# REDBANK COPPER LIMITED

# NORTHERN TERRITORY

**EL 26779 PARTIAL REQLINQUISHMENT REPORT FOR PERIOD ENDING**

**23 December 2012,**

**THE NORTHERN TERRITORY**

**DEPARTMENT OF MINES & ENERGY**


**Authors: R Jewson**

**26th March 2013**

**Redbank Copper Limited**

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**Title Page**

| | |
|---|---|
| Titles/Tenements | EL 26779 |
| Titleholder/Operator | Redbank Mine Operations Pty Ltd |
| Tenement Manager | M&M Consulting, PO Box 8197 Subiaco WA 6008 (08 9381 5866) |
| Grant Date | 24th December 2008 |
| Retained Area | 28 Blocks |
| Relinquished Area | 27 Blocks |
| Report Title | EL 26779 Partial Relinquishment Report Ending 23 December 2012 |
| Date of Report / Status | 26th March 2013, Year 4 |
| Personal Authors | R Jewson |
| Corporate Authors | Redbank Copper Limited |
| Target Commodities | Cu, Pb, Zn, Au, Ag, Co, Mn, Diamonds |
| Project Name | Calvert |
| Datum/Zone | GDA94, Zone 53 |
| 250,000 sheet | Calvert Hills |
| 100,000 sheet | Calvert Hills(6463), Nicholson River (6362) |
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## EXECUTIVE SUMMARY

EL26779 is a granted lease within the Redbank Copper operational area in the Northern Territory, and currently is in its fourth year of tenure. A partial surrender was conducted by Redbank in accordance with its statutory obligations. A total of 27 blocks were relinquished, therefore retaining a total of 28 blocks.

Activities conducted across the relinquished portion involved the regional compilation of all open file and available geophysical, geochemical and geological data. This compilation has been indexed and geo-referenced with point extraction of data where required. Detailed geophysical interpretation was completed over the tenement to develop a more refined geological and structural framework with subsidiary target generation.

# CONTENTS



**Figures:**

# 1. BACKGROUND

The Redbank Copper Mine is located in the north-east of the Northern Territory approximately 30 km from the Queensland border and 70 km from the coast of the Gulf of Carpentaria. It straddles the Savannah Way which connects the townships of Borroloola in the Northern Territory and Burketown in Queensland. It is around 1,200 km south east of Darwin by sealed and unsealed road.

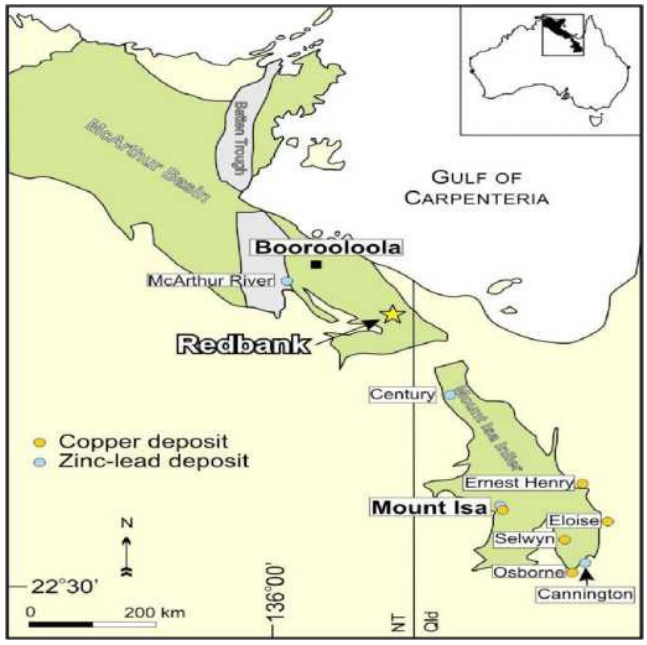


**FIGURE 1:LOCATION AND REGIONAL SETTING OF REDBANK COPPER LIMITED**

The Redbank Copper field was discovered in 1916 and small scale mining was carried out until the early 1960's. Subsequently exploration was carried out during the late 1960's through to the 1990's by various groups, culminating in larger scale mining operations being undertaken in the mid 1990's when the Sandy Flat open pit was developed to supply oxide/sulphide ore to a 250,000 tpa flotation plant built on site. Some very high grade (>25% copper) ore was also direct shipped at this time. The operation ceased after less than 2 years because of declining copper prices. With the exception of the mill, the flotation plant and crushing circuit remain on site. Both are in reasonable condition and are planned to be refurbished to operating condition with a redevelopment of the Project.

