

## CONTENTS

<b>Preface</b> . . . . .	<b>11</b>
<b>PART I (Assoc. Prof. M. Kužvart, CSc.)</b> . . . . .	<b>19</b>
<b>Introduction</b> . . . . .	<b>19</b>
<b>Literature on prospecting and exploration</b> . . . . .	<b>24</b>
<b>Industrial types of mineral deposits</b> . . . . .	<b>26</b>
<b>Prospecting of mineral deposits</b> . . . . .	<b>57</b>
Criteria for ore prospecting . . . . .	57
1. Stratigraphical criteria . . . . .	57
2. Lithological criteria . . . . .	60
3. Structural criteria . . . . .	64
4. Magmatogenic criteria . . . . .	87
a) The relationship between ore deposits and magma chemistry . . . . .	87
b) The relationship between ore deposits and magma differentiation . . . . .	91
c) Rock alterations in the neighbourhood of deposits as prospecting guides . . . . .	91
d) The relationship between ore deposits and the grain size of rocks . . . . .	98
e) The relationship between ore deposits and the size of intrusions . . . . .	99
f) The relationship between deposits and the internal structure of intrusions . . . . .	101
g) Relationship between deposits and the depth of magma cooling . . . . .	101
5. Metamorphogenic criteria . . . . .	101
6. Geochemical criteria . . . . .	102
7. Geomorphological criteria . . . . .	102
8. Palaeogeographical criteria . . . . .	106
9. Palaeoclimatic criteria . . . . .	111
10. Historical criteria . . . . .	112
Natural factors controlling the choice of prospecting methods . . . . .	112
Prospecting methods and indications . . . . .	113
Mining-historical methods and indications . . . . .	113
Geological ground prospecting methods . . . . .	122
Prospecting for deposit outcrops . . . . .	122
Prospecting for the mechanical aureoles (haloes) of ore fragments . . . . .	130
Prospecting based on erratic ore boulders . . . . .	131
Prospecting based on heavy mineral concentrates . . . . .	133
Prospecting based on ore pebbles . . . . .	140
Use of aerial photography and satellite imagery in prospecting . . . . .	142
Geochemical prospecting methods and indications . . . . .	143
Prospecting for concealed deposits . . . . .	155
Prospecting for ore deposits in various geographical areas . . . . .	162
Prospecting in little investigated areas . . . . .	163
Prospecting in industrial countries . . . . .	169
Geological mapping, phases and types of prospecting . . . . .	170

<b>The prospecting-exploratory stage of mineral deposits</b>	173
Detailed geological mapping	173
Detailed metallometric mapping	176
Structural research of ore fields and ore deposits	179
Documentation and prospecting-exploratory works on mineral deposits	180
Maps of mineral resources and reserves	182
Economic assessment of the prospecting-exploratory results	183
<b>Geophysical methods of prospecting and exploration of metallic, non-metallic and coal deposits</b>	
(Prof. Ing. J. Gruntorád, CSc.)	185
Physical properties of rocks and minerals	185
Geophysical methods	190
Application of geophysical methods	195
<b>Prospecting and exploration of oil and gas deposits (Prof. Dr. V. Homola, CSc.)</b>	220
1. The genesis of oil and natural gas and of their deposits	220
2. Prospecting and exploration	221
3. Prospecting for oil traps	223
Direct prospecting methods	237
Indirect prospecting methods (in collaboration with Dr. S. Mareš, CSc., Assoc. Prof. Ing. K. Müller, CSc. and Dr. J. Skopec, CSc.)	241
Pioneer boreholes	250
Exploratory drilling	255
Drilling of producing wells	258
<b>PART II (Prof. Ing. M. Böhmer, CSc.)</b>	259
<b>Exploration of mineral deposits</b>	259
Preliminary and detailed exploration	259
Methods of subsurface exploration	262
Exploratory systems	265
Exploratory grids	273
The use of mining works and drilling in exploratory systems	277
Location of exploratory works	279
Delimitation of the deposit	282
Delineation of the deposit in the exploratory grid	283
Evolution of an exploratory grid	290
Determination of the optimum density of exploratory grids	295
1. Determination by analogy	296
2. Comparison of exploration data with mining records	296
3. Gradual thinning of exploratory grid	302
4. Analysis of the accuracy of exploratory profiles	307
5. Mathematical-statistical methods	307
6. Determination of the optimum density of exploratory grids by modelling	310
7. The economics of exploration costs	311
Categories of mineral reserves and degrees of geological assurance of the deposit	312
<b>Sampling</b>	320
Chemical sampling	320
Sampling in underground workings	320
Sampling of exploratory drill holes	324
Mineralogical sampling	326
The initial sample weight and density of sampling	328
Combining basic samples	330

Preparation of samples for chemical analysis . . . . .	331
Technological sampling . . . . .	335
Control of sampling . . . . .	336
Determination of the quality of raw materials based on physical properties . . . . .	337
<b>Geological documentation of mineral deposits . . . . .</b>	<b>339</b>
Basic geological documentation of exploratory works . . . . .	339
Underground geological mapping . . . . .	341
The use of photography in underground mapping . . . . .	345
Documentation of exploratory drill holes . . . . .	347
Documentary rock material . . . . .	349
Construction of geological sections . . . . .	352
Spatial illustration and models of mineral deposits . . . . .	357
<b>Hydrogeological and engineering-geological investigations of mineral deposits (Dr. I. Mucha, CSc.)</b>	<b>358</b>
Hydrogeological investigation on various types of deposits . . . . .	359
Methods of hydrogeological investigation of mineral deposits . . . . .	360
Engineering-geological problems in prospecting, exploration and working of mineral deposits	362
<b>Exploration during mining operations . . . . .</b>	<b>365</b>
<b>Prospecting and exploration of placer deposits . . . . .</b>	<b>368</b>
Genetic types of placer deposits . . . . .	369
Classification of placers according to their age . . . . .	372
Geomorphological and genetic classification of placers (with a view to prospecting and exploration) . . . . .	373
1. Placers in the valleys of recent drainage pattern . . . . .	373
2. Placer deposits related to the former drainage pattern . . . . .	376
3. Placer deposits of piedmont and intermontane depressions . . . . .	377
4. Placer deposits of sea coasts . . . . .	377
Methods for prospecting and exploration of placers . . . . .	378
Preliminary and detailed exploration of placers . . . . .	379
Exploratory systems . . . . .	380
Methods of placer exploration . . . . .	383
Sampling of placer deposits . . . . .	384
Placer mining . . . . .	394
<b>Economic evaluation of mineral deposits . . . . .</b>	<b>396</b>
<b>References to prospecting . . . . .</b>	<b>407</b>
<b>References to exploration . . . . .</b>	<b>412</b>
<b>Index . . . . .</b>	<b>415</b>