

THE UNIVERSITY OF ADELAIDE

Examination of the Aeromagnetic Anomaly
over the Talisker Mine area on the southern
Fleurieu Peninsula, South Australia.

by LESLIE HARVEY B.Sc. B.Sc. (Ma)

November, 1989

1

Examination of an Aeromagnetic Anomaly Over the Talisker Mine Area
on the Southern Fleurieu Peninsula, South Australia.

by

Leslie M. Harvey, B.Sc., B.Sc.(Ma.)

This thesis is submitted in partial fulfilment of the
requirements for the Bachelor of Science, Honours Degree
(Geophysics) at the University of Adelaide.

November, 1989.

University of Adelaide,
Department of Geology and Geophysics.

CONTENTS

	PAGE
Acknowledgements	I
Abstract	II
List of Figures	III
CHAPTER 1: INTRODUCTION	1
CHAPTER 2: REGIONAL & LOCAL GEOLOGY	2
2.1: Regional Geology	2
2.1.1: Stratigraphy	2
2.1.2: Structure	5
2.2: Geological Mapping of the Talisker Area	6
CHAPTER 3: MAGNETICS	9
3.1: Rock Magnetism	9
3.2: Remnant Magnetization	10
3.3: Susceptibilities	12
CHAPTER 4: MODELLING	13
4.1: Modelling of Aeromagnetic Anomalies	13
4.2: Correction of Profile Positions	14
4.3: Discussion of Models	16
4.3.1: Line 166	17
4.3.2: Lines 182, 191 & 200	18
4.3.3: Line 223	19
4.4: Ground Traverses	20
4.5: Modelling of Ground Magnetic Data	21
4.6: Discussion of Modelling	22
CHAPTER 5: MINERALOGY & PETROGENESIS	23
5.1: Opaque Mineralogy	23
5.2: Non-Opaque Mineralogy	25
CHAPTER 6: CONCLUSION	26
REFERENCES	28
APPENDICES	32
Appendix One	
Appendix Two	

LIST OF FIGURES

Table 1	Susceptibility Measurements from Hand Samples
Figure 1	Locality Map
Figure 2	Contour Map of Data including Flightline Positions
Figure 3	Geological Map after Mancktelow
Figure 4	Geological Map of Talisker Area
Figure 5	Rock Relation Diagram of Brachina Subgroup
Figure 6	Stratigraphic Table
Figure 7	Photos of rocks in the Vicinity of the Talisker Fault
Figure 8	Contour Map of Residual Data
Figure 9	Contour Map of Regional Data
Figure 10	Contour Map of Corrected Residual Data
Figure 11	Modelled Aeromagnetic Line 166
Figure 12	Modelled Aeromagnetic Line 182
Figure 13	Modelled Aeromagnetic Line 191
Figure 14	Modelled Aeromagnetic Line 200
Figure 15	Modelled Aeromagnetic Line 223
Figure 16	Modelled Ground Traverse near Mine
Figure 17	Modelled Ground Traverse 6
Figure 18	Modelled Ground Traverse 7
Figure 19	Modelled Ground Traverse 9
Figure 20	Modelled Ground Traverse 10
Figure 21	Photos of Thin Sections Under Transmitted and Reflected Light
Figure 22	Rock Mineralogy after Rajagopalan and Mancktelow

ACKNOWLEDGEMENTS

I wish to thank Professor David Boyd for introducing me to this most interesting and challenging project and for his role as supervisor. I also wish to thank my fellow honours students who have lent great support and motivation to me throughout the year.

I would especially like to thank Dr. Peter Brooker who has given me much guidance and reassurance throughout the year, and also Dr. Pat James for taking over in a supervisory role late in the year while Prof. Boyd was away.

Shanti Rajagopalan and Zhiqun Shi deserve special thanks for the many hours help each has given me. Finally, I would like to thank my family for their support and long sufferance throughout this difficult and challenging year.

ABSTRACT

A N-E striking elongate aeromagnetic anomaly is observed over the Talisker Mine area, on the Southern Fleurieu Peninsula, which has character and amplitude similar to an anomaly observed at Delamere (several kilometres to the north) found to be caused by magnetic Brachina Formation. Geological and geophysical techniques have been used to determine if the rock type at Talisker is also magnetic Brachina Formation, why there is a gap between the two anomalies, and why the anomaly at Talisker ends near the south coast.

Geological mapping, microscopy and petrologic studies have been used in conjunction with local ground magnetic surveys and modelling procedures, to reveal magnetic Brachina Formation as the cause of the anomaly at Talisker. Mapping has shown the anomaly to be the result of a sliver of magnetic Brachina Formation caught up within a local zone of intense deformation that extends for at least 1500m across strike, and which outcrops on the coast. The Brachina Formation is sheared out against Cambrian Backstairs Passage Formation to the south, forming the Southern end to the anomaly. To the north, the Brachina Formation suffered deeper erosion during Permian times, and is covered by a greater thickness of non-magnetic cover which causes the apparent gap in the aeromagnetic anomaly.