The most recent processing was a copper leaching operation that began producing on an intermittent basis in 2004 and utilised oxide ore that had been stockpiled during the previous mining. The current owners have operated the site since 2005 and some of the remaining ore stockpiles from the previous mining venture in the 1990's have been processed.

In 2009, Redbank undertook the following:

- Placed the site on care and maintenance and embarked on a program to improve environmental compliance, in particular to remedy discharges of contaminated water from the site.
- Carried out a review of the project to determine the future direction of its development, and generate a mine study outlining the path to redevelopment.
- Embarked on a well-funded exploration program that aims to discover new resources and to upgrade the status of the existing resources.

The study undertaken by Redbank examined options for future development of the project. Redbank identified that the future of the project is primarily in processing sulfide copper ores, which comprise more than 86% of the current resources, to make quality copper concentrates. In addition copper cathode can be made from the oxide ores. Further work is required to establish additional resources and better define operating parameters. In November 2009 the total resource was estimated by SRK Consultants as 6,244,000 tonnes at a grade of 1.5% copper containing 95,900 tonnes of copper metal.

**FIGURE 2:REDBANK INFRASTRUCTURE ON ERL94, JULY 2009**

The operational area consists of an Exploration Retention License (ERL94) and seven Mineral Leases (ML631, ML632, ML633, ML634, ML635, ML636 and ML1108) contained within the ERL. The company has recently applied for a Mining Lease (MLA27385) to replace ERL94. Redbank Mine Operations Pty Ltd, the holder of EL26779, also has a number of exploration interests within the vicinity of the existing Redbank Mine site (EL24654, EL26758, EL26780, EL26781, EL26999, ELA27737, ELA28003 and ELA28024). These are located mostly to the north and west of the mine site as shown below in Figure 3.

## 2. REGIONAL GEOLOGICAL SETTING

Regionally the Redbank copper deposits lie within the Proterozoic sequences of the MacArthur River Basin (see Figure 1). The basin hosts a number of world class base metal deposits. The Redbank copper mineralisation is hosted by the Lower Proterozoic Gold Creek Volcanics, a sequence of predominantly intermediate sub volcanic intrusions, extrusions, breccia pipes, and intercalated sediments. The copper mineralisation identified to date has been principally interpreted as being contained in volcanic breccia pipes, of which 30 to 50 have been recognised by various explorers. Only a minority of the breccia pipes are mineralised and only some of those contain potentially economic concentrations of copper.

The Packsaddle Microgranites locally intrude the Gold Creek Volcanics and are present close to the known Redbank copper deposits. Gold Creek Volcanics are present in a significant portion of the regional tenements. Further east the Gold Creek Volcanics are obscured beneath surficial Cainozoic sequences. The Hobblechain Rhyolite, a member of the Masterton Formation overlies the Gold Creek volcanics to the west.

