OF ECONOMIC GEOLOGY 32
- 3. MATERIALS OF MINERAL DEPOSITS AND THEIR FORMATION 41
- **4.** PETROLOGY OF MINERAL DEPOSITS: MAGMAS, SOLUTIONS, AND SEDIMENTS 60

Part II Processes of Formation of Mineral Deposits 77

- 5. MAGMATIC CONCENTRATION 81
- 6. SUBLIMATION 94
- 7. CONTACT METASOMATISM 95
- 8. HYDROTHERMAL 105
- 9. SEDIMENTATION 151
- 10. BACTERIOGENIC 169

- **11.** SUBMARINE EXHALATIVE AND VOLCANOGENIC 179
- 12. EVAPORATION 199
- 13. RESIDUAL AND MECHANICAL CONCENTRATION 213
- **14.** OXIDATION AND SUPERGENE ENRICHMENT 239
- 15. METAMORPHISM 251
- **16.** SUMMARY OF ORIGIN OF MINERAL DEPOSITS 258
- **17.** CLASSIFICATION OF MINERAL DEPOSITS 261

Part III Metallic Mineral Deposits 269

- 18. THE PRECIOUS METALS 271
- 19. THE NONFERROUS METALS 312
- 20. IRON AND THE FERROALLOY METALS 386
- **21.** MINOR METALS AND RELATED NONMETALS 443

Part IV Nonmetallic Minerals 461

- 22. ENERGY AND COAL 465
- 23. PETROLEUM GEOLOGY 483
- 24. CERAMIC MATERIALS 496
- **25.** STRUCTURAL AND BUILDING MATERIALS 506
- **26.** METALLURGICAL AND REFRACTORY MATERIALS 525

- **27.** INDUSTRIAL AND MANUFACTURING MATERIALS 536
- 28. CHEMICAL MINERALS 553
- **29.** ABRASIVES AND ABRASION MINERALS 571

GENERAL REFERENCES ON ECONOMIC GEOLOGY 579

INDEX 581