



**MOUNT ISA  
MINES**

A GLENCORE COMPANY

**Technical Report  
No. 3911**

**Exploration Permit for Minerals No. 16695  
'Overlander'  
Partial Relinquishment Report  
For the Period Ended 19 December 2013**

# MIM RESOURCE DEVELOPMENT PTY LIMITED

## TECHNICAL REPORT

**No. 3911**

**TITLE:** EXPLORATION PERMIT FOR MINERALS No. 16695  
'OVERLANDER', QUEENSLAND  
PARTIAL RELINQUISHMENT REPORT  
FOR THE PERIOD ENDED 19 DECEMBER 2013

**HOLDER:** MOUNT ISA MINES LIMITED

**OPERATOR:** MIM RESOURCE DEVELOPMENT PTY LIMITED

**1:250,000 SHEET:** SF54-2 'CLONCURRY'  
SF54-6 'DUCHESS'

**1:100,000 SHEETS:** 6856 'MARY KATHLEEN'  
6855 'DUCHESS'

**INVESTIGATIONS  
CONDUCTED BY:** MIM RESOURCE DEVELOPMENT PTY LIMITED

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**SUBMITTED BY:** T SHAW

**DATE:** DECEMBER 2013

**COPY:** 2

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## LIST OF CONTENTS

1	INTRODUCTION .....	1
2	LOCATION AND ACCESS.....	1
3	TENURE .....	1
4	REGIONAL GEOLOGY .....	2
5	PREVIOUS EXPLORATION ACTIVITY .....	2
6	EXPLORATION COMPLETED DURING THE TERM OF TENURE.....	3
6.1	AEROMAGNETIC-RADIOMETRIC SURVEY.....	3
6.2	GEOLOGICAL MAPPING .....	3
	<i>Orpheus 2 (888 Q)</i> .....	3
	<i>NE Sub-blocks (816 X, 888 C)</i> .....	4
6.3	SOIL XRF SURVEYS .....	4
	<i>Orpheus 2 (888 Q)</i> .....	4
	<i>NE Sub-blocks (816 X, 888 C)</i> .....	5
7	CONCLUSIONS AND RECOMMENDATIONS.....	5
8	REFERENCES .....	6

## LIST OF TABLES

<b>Table No</b>	<b>Title</b>
Table 1	Summary of Historic Exploration over the Overlander Tenement

## LIST OF DRAWINGS

<b>Drawing No</b>	<b>Title</b>	<b>Scale</b>
58919	EPM 16695 Overlander Location and Sub-block Details	1:250,000
63236	Overlander Regional Geology	1:50,000
63376	Location of Aeromagnetic Survey Flight Lines, 2013 Relinquishment	1:25,000
63370	Orpheus 2 Geology, Alteration, Soil XRF Geochemistry	1:10,000
63371	NE Sub-blocks Geology and Geochemistry	1:10,000

## LIST OF APPENDICES

<b>Appendix No</b>	<b>Title</b>
Appendix 1	Aeromagnetic-radiometric Data
Appendix 2	Orpheus 2 Soil XRF Data
Appendix 3	NE Sub-blocks Soil XRF Data

# SUMMARY

## **Aim of Project**

The exploration programme undertaken on Exploration Permit for Minerals (EPM) 16995 'Overlander' is aimed at the discovery of economic copper-gold mineralisation.

## **Object of Report**

This report provides details of exploration carried out by MIM Resource Development (MIMRD) over the four relinquished sub-blocks of EPM 16695 'Overlander' during the period of tenure ending 19 December 2013.

## **Location**

The 'Overlander' tenement covers approximately 92 km<sup>2</sup> and is located 50-65 km SE of Mount Isa, and 22-45 km north of Duchess, between latitudes 21°09'53" and 20°57'56" south, and longitudes 139°52'03" and 139°58'03" east.

## **Tenure**

EPM 16695 'Overlander', consisting of 29 sub-blocks, was originally applied for on 1 August 2007 and was granted to Mount Isa Mines Limited on 20 December 2011 for a period of five years.

