EL 29837 Catfish Hole

First Annual Report year to 26th August 2014

Ripple Resources Pty Ltd

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Summary

Ripple Resources is a fully owned subsidiary of Armour Energy Ltd. Armour has been exploring the gas and oil resources of the McArthur Basin, and has made a significant gas discovery in the Glyde sub basin.

Ripple has selected Exploration Licences within areas inside the Armour Energy permits, and has been cooperating with Armour in order to evaluate these ELs for their base metal potential.

This cooperation has involved modifications and extensions to the Armour program so that it has greater relevance for base metal exploration. Additionally the techniques and concepts used in hydrocarbon exploration overlap with leading edge base metal exploration.

Base metal exploration within EL 29837 is challenging because of the rugged topography and cover geology. Breccia hosted and stratiform mineralisation trends into the area from outcropping areas to the north west, the most notable being the Coxco trend and the Myrtle sub basin. The imputed depths of mineralisation are believed to be mostly about 500m – 1000m, below the limit of airborne EM penetration.

Previous exploration by Amoco Minerals (and Petroleum) and by MIM relied on airborne EM as a target generating technique. Amoco found outcropping Barney Creek shales and breccias in what was named the Glyde sub basin. Subsequent drilling found little evidence of proximal hydrothermal sulphide deposition in the sub basin, although it did encounter gas flows. The Glyde sub basin boundary was a NW – SE striking growth fault that passed through the southern third of the EL. Very little is known about the Barney Creek formation to the north.

Ripple has participated with Armour in two major activities within EL 29837.

A Falcon airborne gravity and magnetics survey has been flown, imaged and interpreted.

One gravity anomaly adjacent to the Emu fault was diamond drilled to 1275m in hole LP3. The hole was subsequently logged with downhole geophysics including IP.

This hole intersected 75m of semi massive pyrite infill and replacements hosted by the Cooley breccia member of the Barney Creek formation. This is considered significant because it demonstrates that the Falcon survey has generated drill targets due to sulphides, and also it demonstrates that a significant hydrothermal sulphide system has mineralised the Barney Creek Formation in the area.

The Caranbirini member of the Lynott formation is considered to be a secondary base metal target because of its abundance of laminated pyrite, its occasional zinc lead anomalism and numerous occurrences of infill mineralisation occur up to its base.
It is considered that several other gravity features could be due to sulphide accumulations, but there remains a difficulty in ranking them prior to drilling. The depth to target needs to be better estimated, and the likelihood of base metals rather than pyrite is also a factor to consider.

Ongoing work is planned for the EL. This includes further modelling of the Falcon gravity data, and trials of leakage geochemistry over selected gravity features. The purpose of this next stage is to rank prospective gravity features for future drilling.

1.0 Introduction
Ripple Resources Pty Ltd was set up by DGR Global Ltd for the purpose of exploring for base metals within areas of the McArthur and Mount Isa basins that were being examined by Armour Energy Ltd for gas and oil. After the float of Armour Energy, Ripple Resources was sold to Armour at cost. Since that time, Armour has been providing funding and much of the operating resources for Ripple.

Modern concepts regarding the formation of sediment hosted basemetal deposits have given new emphasis to the century old model that the metals were introduced along with hydrocarbons, either in conventional trap sites or within basin centred accumulations.

There was an opportunity to modify and extend the Armour program so that Ripple Resources could benefit from aspects of the petroleum evaluation which were relevant to base metals.

2.0 Location and Access
Fig. 1 EL 29837 location and access
The EL extends from 10 km east of the HYC mine at MacArthur River, in an arc to about 50 km south of the mine. Access is made via the road to Merlin diamond mine. Within the EL, access is difficult
due to a rugged physiography, and the only rough tracks are long the ridge lines. Helicopter support is essential in most areas away from the Merlin Road.

