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# PARTIAL RELINQUISHMENT REPORT FOR EPM 11177 FOR THE PERIOD 15/8/96 TO 14/8/98



## VOLUME 1 OF 1

Author: R J Worland

Date: September 1998

Commodities: Gold, Copper, Lead, Zinc, Silver

Accepted by:

Distribution:
- ❑ Queensland Department of Mines and Energy – Brisbane (1)
- ❑ Normandy Exploration - Townsville (1)
- ❑ Normandy Exploration - Adelaide (1)
- ❑ Homestake Gold of Australia Limited – Townsville (1)
- ❑ Battle Mountain (Australia) Inc – USA (1)



**Report No. 23598**

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CR 30320

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**Title:** Partial Relinquishment Report for EPM 11177 for the period 15/8/96 to 14/8/98

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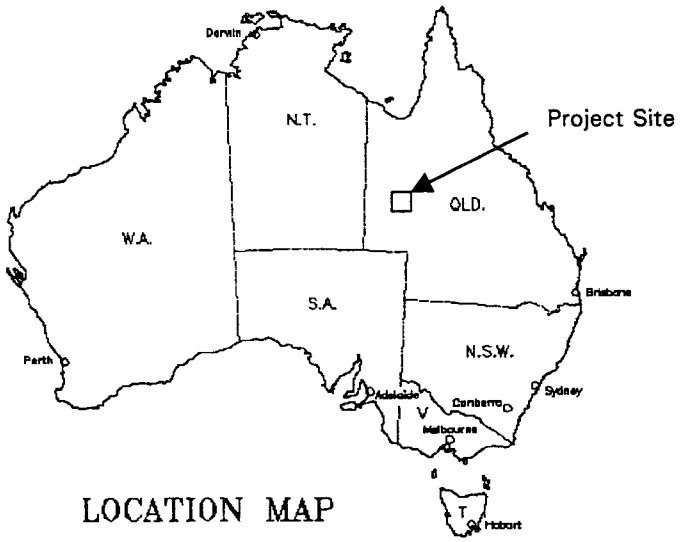


LOCATION MAP

## SUMMARY

EPM 11177 was granted to Homestake on 15 August 1996 for a period of two years. The area was previously subject to a joint venture between Homestake and Battle Mountain. Normandy entered into a joint venture with Homestake and Battle Mountain on EPM 11177, as manager in January 1998. In July 1998, Normandy applied to renew EPM 11177, relinquishing six sub-blocks from the original tenement area.

Normandy entered the joint venture to explore for stratiform and structurally controlled base metal mineralisation and structurally controlled Cu-Au mineralisation.

Work on the relinquished area included stream sediment sampling. No further work on the relinquished portion of EPM 11177 was recommended.

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# 1 INTRODUCTION

This report details all exploration completed on the area relinquished from EPM 11177 for the period 15 August 1996 to 14 August 1998.

EPM 11177 (Gilded Rose) was granted on 15 August 1996. It is a joint venture with Homestake Gold of Australia Limited (Homestake) and Battle Mountain (Australia) Inc (BMA) and is managed by Normandy Exploration Limited (Normandy).

Normandy entered the joint venture to explore for stratiform and structurally controlled base metal mineralisation and structurally controlled Cu-Au mineralisation.

# 2 LOCATION AND ACCESS

The relinquished portions of EPM 11177 are located south-east and south-west of Cloncurry Township (see Drawing 333.A4.02) and are within Roxmere Holding (PH 4893)and The Gorge Holding (PH 2330). The relinquished areas lie on the Cloncurry SF 54-02 1:250,000 sheet, and on two 1:100,000 map sheets: Marraba 6956 and Cloncurry 7056.

Access to the area relinquished in the south-east, is south of Cloncurry via station tracks, past Roxmere Homestead. Access to the area relinquished to the south-west is south via the Malbon Road towards Duchess and then east from the Marimo railway siding via station tracks.