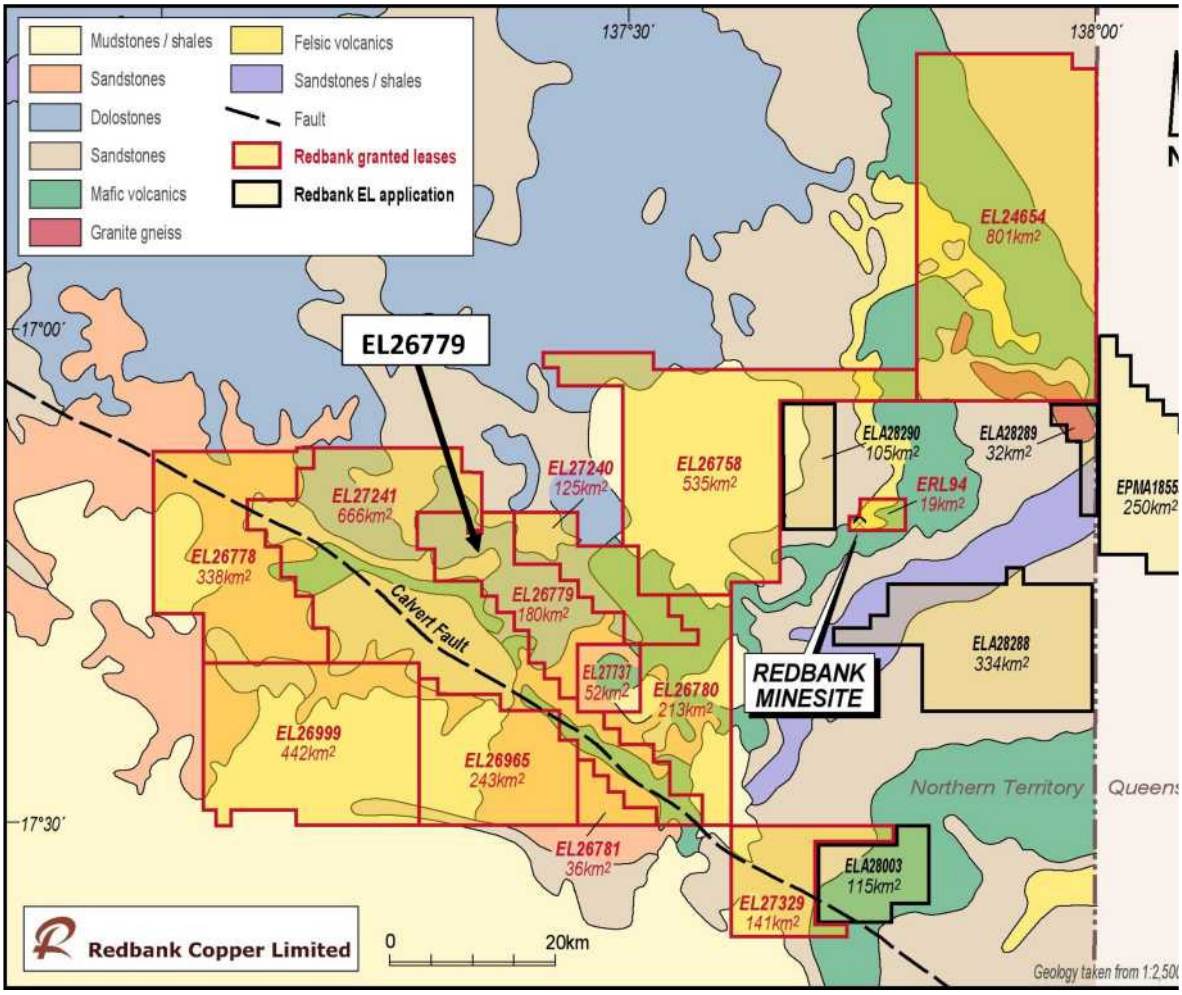


**FIGURE 3: LOCATION OF EL26779 AND TENEMENT HOLDING OF REDBANK COPPER LIMITED.**

## 3. TENEMENT GEOLOGY

Within EL26779 exposure is extensive and the topography varies from flat peneplain remnants left by the deeply incised drainage pattern following rejuvenation of the stream system that is dominated by structural features. Cainozoic surficial deposits, predominantly lateritic (pisolitic and nodular) duricrust with skeletal sandy soils and ferruginous cemented detritus developed above a well developed deep lateritic weathering profile is also evident in areas with deep creek incisions into the landscape.

Key lithological units observed but with varying outcrop exposures include:

(i) Mullaman Beds - early Cretaceous shallow marine fluvial sediments, typically siltstones, sandy siltstones, quartz sandstones and pebble to conglomerate beds.

(ii) Bukalara Sandstone - early Cambrian shallow marine fluvial sediments, typically feldspathic sandstones, quartz sandstones and pebble to cobble conglomerates.

(iii) Karns Dolomite - Proterozoic McArthur Basin Sequence, McArthur Group dolomite, algal dolomite, dolarenite: laminated, oolitic and algal cherts; dolomitic siltstone and sandstone, silty and sandy dolomite, oolitic-chamosite dolomite.

(iv) Masterton Sandstone - Proterozoic McArthur Basin Sequence, McArthur Group sandstone, med to coarse pebbly in upper unit; minor beds of clast supported conglomerate; locally micaceous siltstone and breccia at the base.

(v) Gold Creek Volcanics - Proterozoic McArthur Basin Sequence, Tawallah Group Trachyte and latite flows, tuff, tuffaceous and lithic sandstone, siltstone.

(vi) Wollogorang Formation - Proterozoic McArthur Basin Sequence, Tawallah Group Dolomitic and quartz sandstones, ferruginous in parts, feldspathic; dolomitic siltstones; stromatolitic dolomite, oolitic dolomite.