Following the relinquishment of four sub-blocks reported here, the tenement now totals 25 sub-blocks.

## **Summary of Work**

Exploration conducted by MIMRD over the four relinquished sub-blocks to 19 December 2013 comprised compilation of open file data, a detailed aeromagnetic-radiometric survey, geological mapping and XRF soil surveys.

## **Conclusions and Recommendations**

Exploration work failed to identify targets of significant size or interest to MIMRD over the relinquished sub-blocks.

# 1 INTRODUCTION

EPM 16695 'Overlander' was applied for after target generation work for conceptual magnetic iron oxide copper gold (IOCG) targets. Targets at Overlander have been identified based on magnetic features which appear to have developed along the contact between calc-silicate and felsic volcanic units within the Corella Formation (Drawing 63236). These metasomatic zones have the potential to host IOCG mineralisation similar to that identified at Edgarda and Beauty to the south. Other mineralisation styles targeted include:

- Sulphide vein stockwork and breccia in graphitic shale. Mineralisation is typically hosted in and adjacent to graphitic shale enveloped in calc-silicate. Examples of this style of mineralisation include the Pelican and Kalman prospects that are located immediately to the east of the tenement area.
- Skarn hosted mineralisation developed within Corella Formation rocks on the margins of granite. An example of this is the Overlander workings located close to the northern half of the tenement.
- Calcite-sulphide vein systems in meta-dolerite. The Andy's Hill prospect located central to, but outside the tenement area is an example of this style of mineralisation.

This report documents work conducted by MIMRD on the four sub-blocks relinquished during the tenure period ending on 19 December 2013.

## 2 LOCATION AND ACCESS

The 'Overlander' tenement is centred approximately 60 km southeast of Mount Isa, and 30 km north-north east of Duchess. Access is via the Fountain Springs track from the Barkly Highway, or via station tracks from Duchess. Station tracks provide reasonable access to the northern and southern parts of the tenement

## 3 TENURE

EPM 16695 'Overlander' was originally applied for on 1 August 2007 and was granted to Mount Isa Mines Limited on 20 December 2011 for a period of five years.

Four sub-blocks were submitted for relinquishment on 19 December 2013. The sub-blocks retained and relinquished from the project area are listed below while the tenement location and sub-blocks details are shown in Drawing No. 58919.

<b>BIM</b>	<b>Block</b>	<b>Sub-block</b>
CLON	815	y, z
CLON	887	d, e, n, s, x, z
CLON	888	g, l, m
CLON	959	c, e, h, j, k, o, p, s, t, u, x, y, z
CLON	960	l
<b>Total</b>		<b>25 Retained Sub-blocks</b>

<b>BIM</b>	<b>Block</b>	<b>Sub-Blocks</b>
CLON	815	u
CLON	816	x
CLON	888	c, q
<b>Total</b>		<b>4 Relinquished Sub-Blocks</b>

## 4 REGIONAL GEOLOGY

The Overlander tenement occupies the area between the Pilgrim and Fountain Range Faults where they splay apart, and extends up to 5 km to the north of the Fountain Range Fault. North of the Fountain Range Fault, the area is covered by felsic volcanics of the Argylla Formation, unconformably overlain by quartzites and micaceous quartzites belonging to the Ballara Quartzite (Derrick et al., 1977). South and east of the Fountain Range Fault the area is dominated by calc-silicates, metasediments, amphibolites and felsic volcanics of the Corella Formation. These have amphibolite grade metamorphism, silicification and red rock alteration. A north-south orientated granite body – the Overlander Granite of the Wonga Batholith (1750-1730 Ma), along with amphibolite and dolerite intrusions extend through the western side of the tenement, intruding the Corella Formation. The Mt Philp Breccia formation is present in the north-eastern part of the tenement (Bultitude et al., 1982). The Pilgrim and Fountain Range Faults are regional scale structures which can be traced for tens of kilometres. The area is cut by multiple NE striking dextral faults, which are often characterised by prominent quartz ridges. The tenement area on 1:100 000 scale regional geology is shown in Drawing 63236.