3.0 Licence Details
EL 29837 was granted on 27th August 2013 for 6 years until 26th August 2019. It covers 197 blocks with an area of 648.23 sq kms, which is subject to 50% minimum reduction every second year. Native Title and Heritage clearances have been handled concurrently with overlapping EP 171 and EP 176.

Work requirements require an expenditure of $60,000 in the first year, and $80,000 in the second.

4.0 Geology and Previous Exploration
Most of the EL is comprised of the flat lying late Proterozoic Bukalara sandstone, which forms a rugged plateau and largely obscures the prospective McArthur Group, which is faulted and gently folded. The formations of prime interest are the Barney Creek and adjacent/underlying Coxco dolomite member. Most mineralisation of note lies between the Coxco and the Caranbirini member of the Lynott Formation, but some bitumen – galena- sphalerite infills extend up as far up sequence as the Bessie Springs sandstone in the Roper Group. As a rule, the lower formations with hydrocarbon shows as shown in Fig.2 are those with mineralisation.

The economically significant lead zinc deposits are part of the Mt. Isa – McArthur metallic province, which is the most productive zinc district in the world. Locally, the HYC mine is the only producer, with a global resource of over 200 million tonnes of lead zinc with minor copper. New exploration by Rox Resources (Teck) has enhanced the nearby Myrtle and Teena deposits by means of deeper drilling and larger richer intercepts. They are typical of the basin hosted deposits which are normally richest in the structurally lowest sites, within the most organic dolomitic shales.

Other zinc-lead copper deposit types are known, and are mainly of the porosity infill type, where hydrocarbons and metals have migrated into trap sites usually in solution breccias or decarbonated dolomitic shales. Locally, these include the Coxco, Cooleys and Ridge deposits. Century in Queensland is the largest known deposit of this type, and is currently the worlds largest source of zinc. At Century, the stratiform sulphide mineralisation occurs in a matrix of live oil occupying secondary porosity sites, and adjacent smaller mines have produced pitch as well as silver lead.

Locally, the major previous work on the Bukalara Plateau was done by Amoco and its J-V partners and has been reported in CRs 1979-192, 1979-013, 1980-064, 1981-28, 1982-228 and 393, 1983-24 and 48, and 1986-299. Amoco found outcropping Barney Creek shales and breccias in what was named the Glyde sub basin. Subsequent drilling found little evidence of proximal hydrothermal sulphide deposition in the sub basin, although it did encounter gas flows. The Glyde sub basin boundary was a NW – SE striking growth fault that passed through the southern third of the EL. Very little is known about the Barney Creek formation to the north. Lesser work was done by MIM who drilled a single hole in the EL – CAPD1 to 438m to test an EM conductor sourced in the Lynott formation (1996-236).

BHP flew airborne EM outside their nearby EL during the 1990s but the survey apparently has not been placed with the NT Mines department. No EM survey reported covers the south-western portion of the tenement.

The EL area has seen little serious exploration due to the difficult topography and the problematical cover sequences. To understand the targets that may lie within the EL, a compilation must rely on extrapolation from exploration outside of the EL itself. Most of the relevant work in the exposed areas to the north and west was done by MIM and more recently by the Rox Resources – Teck joint venture. The latter partnership has had considerable success in improving the Myrtle and Teena
stratiform deposits by locating and drilling the structurally lowest portions of the Barney creek formation within localised metalliferous sub basins. Rox – Teck encountered a problematic strong gas flow at Myrtle and oil has also been reported in earlier drilling by MIM.

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Fig. 2 Stratigraphic column for the MacArthur area
A compilation was made of previous exploration using data and reports covering the adjacent areas. From this (Fig. 4) it can be seen that strong mineral systems lie to the north and west, and that they trend into the covered areas within EL 29837.

The breccia hosted Coxco – Larrakeyah trend passes under the cover and enters the EL about 6 km north of Ripple Armour LP3. This zinc – lead is hosted in 200m thick interval of solution breccias developed between the Lynott formation and the Teena dolomite. It is accompanied by oil and pockets of flowing gas at Coxco, which is located within an anticlinal crest on a structural high. The east side of the Coxco dome is downfaulted to the stratigraphic level of the Limmen sandstone, so that this hydrocarbon and basemetal play is intact at a depth of a few hundred metres.