# 3 TENURE

EPM 11177 is part of a joint venture agreement between Normandy, Homestake and BMA, which commenced in late January 1997. Details of tenure prior to the relinquishment are listed below in Table 1. The relinquishment area comprises six sub-blocks (block numbers 678/l, 751/h,m,n,r,s), located on the Marraba 6956 and Cloncurry 7056 1:100,000 sheets (Drawing 333.A4.01).

| Project | JV Name | J V Companies | EPM No. | EPM Name | Area $km^2$ | Sub-blocks | Date Granted | Expiry Date | Covenant |
|---|---|---|---|---|---|---|---|---|---|
| Cloncurry | Gilded Rose | Homestake BMA | 11177 | Eldorado | 153 | 47 | 15/8/96 | 14/8/98 | $100,000 |

Table 1: Tenure Details



# 4 PHYSIOGRAPHY

The climate of the region is semi arid with an average rainfall of approximately 30 centimetres, though the rainfall varies depending on the wet season over summer. Temperatures range from hot and mostly dry in summer (20° - 45°C) to mild and cold overnight in winter (0-25°C).

The terrain over EPM 11177 is rugged with steep north-south ridges dominating the landscape. Between ridges generally flat lying flood plains host meandering rivers draining into the northward draining Cloncurry River, which divides the permit area. Both relinquished areas comprise a rugged terrain of low-lying hills and narrow valleys. Land use is dominantly beef cattle grazing with only minor clearing confined to floodplains serviced by water bores.

# 5 GEOLOGY

## *5.1 Regional Tectonics*

The Mount Isa Terrane of north-west Queensland has been deformed and metamorphosed in a zone of long-lived tectonic activity during at least two orogenic cycles between 1900 and 1500 Ma. This Terrane comprises Early to Middle Proterozoic sediments, bimodal volcanic rocks and plutons which record processes of intracontinental rifting followed by subsequent crustal shortening and metamorphism. It displays superb examples of rift development, structural inversion, regional low-pressure metamorphism, wrench faulting and extensive metasomatism produced during extensive crustal shortening. The Mount Isa Terrane offers an opportunity to examine the superposition of extensional and compressional geometries within a spectacularly exposed stratigraphic sequence.

At around 1900 Ma, a widespread extensional event in Australia led to the deposition of voluminous bimodal volcanic rocks and rift-sag sequences (Etheridge et al. 1987) which were then deformed and metamorphosed during the Barramundi Orogeny (1870 to 1850 Ma).

Following this orogeny, the Mount Isa Terrane, along with much of northern Australia, underwent a complex history of rifting and deposition between 1800 and 1670 Ma. Igneous and sedimentary rocks of this period were formed or deposited during at least three episodes of superimposed intracontinental rifting and associated thermal subsidence associated with the deposition of three cover sequences, termed cover sequences 1,2 and 3 (See Table 2)

The Isan Orogeny (1620 to 1500 Ma), began with a period of local pre-metamorphic thrusting, the duration and significance of which is unconstrained regionally. This was followed by regional east west shortening synchronous with low-pressure metamorphism possibly reflecting a cycle of early heating, crustal thickening and isobaric cooling. Deformational features produced during the Isan Orogeny dominate the map pattern, many of which were superimposed on inherited extensional features related to the earlier rifting history of the terrane.

## *5.2 Proterozoic Stratigraphy*

Rocks belonging to a basement that was affected by the 1890-1890Ma Barramundi Orogeny are rarely exposed in the eastern part of the Mount Isa Block (Blake and Stewart, 1992). Small areas of old metavolcanic rocks belonging to the Kurbaya Migmatite occur near Mary Kathleen and a unit known as the Double Crossing Metamorphics west of the Selwyn Mine could also belong to the basement (eg Blake and Stewart, 1992) though Laing, (1993) suggested it is an isolated fragment of one of the cover sequences.