(vii) Settlement Creek Volcanics - Proterozoic McArthur Basin Sequence, Tawallah Group quartz laterite and quartz trachyte flows, and sills; minor siltstones; volcanic breccia and conglomerate.

(viii) Aquarium Formation - Proterozoic McArthur Basin Sequence, Tawallah Group Glauconitic sandstone, fine to medium; glauconitic and dolomitic siltstone; dolomites.

(ix) Sly Creek Sandstone - Proterozoic McArthur Basin Sequence, Tawallah Group lithic and quartz sandstone, fine to medium, flaggy, locally feldspathic.

## 4. EXPLORATION MODELS

The consensus of most of the modern era (post-1970) explorers in the Redbank area is that the mineralisation is contained in the approximately circular volcanic breccia pipes as the result of fluid circulation in the breccia. The breccia pipes development has also been interpreted as involving largely autochthonous brecciation of the trachyandesite host rock, with little displacement.

There have been some suggestion that there has been post volcanic slumping in some pipes causing minor (<10m) vertical displacement of sediments overlying the Gold Creek volcanics into the pipes. Minor normal faults and jointing have been interpreted as exerting a control on the location and form of the pipes. A peculiarity of the more comprehensively mineralised pipes is the association of the mineralisation with pyrobitumen. The origin of the pyrobitumen has been variously speculated as resulting from intense reduction of carbonate to a high temperature derivative of an organic precursor.

RC and diamond core drilling by Redbank on deposits in the area during 2006 to 2009, has indicated that the mineralisation does not display all the characteristics that could be expected solely from the circulation of mineralised fluids through the prepared breccia pathways. While there are clearly veins of sulphidic copper mineralisation contained within the breccia they are typically fragmented. Also much of the primary mineralisation consists of chalcopyrite and chalcocite grains disseminated through the host trachyandesite. The oxide mineralisation retains the characteristics of the primary mineralisation structures and fabrics with cuprite largely replacing the disseminated chalcocite and chalcopyrite, with a minor amount of azurite and malachite vein formation following ground water migration along open weathering fractures.

More detailed studies of petrogenesis and ore formation are planned but the initial indications are that there may be a precursor disseminated style of mineralisation emplaced in the breccia pipes. The source of the precursor mineralisation could represent a major target for large scale disseminated copper mineralisation. As a corollary exploration should not only focus on finding mineralised breccia pipes but should also be trying to discover the source of the precursor disseminated mineralisation which has the potential to be a much larger target.

Conceptually, the possibility exists for 'Manto' style stratabound deposits forming at depth below the limit of breccia formation, as a primary mineralisation focus over structural decollements from fluid travelling laterally from major through-going lineaments, such as the Calvert Hills fault immediately north of the EL26779.

A stromatolitic dolomite bed in the McDermott Formation immediately below the Sly Creek sandstone, reports consistently elevated copper and cobalt levels over a few km south of the Calvert Hills homestead.

Packsaddle Microgranite (or rhyolitic) intrusions occur in close association with the Redbank copper Mineralisation. It is not yet apparent if there is any paragenetic significance in this spatial association. The Packsaddle Microgranites have interpreted as associated with a regional 1,725Ma felsic intrusive event in the Macarthur River Basin (Page et *al,* 2000).

## 5. PREVIOUS EXPLORATION ON REGIONAL TENEMENTS

Review of the available historic data indicated that it was disjointed and compilation into a modern GIS system was required. Principal explorers were Carpentaria, Rio Tinto, and then later CRA, mainly exploring for base metals, uranium and diamonds in the general area. Several generations of work starting in the 1960's can be grouped according to commodity as follows:

(i) 1956 to 1960 - predominantly uranium exploration,

(ii) 1965 to 1971 - again mainly uranium with another focus on copper, particularly at Redbank,

(iii) 1978 to present - uranium, diamonds, gold and base metal, manganese and industrial minerals (phosphates)

Apparently no broad approach to the current land package has been effectively applied, and with no application of new generation of geophysics and deep sensing geochemical methods.

## 6. EXPLORATION COMPLETED BY REDBANK ACROSS RELINQUISHED TENURE

Work undertaken by Redbank across the tenure included:

(i) Regional compilation of open file and other available company data from all known sources by an external consultant directed by the company's exploration manager.

