

The Geochemistry and Textures of the Grevillea Gossan, Northwest Queensland

Veryan Hann

Bachelor of Science



UNIVERSITY OF TASMANIA

A research thesis submitted in partial fulfilment for the requirements of the Degree of
Bachelor of Science with Honours



CODES SRC

**Centre for Ore Deposits and Exploration Studies
School of Earth Sciences, University of Tasmania
December, 1999**



Notice in foreground the excellent 'termites' impression of the gossan'.

To my artistic family I would like to comment;

*There cannot be art without fact ,
As there cannot be science without imagination.*

Abstract

The Grevillea deposit is a newly discovered Pb-Zn-Ag stratabound sediment-hosted deposit in the Lawn Hill Region of NNW Queensland. It lies in part of the Mount Isa Inlier which has been described as one of the richest mineral provinces in the world.

The study undertook varied geochemical analyses for determining element variations and the relationships, and elemental partitions in the regolith units. It was found that Tl, Pb, Si, Fe are surface indicators of mineralisation for the Grevillea deposit. Two types of rock units dominated the regolith, which overlies the massive pyrite zone: the jarosite limonites and the hematite limonites, and both act as sponges for metals derived from the ore. The jarosite types in the area are likely plumbojarosite and argentojarosite.

Textures were also studied in outcrop, on a handspecimen scale, and on microscopic scales to search for evidence of primary sulfides. Sections of ore sample were studied and some links were made to surface textures. These included sedimentary features, bladed and platy hematite, and framboidal structures. Light rare earth minerals (monazites) in the core were an unexpected unusual find as they are not normally associated with sedex style deposits. The monazites may have useful application in dating the deposit or gossan formation.

Contents

Abstract

Contents

List of Illustrations, Tables, Figures and Plates

Acknowledgments

Chapter 1 Introduction	1
1.1 Introduction	1
1.2 Aims	1
1.3 Methodology	3
Chapter 2 Geology of the Grevillea Area	4
2.1 Geological Setting	4
2.2 Structure- Nature of Folding and Faulting	4
2.2.1 Faults	7
2.2.2 Discussion	11
2.2.3 Folding	13
2.2.4 Surface expression versus the sulphide body at depth	13
2.2.5 Discussion	15
2.3 Regolith Units of the Grevillea Deposit	16
2.3.1 Unit 1a	16
2.3.2 Unit 1b	17
2.3.3 Unit 2	18
2.3.4 Unit 3a	18
2.3.5 Unit 3b	19
2.3.6 Unit 4	19
2.3.7 Unit 5	19
2.3.8 Discussion	19
Chapter 3 Macro Scale Textures and Mineralogy	24
3.1 Introduction	24
3.2 Formation of Ore-related Textures in Outcrop	24
3.3 Ideal Textures for Galena and Sphalerite	25
3.3.1 Galena	25
3.3.2 Sphalerite	25
3.4 Ore-derived Textures at Grevillea	26
3.4.1 Unit 1a	26
3.4.2 Unit 1b	27
3.4.3 Unit 2	27
3.4.4 Unit 3a	27
3.4.5 Unit 3b	27
3.4.6 Unit 4 and Unit 5	28
3.5 Non-ore Related Textures	28
3.6 Interpretation	28

Chapter 4 Fine Scale textures and Mineralogy	47
4.1 Textures from Core	47
4.1.1 Sulfide-ore Mineral Texture	47
4.1.1.1 Pyrite	47
4.1.1.2 Galena	48
4.1.1.3 Sphalerite	49
4.1.2 Descriptions of Thin-sections	49
4.2 Textures at Surface	54
4.2.1 Pyrite	54
4.2.2 Other Minerals	54
4.3 Thin section descriptions of Surface Samples	55
4.4 Electron Microscop	62
4.5 Discussion	63
Chapter 5 Geochemistry	65
5.1 Introduction	65
5.2 Sample Preparation	65
5.2.1 XRF	65
5.2.2 XRD	65
5.2.3 ICP-OES	66
5.2.4 PIMA and FTIR	66
FTIR	
PIMA	
5.3 Results	67
5.3.1 XRF	67
Element Variance	
Trends	
Summary and Discussion	
5.3.2 XRD	74
Hematite Samples	
Jarosite Samples	
Summary and Discussion	
5.3.3 ICP-OES	79
Traverse 15 150N	
Enrichment in the Gossan	
Enrichment in the Jarosite	
Comparison of traverse 15200N	
Element Variation for typical hematite and jarosite	
Discussion	
5.3.4 PIMA	83
Opal samples	
Jarosite and Opal Samples	
Interpretation	

5.3.5 FTIR	86
Results	
Hematite and the FTIR	
Interpretation	
Jarosite and the FTIR	
Interpretation	
Summar	
Chapter 6 Conclusions	89

References

Appendix 1 Literature Review: Gossan Forming Processes.

Appendix 2 North Limited Drillhole data for 15 235N, and 15 185N

Appendix 3 North Limited Diamond Drillhole Log RVD017

**Appendix 4 -Regolith geochemistry: ICP-OES results from this study
- ICP-OES data for transects 152500N and 15 150N
supplied by North limited.**

Appendix 5 XRD Traces and Tables.

**Appendix 6 PIMA and FTIR Traces. Geochemical techniques for
Gossan Analysis.**

Appendix 7 Rock Catalogue