## 5 PREVIOUS EXPLORATION ACTIVITY

The tenement has not been subject to significant field activities. Stream sediment samples taken by various companies from the 1960s to 1990s cover the tenement. A few lines of soil samples were taken in the 1990s, and a number of rock chip samples have been taken in the southern half of the tenement. Some of this historical geochemical data appears to be miss-plotted in Xstrata's database.

Two historic Cu workings are found in the Queensland mineral deposit database – Non Pariel in the north of the tenement, and Mt Morah in the south. Malachite, chrysocolla and cuprite were mined at Non Pariel, producing 496.7 tonnes of ore at 3.1% copper, for 15.4 tonnes of copper (Derrick, 1977).

<b>Tenement</b>	<b>Tenement Holder</b>	<b>Completed Work</b>	<b>Year</b>
EPM 318	Australian Selection Pty Ltd	Regional scale geological mapping, Stream sediment sampling	1966-68
568	Texins Development	Stream sediment sampling, Radiometric survey	1969
380, 3255, 542	CRA Exploration	Stream sediment sampling	1967-69, 1983



1942	Carpentaria Exploration	Soil Sampling	1979
3386	Union Oil Development	Stream sediment sampling	1984
5215	Pathfinder Exploration	Stream sediment sampling, Rock Chip Sampling	1988-90
5159, 9083, 9704, 9899	MIM Exploration	Soil sampling, Stream Sediment Sampling, Rock Chip Sampling	1988-90, 1995, 1998
6037	Sons of Gwalia	Stream sediment sampling	1990
5985	Placer Exploration	Stream sediment sampling	1992
7755	Battle Mountain Australia	Stream sediment sampling	1993
7485	Bruce Resources	Stream sediment sampling	1993
8260	MIM/Hunter Resources	Airborne magnetic & radiometric survey Stream sediment sampling	1993

**Table 1:** Summary of Historic Exploration over the Overlander Tenement

## 6 EXPLORATION COMPLETED DURING THE TERM OF TENURE

Exploration work conducted by MIMRD over the sub-blocks relinquished during the period of tenure ending 19 December 2013 comprised compilation of open file data, a detailed aeromagnetic-radiometric survey, geological mapping and XRF soil surveys.

### 6.1 Aeromagnetic-radiometric survey

An airborne magnetic-radiometric survey was conducted by Fugro Airborne over the tenement in July-August 2012. Survey parameters comprised 50 metre spaced east-west flight lines at 40-45 metre terrain clearance, with 500 metre spaced north-south tie lines.

The survey length over the relinquished sub-blocks was 277 km, and consisted of 159 lines determined using 5540 stations. Data was collected at 2 Hertz, which equates to a TMI measurement approximately every 5 m, conducted with a modal terrain clearance of 45 m over the entire tenement.

Drawing 63376 shows locations of the flight lines, and digital data is found in Appendix 1.

### 6.2 Geological Mapping

*Orpheus 2 (888 Q)*

Drawing No. 63370 shows interpreted lithology, alteration, structure and mineralisation at Orpheus 2.

The area is dominated by Corella Formation calc-silicates and metasediments. A felsic volcanic member is present in the east of the area. A mafic unit coincides well with the strongest magnetic anomalies. A magmatic albitite breccia with amphibolite clasts and albite-amphibole-magnetite matrix forms the felsic volcanic-calc silicate contact in the north of the area, and intrudes both the felsic volcanics and metasediments in small patches throughout the area. Very strongly magnetic ironstones ( $1200 \times 10^{-3}$  SI) are present in the east and south-east.

Alteration is generally weak albite-amphibole-epidote, with areas of amphibole only alteration. Magnetite-biotite alteration affects the mafic units, and magnetite alteration affects the metasediments and felsic volcanics.

Very minor Cu mineralisation was observed within the mafic units in two locations. This occurs as disseminated chalcopyrite and malachite.

*NE Sub-blocks (816 X, 888 C)*

Drawing No. 63371 shows interpreted lithology, structure and mineralisation at the NE sub-blocks.