(ii) Indexing and geo-referencing of all data accumulated with point extraction of data where required,

(iii) Production of relevant maps for interpretation and ground survey planning,

(iv) Commissioning and commencement of a re-interpretation of available geophysical information including magnetic, radiometric and gravity data and target generation by external consultants,

(v) Field review of access, ground conditions, sample media and field program planning.

# 7. CONCLUSIONS & RECOMMENDATIONS

The ultimate prospectivity of the relinquished area has not been tested due to the Redbank's constraints on funding. Further exploration is recommended.

# REFERENCES

Ahmad M and Wygralak AS (1989) Calvert Hills, Northern Territory. 1:250 000 metallogenic map series explanatory notes SE 53-08. Northern Territory Geological Survey, Darwin

Orth K, 2010. Geology, vulcanology and mineral potential of the Cliffdale and Seigal volcanics, Calvert Hills 1:250 000 geological mapsheet, SE 53-08, Northern Territory Geological Survey, Record 2010-003.

Page R. W., Jackson M. J., Krassay A. A. (2000) Constraining sequence stratigraphy in north Australian basins: SHRIMP U-Pb zircon geochronology between Mt Isa and McArthur River. Australian Journal of Earth Sciences 47 (3), 431-45

# APPENDIX 1: RELINQUISHED AND RETAINED TENURE

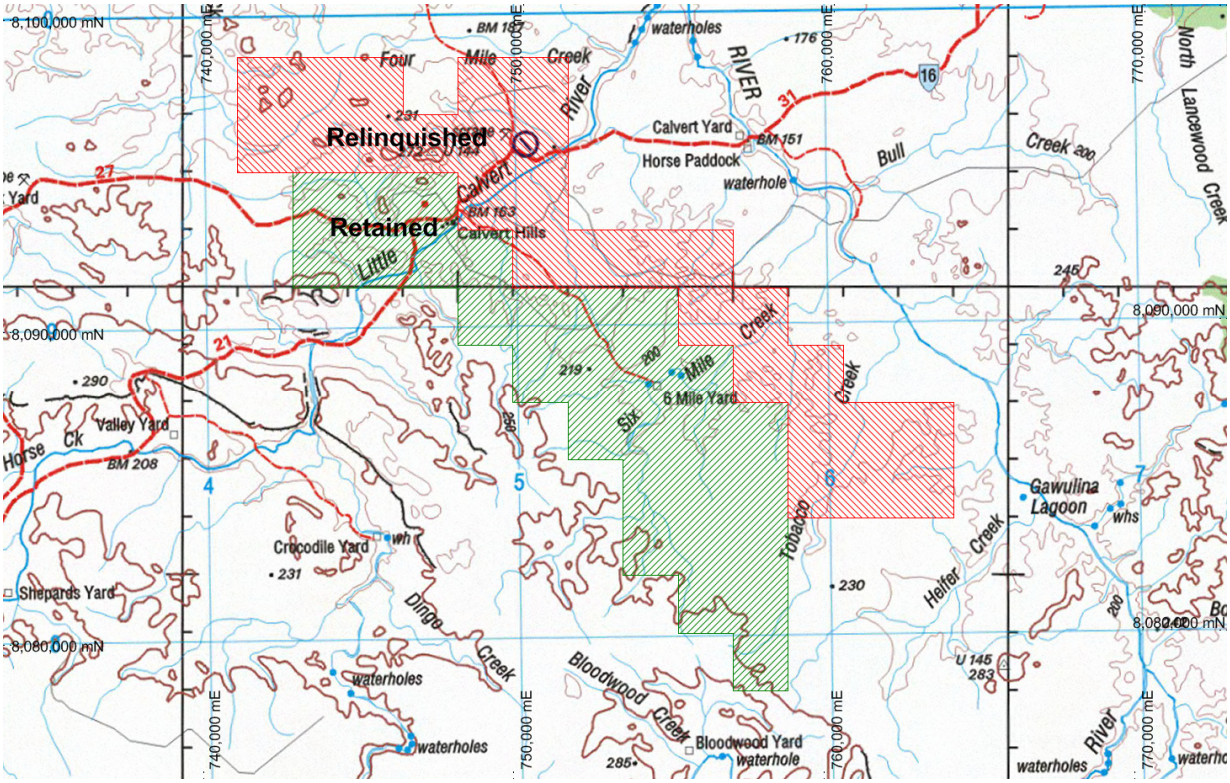


**FIGURE 4: RELINQUISHED AND RETAINED**