This trend lies on a structural high on the east side of the Western Fault - a mineralised N-S growth fault that along with the E-W Bald Hills fault, has formed the HYC sub basin. The Western fault also forms the mineralised eastern boundary of the Amelia sub basin. The Emu fault itself is a younger feature parallel to the Western fault and is not a growth fault.

The distribution of Barney Creek formation in the Leila, Amelia, Glyde and Myrtle sub basins suggests that the broad Calvert Fault set was active during Barney Creek time. It is not known whether it is mineralised.

A trend of discordant copper mineralisation strikes south west from Coxco towards the mineralised Myrtle sub basin. This implies that there is a mineralised growth fault similar to Bald Hills structure that...
has localised the Teena – W fold – Wickens Hill – HYC sub basins. Adjacent to HYC, the Bald Hills structure has breccia hosted copper. These strongly discordant growth faults are apparently important in localising the best mineralisation. The growth faults are difficult to map conventionally because they have not been reactivated since Barney Creek time, and there is little or no magnetic contrasts in most localities. They are implied from stratigraphic information gained from drilling and from geochemical trends, as much as outcrop mapping.

Fig. 4 Map of previous exploration results. Lead zinc basins shown in pink other Barney creek basins in brown.
5.0 Exploration Completed during the Reporting Period
Two major activities were conducted during the year. A Falcon airborne gravity survey (fig.6) covered most of the EL, and a gravity feature was diamond drilled to 1275 metres in hole LP3.

5.1 Falcon Survey
The purpose of the survey was to provide information that would allow structural interpretation of the areas obscured by cover, at the same time as providing gravity targets that may be due to sulphide accumulations. Modelling of detailed density information concerning the Century deposit indicated that similar deposits should be readily recognisable as positive anomalies.

Survey Specifications have been attached as Appendix 1

An extensive array of imagery has been created from both the gravity and magnetics data. This was used for generating interpretations for use in both base metal and hydrocarbon exploration.

Fig. 5 Barney Creek distribution from prior work. Sub basins are outlined in purple, definite growth faults are solid black, interpreted are dashed. Mineralising structures are red.
Fig. 6 Outline of Falcon survey area

Fig. 7 Gravity data image based on a 1020m source slice
5.2 Falcon survey interpretation
The imagery was used to generate a structural interpretation, and to generate gravity targets directly (Fig. 8).

Fig. 8 Gravity targets and structural interpretation
Note that a series of discordant ENE striking structures are apparent in the imagery. They appear to be dilational faults formed by interaction between the regional NNW and NW sets during Barney Creek time. It is believed that these structures localised deep sub basins and provided metalliferous fluids.

5.3 Diamond drilling
Hole Lamont Pass 3 (LP3) was percussion drilled and cased to 300.9 metres and then cored to 1275m. The collar location at GDA 94 631148E 8146460N, and the orientation vertical. A BOP and a safe flame outlet pipe was attached in case of gas flows.

The site was chosen for several reasons including accessibility. Geologically, the site was chosen because the stratigraphic location was clearly within the Donnegann member anhydrite concretion beds – meaning the Barney creek and Coxco dolomite targets were within drilling capability, but outside the limit of airborne EM.

The location was also on gravity target D. From a petroleum point of view the site was chosen because if successful, it would have substantially increased the resource of gas known to lie along the Emu fault extension further south. The targets included shale oil/gas in the Caranbirini and HYC members, as well as the conventional gas in the Coxco member solution breccias.

A full log is attached as Appendix 2
Upon completion, a downhole IP survey was run in order to verify the lateral persistence of the major sulphide intervals. Additionally cores from the Lynott to Coxco were measured for s.g. and analysed for suite of relevant metals.