The two north-eastern sub-blocks of the Overlander tenement were targeted due to their location along the extension of the fault associated with the Orpheus 9 mineralisation. The fault strikes NE, dips to the SE and is seen as quartz veins, hydrothermal breccias and silicified ridges. The fault juxtaposes the Mt Philp Breccia (a magmatic albitite breccia with amphibolite clasts and albite-amphibole-magnetite matrix) against the Overlander Granite. In the south-eastern corner an intrusive contact is seen between the Overlander Granite and the Corella Formation. Some basalts are found within the Mt Philp Breccia, and a dolerite is seen towards the NE of the area. Alteration, other than typical regional alteration is minimal. Magnetic anomalies within the granite were found to be rafts of Corella (metasediments and amphibolites). Bullseye type magnetic anomalies within the Mt Philp Breccia were found to be areas with up to 10% euhedral magnetite crystals within the breccia matrix.

No significant mineralisation was seen – minor chalcopyrite was found in a carbonate vein within dolerite, and some malachite was found in a quartz-epidote vein within an epidote-magnetite altered raft of Corella. The northern-most part of the area was not mapped.

### **6.3 Soil XRF Surveys**

*Orpheus 2 (888 Q)*

An XRF soil survey was completed in June, and totalled 152 samples (including 6 duplicates). The survey covered an area 1.2 km E-W and 1 km N-S, with 50 m spaced samples on 200 m spaced lines. Location and sample information was collected digitally on a Trimble handheld device running Discover Mobile. Soil was sieved to -2 mm and analysed with the Olympus XRF on the ground, or soil was collected for later analysis. When analysing the collected samples, the soil was tipped out of the bag, and the XRF was used directly on the soil. Each sample was analysed with the XRF three times and then averaged.

Data are included as Appendix 2, and copper values are plotted in Drawing No. 63370. Cu values were low, with the majority of the samples below the detection limit of the XRF. Five samples contain above 75 ppm with the maximum 111 ppm. Elevated readings occur over the mafic unit where chalcopyrite was observed.

### *NE Sub-blocks (816 X, 888 C)*

An XRF soil survey was completed in July, and covers an area of 1.7 x 3.5 km, on a 200 x 50 m spaced grid. A total of 613 soil samples (including duplicates) were taken. Location and sample information was collected digitally on a Trimble handheld device running Discover Mobile. Soil was sieved to -2 mm and analysed with the Olympus XRF on the ground, or soil was collected for later analysis. When analysing the collected samples, the soil was tipped out of the bag, and the XRF was used directly on the soil. Each sample was analysed with the XRF three times and then averaged.

Data are included as Appendix 3, and copper values are plotted in Drawing No. 63371. A +300 ppm copper anomaly is present in the NE of the survey, and is open to the north. The northern-most 1 ½ lines of the planned survey were not completed. No further work was recommended on the NE sub blocks, and the area has been selected for relinquishment.

## **7 CONCLUSIONS AND RECOMMENDATIONS**

Exploration work failed to identify targets of significant size or interest to MIMRD over the relinquished sub-blocks. At Orpheus 2 (888 Q), the lack of any encouraging geological anomaly seen during the mapping, and the soil survey confirming the lack of Cu mineralisation resulted in no further work being recommended. At the NE sub-blocks (816 X, 888 C), the lack of any encouraging mineralisation, anomalous alteration, or structures observed during the mapping and reconnaissance, resulted in no further work being recommended.

## 8 REFERENCES

Bultitude, R. J., Black, D. H., Donchak, P. J. T., Mock, C. M., 1982. 1:100 000 Geological Map Commentary, Duchess Region, Queensland. Department of National Development & Energy, Bureau of Mineral Resources, Geology and Geophysics.

Derrick, G. M., Wilson, I. H., Hill, R. M., Glikson, A. Y., Mitchell, J. E., 1977. Geology of the Mary Kathleen 1:100 000 Sheet area, northwest Queensland. Bulletin 193, Department of National Resources, Bureau of Mineral Resources, Geology and Geophysics.

# **DRAWINGS**

# APPENDICES