Summary .............................................................................................................................................. 3
1.0 Introduction ........................................................................................................................................ 4
2.0 Location and Access .............................................................................................................................. 4
3.0 Licence Details ....................................................................................................................................... 5
4.0 Geology and Previous Exploration ......................................................................................................... 5
5.0 Exploration Completed during the Reporting Period ............................................................................. 8
  5.1 Falcon Gravity Survey .......................................................................................................................... 8
  5.1 Frogtech Basin Study ........................................................................................................................... 8
6.0 Results and Conclusions ....................................................................................................................... 10

Figures

Fig. 1 Location and access ............................................................................................................................... 4
Fig. 2 Stratigraphic column .............................................................................................................................. 6
Fig. 3 Previous drilling and geology .............................................................................................................. 7
Fig. 4 EM Conductors and magnetics ........................................................................................................... 7
Fig. 5 Falcon gravity survey .......................................................................................................................... 8
Fig. 6 Tilted Frogtech Image with targets ..................................................................................................... 8
Fig. 7 Frogtech depths to Wollogorang ......................................................................................................... 9
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 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. Ripple and Armour are taking a basin-wide approach, using expensive large scale geophysical geochemical and geological studies in order to select the optimal targets for expensive deep drilling. Future work will become more separated.

Base metal exploration within these Licences is challenging because of the rugged topography and cover geology. Breccia hosted and stratiform mineralisation trends into the area from outcropping areas, the most notable being the Bald Hills - HYC trend and Western Emu fault. The imputed depths of mineralisation are believed to range from about 200m – 1000m, much of which is below the limit of airborne EM penetration.

Previous exploration by Amoco Minerals (and Petroleum) and by BHP RTZ and 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. Very little is known about the Barney Creek formation away from the Amoco drillholes.

No field work was conducted within the 51 surrendered sub blocks. A Falcon gravity survey covered part of three blocks.

A basin wide Frogtech study was conducted.

The blocks surrendered in EL 29954 lay within an area of subcropping Tawallah and lower McArthur Group. This area has low prospectivity, based on very sparse evidence.
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. Armour Energy was since restructured by bringing in American Energy Partners (AEGP) as a major shareholder, and as the manager and funds provider for the NT petroleum exploration.

AEGP was to pay a substantial sum to Armour Energy which will fund Ripple Resources as a separately managed entity. This arrangement came unstuck after the death of the principal of AEGP and the withdrawal by the executors of his estate. Further problems have arisen due to the imposition of a well stimulation ban in the NT, effectively freezing all petroleum exploration in these frontier basins. Ripple was to participate in joint programs.

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. Ripple and Armour have employed a basin wide approach towards exploration, and has widened its search away from the Batten trough and the Barney Creek formation.

2.0 Location and Access

Fig. 1 Location and access – surrendered blocks
The ELs extend over 120 km in a north–south belt east of the HYC mine at McArthur River. Access is made to the centre via the road to Merlin diamond mine. Access further south can be made along the Old Salt road east of Kiana. The Amoco road has been upgraded by Armour Energy as far as the Glyde gasfield, and is the best option. Within the EL, access is difficult due to a rugged physiography, and the only rough tracks are along the ridge lines. Helicopter support is essential in most areas.

3.0 Licence Details
ELs 29951, 52, 54 and 55 were granted on the 21st November 2013 for 5 years, and form the Barney Creek 1 Project area. EL 29954 covered 187 blocks at grant. The EL. This report concerns the surrender of 54 blocks.

4.0 Geology and Previous Exploration

Most of the area is comprised of the flat lying late Proterozoic Bukalara sandstone, which forms a rugged plateau and largely obscures the prospective McArthur Basin, 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. In the south, within ELs 29954 and 55, BHP drilling has revealed bitumen chalcopyrite galena sphalerite infills within thick strongly organic dolomitic shales of the McDermott formation. As a rule, the lower formations with hydrocarbon shows as shown in Fig.2 are those with mineralisation.

The economically significant lead zinc copper 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 world’s 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. Renewed exploration at Walford Creek (in Queensland, close to the NT border) has discovered significant Mt. Isa style copper cobalt phases that overprint the silver lead zinc. This style is also present in breccias at Cooleys, but is not economically significant.

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 within hydrothermal breccias close to the Emu fault. The Glyde sub basin boundaries are reactivated growth faults that are displaced variable distances away from the original planes of movement. Very little is known about the Barney Creek formation under the Bukalra cover. Lesser work was done by MIM who drilled a single hole near Catfish Hole – CAPD1 to 438m to test an EM conductor sourced in the Lynott formation (1996-236).
BHP flew airborne EM over a large area including some of EL 29954. EL during the 1990s but the survey apparently has not been placed with the NT Mines department. They also took stream sediment samples over a large part of the region, although their coverage was rather patchy in the main areas of anomalism within EL 29954 and 55. BHP subsequently drilled several widely spaced holes within those ELs near the unclosed anomalies (Gundy Springs prospect), and intersected weak infills of copper lead and zinc within the McDermott formation. They initially thought the host was the Barney Creek formation which can be very similar, and may have been misled by the dropping of the McDermott from the official revised stratigraphy (fig.2).

To the west, CRA also flew EM and lodged coverage and conductors with the Mines department. Their work led to drilling near Kiana in the far southwest of the project area. They encountered weak mineralisation in what appears to be the Tooganinnie formation.

Diamond exploration has been conducted throughout, and this led to the discovery of the Merlin field.

The EL area itself has seen little serious base metal exploration due to the difficult topography and the problematical cover sequences.

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Fig. 2 Stratigraphic column - note that the >200m thick McDermott formation black dolomitic shales and evaporites have been removed from this official version, despite its widespread distribution about 150m above the Siegal volcanics. It is considered too relevant to ignore.
Fig. 3 Previous drilling and geology

Fig. 4 EM conductors and magnetics
A compilation was made of previous exploration using data and reports covering the adjacent areas. From this (Figs.3 and 4) it can be seen that no known mineral systems trend into the surrendered areas. This is as much an artefact of a lack of data, rather than a proven observation.

The Glyde gasfield is hosted by hydrothermal breccias developed in the Coxco dolomite, and further north the Armour Energy – Ripple diamond hole LP3 intersected a 70m thick epigenetic pyrite accumulation in Cooley breccias just above Coxco breccias.

5.0 Exploration Completed during the Reporting Period

5.1 Falcon Gravity Survey

Fig. 5 Falcon Gravity survey (300m depth modelled)

A small portion of the Armour Ripple Falcon gravity survey covered the northernmost blocks the subject of this report.

5.2 Frogtech Basin Study

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 identifying fault bounded sub basins that may host sulphide accumulations. Figure 5 shows a 3D image with some targets illustrated.

Frogtech uses geophysical geological and downhole information to generate an image of the basin structure. The pale colours are areas of shallow McArthur group, darker areas are deeper. The Emu fault system is clearly illustrated as are the other growth faults controlling sub basinal development.
The hydrothermal system along the Emu fault sets (it is more than one fault) is regionally extensive, but is only known from drill cores and chips in this southern area. The other fault systems have mineralised hydrothermal breccias but these have been poorly documented. A subtle ENE set is of prime importance in the McArthur Basin and in the adjacent part of the Mt. Isa superbasin. These have been strongly highlighted in the HYC – Teena area.

Fig. 6 Tilted Frogtech image with targets

Fig. 7 Frogtech Depths to Wollogorang
6.0 Results and Conclusions

The Frogtech basin analysis has not identified fault bound sub basins within the relinquished blocks. The sparse previous work has not indicated the base metal prospectivity of these blocks.