The geophysical log is attached as Appendix 3

The analyses are attached Appendix 4

The s.g. measurements are attached as Appendix 5

A summary of the formations encountered (after review) is as follows:

0m – base of Donnegan Member Lynott formation
611m – base of Caranbirini member Lynott formation
700m – base of Reward formation transition
818m - Barney creek formation base of dolomitic shales
867m – Barney creek formation base of sulphidised Cooleys breccia (no HYC or W fold members)
882m – base of Coxco member solution cavities (old weathering surface?)
957m – base of Teena dolomite and location of more solution cavities
1050m – base of Myrtle red and green shales transitional to thin bedded mixed algal dolomites and green grey shales at 1080m – Toonganninnie formation
1275m – ended in Toonganninnie formation

5.4 Interpretation of the drilling
Lamont Pass 3 intersected a Barney Creek paleo high where there was no deposition during HYC member time. The Cooleys breccia included slump and solution breccias in juxtaposition – an indication of proximity to an active growth fault.

Most importantly, 75 metres of hydrothermal sulphide infill and replacements were encountered in the Cooleys breccia. This was the densest section of core and the likely source of the gravity anomaly. This sulphide was very low in base metal anomalism, and is seen as a distal sulphide facies.

No major gas flow was encountered despite the thick section of shale oil and gas above the Cooleys. My interpretation is that Coxco conventional gas has seeped out updip to subcrops of that formation on the margins of the Glyde sub basin. This is therefore a relatively safe local area for drilling through the Coxco.
6.0 Results and Conclusions

The most significant result of the first years work has been the technical success of the Falcon gravity survey. Several previous holes have been drilled through the cover sequences on the Bukalara plateau, mainly based on EM targets, but none have intersected a major hydrothermal sulphide accumulation as seen in LP3.

Additionally, the survey has apparently detected the network of ENE cross structures (Fig. 10) that are critical in forming Barney Creek sub basins and providing the flow of metalliferous brines. These brines have flushed large volumes of sulphates and chlorides out of the lower sequences and redeposited them as chemical sediments and alteration zones containing dense sulphides and ankerite – siderite. These locally hidden structures have previously taken decades of drilling to outline. It is interesting to note that similar ENE structures control mineralisation and sediment distribution in Barney Creek correlatives (Fish River fault and Doomadgee formation) straddling the NT – Qld border.

The structural interpretation has not provided a good indication as to the target depths of the gravity anomalies. The other remaining issue remains the nature of the targets – whether they are due to base metals, pyrite, ankerite, or porosity variations.

Stratiform pyrite and minor zinc mineralisation is widespread in the Caranbirini Member, as are breccia beds. It should also be considered to be a secondary base metal target, along with the HYC
member and Coxco dolomite breccias. The other secondary targets – the McDermott and Wollogorang formations are too deep to consider in this EL.

Fig. 10 Interpretation of prior work Falcon survey and drilling

7.0 Proposed Program
During the next year, the program will be directed towards the evaluation and ranking of the gravity targets.

This will involve further modelling of the Falcon survey data with the focus on depth to source analysis.

It is also hoped that Ripple will be able to acquire seismic data from Armour work. At this stage, the locations of Armours surveys are not finalised.

More Armour drilling may take place within this EL. If so, Ripple will have access to samples and downhole data, and will assay relevant sequences.

Trials of leakage geochemistry are to be undertaken. This will help rank the anomalies in terms of their likely base metal potential. The fracturing evident in the Bukalara and older cover should have allowed leakage of metals and hydrocarbons. A study of the fracturing may also locate new kimberlite intrusions.

Drilling should resume in year 3 when ranking has been completed over the adjacent Ripple ELs as well.
8.0 Expenditure Statement

A total of $50,607 has been invoiced to and expended by Ripple Resources on EL 29837. This represents a small amount in relation to the size of the reported work program. This serious discrepancy reflects the accounting procedures in place. Shared programs with Armour Energy have not been costed to Ripple, even when the program had aspects which are distinctly for base metals.

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