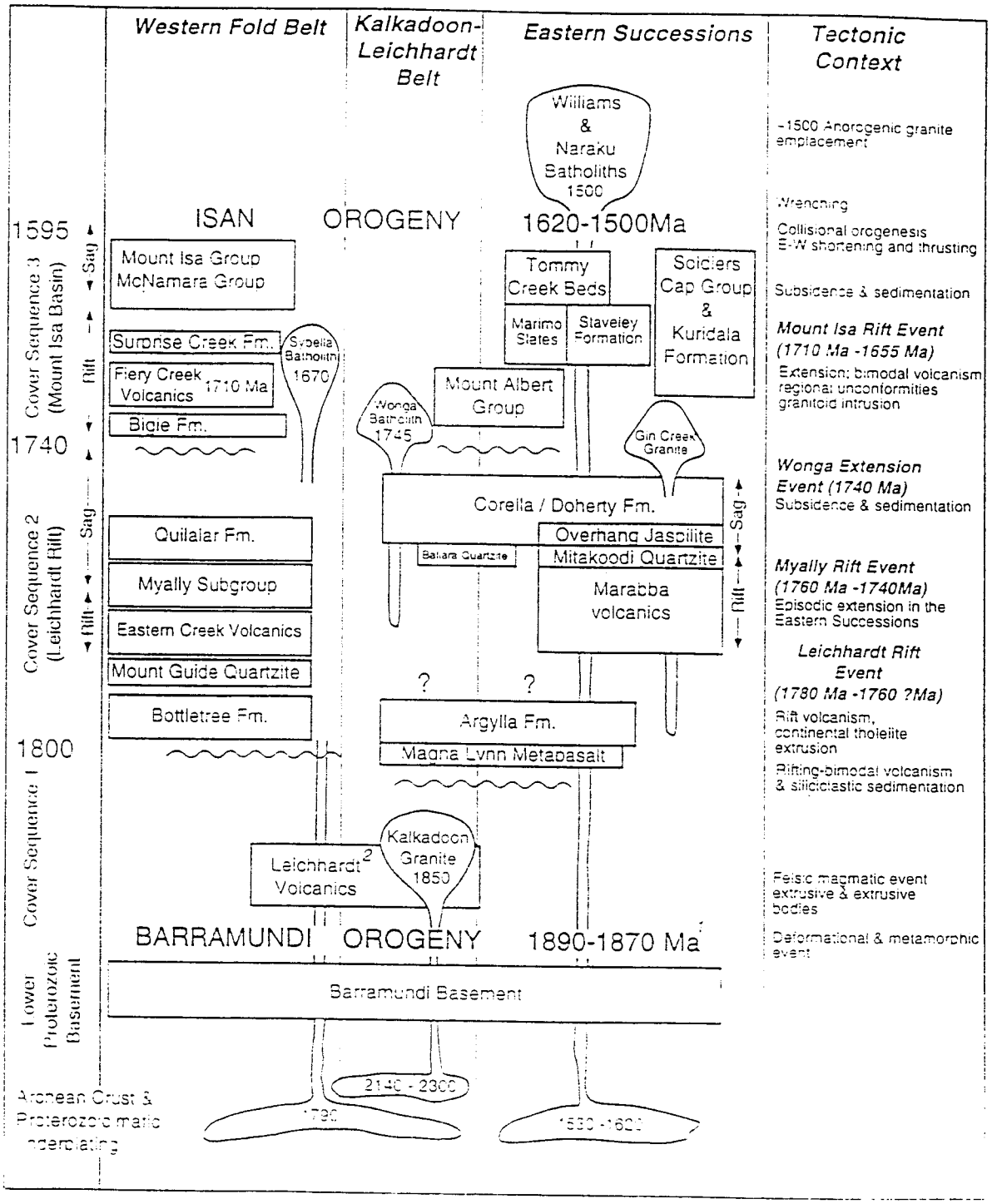


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TABLE 2.SIMPLIFIED TECTONO-STRATIGRAPHIC COLUMN

OF THE MT. ISA INLIER.

The post-Barramundi Proterozoic supracrustal rocks can be broadly divided into two sequences based on lithofacies associations and age both of which were affected by the 1620-1500Ma Isan Orogeny (Table 2). A 1780-1760Ma sequence of compositionally-variable metavolcanic, and mixed clastic-carbonate-evaporite metasedimentary rocks (Argylla Formation, Malbon Group, Mary Kathleen Group) predominates in the west whereas metamorphosed siliciclastic and basic volcanic rocks of the as yet informally-named Maronan Supergroup (Beardsmore et al., 1988) are more abundant further east. The Soldiers Cap Group forms the structurally higher (lower metamorphic grade), and presumed-to-be younger, portion of the proposed supergroup in which sedimentary structures and younging evidence are commonly well-preserved. The Fullarton River Group consists of higher metamorphic grade schists and gneisses that generally lack primary structures other than crude bedding.

The Maronan supergroup is believed to have been thrust over the Mary Kathleen Group early in the deformation history of the region. (Loosveld, 1989; Laing, 1990). The only radiometric age determination from the Maronan sequence has provided a maximum age limit of about 1670Ma (Page, 1994). Given that the rocks must be older than the Isan deformation, the Maronan sequence which contains Cannington and several other Pb-Zn-Ag deposits could have been deposited at the same time as the 1653±Ma (Page, 1993) Mount Isa Group further west.

The Cloncurry area contains two other supracrustal associations with enigmatic affinities. These are the possibly allochthonous≈1625Ma Tommy Creek sequence west of Cloncurry and the Mount Albert Group (Derrick et al., 1977). The latter either unconformably overlies (Derrick et al., 1977) or is in tectonic contact (Laing, 1996) with the Mary Kathleen Group.

### *5.3 Intrusive Rocks*

Extensive bimodal magmatism occurred in the western part of the Cloncurry district during the pre-Isan (1760-1720Ma) extensional deformation and formed the Wonga Batholith composed of tholeiitic basic rocks and A- and I-type granites (Pearson et al., 1992). Similar ages from the eastern part of the area include 1754±25Ma from a microgranite near Cloncurry which occurs within the predominantly late-orogenic Naraku batholith (Wyborn et al., 1988) and 1740-1725Ma ages for porphyry bodies near the eastern edge of the belt.

Much of the eastern part of the area is dominated by large plutonic complexes that form the Williams and Naraku Batholiths. Geophysical evidence suggests these are part of a plutonic belt that extends under the Phanerozoic cover for as much as 500km from Normanton on the Gulf of Carpentaria to well south of the Mount Isa Inlier. A small population of dates from these plutons falls within the range 1530-1480 Ma and several cluster close to 1500 Ma (Page, 1993a; 1994). They provide a minimum age for the termination of the Isan Orogeny.

The main post-tectonic pluton of the Naraku Batholith is composed of I-type biotite monzogranite and alkali feldspar granite (Wyborn et al., 1988). The Williams Batholith has been described as exhibiting a general geographic variation with homogeneous syenogranites and alkali-granites in the north and zoned coarse-grained tonalite/granodiorite to alkali granite/aplite plutons in the south (Wyborn et al., 1988). All of these are petrographically I-type and the whole suite is distinguished by high levels of Na, F, P, U and Th (ie they are high heat-producing granites). Detailed work near the north eastern margin of the Williams Batholith has demonstrated the presence of complex plutonic associations including mafic and felsic components that locally exhibit evidence of magma mingling (Mitchell, 1993).

## *5.4 Local Geology*

EPM 11177 is situated within the Marimo-Staveley Block (Drawing 333.A4.03) which defines an approximate N-S trending tectono-stratigraphic belt in the central Eastern Succession. It is separated from the Mitakoodi Culmination to the west by the Overhang Shear and is separated from the Soldiers Cap Group in the east by the Cloncurry Overthrust.

This block comprises the Marimo Slates, Staveley Formation, Roxmere Quartzites, Mick Creek and Toby Barty sandstone members, and calc-silicate sequences (previously interpreted as belonging to the Corella Formation of the Mary Kathleen Group). The Marimo slates comprise black and grey slates, pelitic sandstones metasiltstones, brown-yellow micaceous schists and siltstones, and minor quartzite and quartz sandstones. The Roxmere quartzite is quite diverse in composition. In some areas it is a massive white quartzite, whereas in other areas it is predominantly composed of banded to massive to thick bedded, feldspathic quartzites and sandstones (Loosveld, 1989), and fine grained grey quartzite. Calcsilicates sequences vary from dark brown to black calcareous siltstones interbedded with chert horizons. Light brown calcareous sandstones and massive calc-silicate breccias are also common. The exact relationship between these sequences is hindered by the tight to isoclinal folding within the block and the faulted contacts between many of the sequences.

Previously, the stratigraphic elements of the Marimo-Staveley Block (Marimo Slates, Answer Slates, Staveley Formation, Roxmere Quartzite) were interpreted to be equivalent to the Mary Kathleen Group (Derrick, 1980) and to conformably overlie sequences of the Mitakoodi Culmination (Loosveld, 1989). However, recent U-Pb zircon dating of tuffaceous horizons within the Marimo Slates has yielded ages of $\approx$ 1655 and $\approx$ 1610 Ma (Page et al., 1997) suggesting that some parts of this block now comprise temporal equivalents to the Soldiers Cap Group in the Eastern Successions, and the Mount Isa Group and the McNamara Group in the Western Fold Belt.

The relinquished areas cover Roxmere Quartzite in the south-west and a large area of exposed Corella Formation carbonates in the south-east.

# 6 EXPLORATION COMPLETED ON THE RELINQUISHED AREA

Work completed on the relinquished area included stream sediment sampling, which was part of a regional program that collected samples for BLEG and multi-element analysis. A total of three stream sites were sampled on the relinquished area.

At each sample site a 2kg −1mm fraction sample was collected for BLEG analysis and a 500g −1mm fraction sample was collected for multi-element ICP analysis. The multi-element sample was sieved to −180μm and −1mm, +180μm fractions, both which were analysed for the same suite of elements. The BLEG samples were prepared by Normandy's in-house laboratory, with assays completed by Analabs (Perth). The multi-element analyses were completed by Amdel (Mount Isa/Adelaide). Table 3 details the techniques used and elements assayed.



| Laboratory | Method | Elements (Detection Limits) |
|---|---|---|
| Analabs | GG346 | Au (0.01 ppb), Ag (0.5 ppb), Cu (0.01 ppm) |
| Amdel | IC3E | Cu (2 ppm), Pb (5 ppm), Zn (2 ppm), Fe (100 ppm), Mn (5 ppm), Ag (1 ppm), Co (2 ppm) |
| Amdel | IC3M | As (0.5 ppm), Cd (0.1 ppm), In (0.5 ppm), Pb (0.5 ppm) |

Table 3: Assay Technique Specifications

The results for the three sample sites in the relinquished area were poor. BLEG sample results peaked at 1.53ppb Au, 0.04ppm Cu and 4ppb Ag. The −180um fraction showed a broader range of results than the +180um fraction. The best results for the −180um fraction include 7ppm As, 13ppm Co, 20ppm Cu, 65 ppm Pb and 62ppm Zn.

All sample site locations and assay results are in Appendix I. The location of sample sites is illustrated in Drawing 333.A4.04.

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# 8 BIBLIOGRAPHIC DATA-SHEET

| | |
|---|---|
| REPORT NUMBER: | |
| REPORT TITLE: | Partial Relinquishment Report for EPM 11177 for the period 15/8/96 to 14/8/98 |
| PROSPECT NAME: | Gilded Rose, Eldorado, Cloncurry |
| TENEMENT NUMBER: | EPM 11177 |
| OWNER/JV PARTNERS: | Homestake, Battle Mountain |
| COMMODITY(IES): | Copper, Gold, Lead, Zinc, Silver |
| TECTONIC UNIT(S): | Mt Isa Inlier |
| STRATIGRAPHIC UNIT: | Soldiers Cap Group, Corella Formation, Marimo Slate, Overhang Jaspolite |
| 1:250,000 MAP SHEET(S): | SF 54-02 Cloncurry |
| 1:100,000 MAP SHEET(S): | Marraba 6956, Cloncurry 7056 |
| KEYWORDS: | Stream Sediments<br>Mt Isa Inlier |