

# ANNUAL TECHNICAL REPORT Group Reporting GR 359 "ALBARTA NORTH PROJECT"

# 1st February 2016 to 31st January 2017

# Exploration Licences 27369, 28029, 29689 & 30793

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Reporting Period:	1 <sup>st</sup> February 2016 to 31 <sup>st</sup> January 2017
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# CONTENTS

1 Summary	3
2 Introduction	3
3 Tenure	5
4 Geology and Mineralisation	5
5 Previous Exploration	6
6 Exploration Work 2016	13
7 Conclusions & Recommendations	14
8 Rehabilitation	14
9 References	14

#### LIST OF TABLES

Table 3.1:	Tenure Details for (	GR3595	5
			·

#### LIST OF FIGURES

Figure 2.1:	Location Map of GR 359 Tenure	4
Figure 5.1:	Mt Riddock VTEM areas (2014)	8
Figure 5.2:	Virginia Prospect drill hole location plan	8
Figure 5.3:	Copper Royals drill hole location plan on RTP Magnetic Imagery	9
Figure 5.4:	Copper in soils at the Greater Paradise Wells Project	122

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## **1 SUMMARY**

This is the second Group Reporting of Core Exploration's (CXO) Albarta North Project (GR359) comprising four exploration licences (EL's 27369, 28029, 29689 & 30793) which are held 100% by DBL Blues Pty Ltd a wholly owned subsidiary of CXO Exploration Limited.

The project area is dominated by parts of the Aileron and Irindina Provinces as well as the Amadeus Basin. The basement in the area consists of sedimentary and igneous rocks of the Aileron Province of Palaeo-Proterozoic age (1865-1500Ma). The rocks have been metamorphosed to upper green-schist to lower amphibolite facies during the Strangways Orogeny (1740-1690 Ma).

In previous years CXO has collected surface geochemistry on a number of tenements, collected IP and VTEM datasets over Mt Riddock and completed RC drilling at Copper Royals and Virginia targeting copper mineralisation.

During this reporting year exploration work on the Albarta North Project has been limited whilst the company focused on its Lithium Projects in the Bynoe area of the Northern Territory.

It is anticipated exploration work will recommence on GR359 during 2017 and will likely include soil geochemistry and geological mapping to assess base metals targets identified by the CSIRO study and assist generating new targets. CXO will have a focus on the lithium potential of the Arunta pegmatites, largely within the Barrow Creek-Anningie pegmatite fields. An assessment of the Albarta North pegmatites suggests most are of the REE style and therefore do not have potential for lithium. However, further field investigation would need to be completed to confirm this. EL30793 also has come potential for hardrock-style uranium. The uranium market appears to be picking up and if this continues there may be impetus to begin exploration on this tenement in the coming year. This is likely to entail rockchip sampling and investigation of the uranium deposit style in the area.soil geochemistry and geological mapping to assess targets identified by the CSIRO study and assist generating new targets. As discussed above, CXO will have a focus on the lithium potential of the Arunta pegmatites.

## 2 INTRODUCTION

This report covers the second year of joint reporting of exploration activities completed within GR 359 "Albarta North" up until 31<sup>st</sup> January 2017. GR 359 comprises of EL's 27369, 28029, 29689 & 30793. GR 359 is located within the Riddock (5851)) 1:100,000 map sheets, and is located within the ALICE SPRINGS (SF53-14) 1:250,000 map sheet.

Access from Alice Springs is north via the Stuart Highway then east along the Plenty Highway or alternatively east along the Ross Highway to Arltunga then on station tracks.



Figure 2.1: Location Map of GR 359 Tenure

# **3 TENURE**

GR359 includes EL's 27369, 28029, 29689 and 30793, all held by DBL Blues Pty Ltd, a wholly owned subsidiary of CXO Exploration Ltd (CXO). During June 2016, EL 29667 & 29668 were surrendered in full in June 2016 reducing the Albarta North area by 67 blocks. These areas were considered non-prospective.

Originally, a number of these tenements were held in Joint venture with other third parties, however CXO negotiated outright purchase of all joint venture tenements covered by GR359 on 28<sup>th</sup> October 2014. Group Reporting of the Albarta North tenure was granted by NT DPIR on 19<sup>th</sup> February 2015 with a reporting year defined 1<sup>st</sup> February to 31<sup>st</sup> January in the following year.

The tenement package overlies the Riddock and Amberlindum Pastoral Leases. Tenure details are tabulated in Table 3.1 and illustrated in Figure 2.1.

EL	OWNER	GRANTED	YEAR	BLOCKS	AREA (KM2)
27369	DBL Blues	28/05/2009	8	11	33.88
28029	DBL Blues	12/04/2010	7	26	78.76
29689	DBL Blues	20/08/2013	5	99	310.46
30793	DBL Blues	21/10/2015	3	6	18.93
				142	442.03

Table 3.1: Tenure Details for GR359

## 4 GEOLOGY AND MINERALISATION

GR 359 covers both the Proterozoic Aileron Province and the Neoproterozoic Irindina Province and there contact in the Central Arunta Region. The Aileron Province rocks mostly comprise variably metamorphosed sediments, volcanics, calcsilicates, amphibolites and granite (Figure 4.1). Detailed geology of the Aileron Province is covered by Murrell (1989) and Zhao & Cooper (1992).

The Irindina Province is a Neoproterozoic to Cambrian aged province that has been highly metamorphosed and multiply deformed by the Larapinta Event and the Alice Springs Orogeny. The bulk of the units within the Irindina Province are interpreted as forming the Harts Range Metamorphic Complex which includes Irindina Gniess (which includes the Naringa Calcareous Member, the Stanovos Gneiss Member and the Riddock Amphibolite) and the stratigraphically overlying Brady Gneiss (Maidment 2005). The Virginia Prospect is interpreted to be within the Riddock Amphibolite. The Riddock Amphibolite is described as a variably deformed metagabbro or metadolerite, interlayered with layered, quartz rich

amphibolite, metapsammopelitic rock, and minor marble calc-silicate rock and quartzo-feldspathic gneiss (Scrimgeour IR, 2013). It is also interpreted to be interlayered with the Irindina Gneiss in places.

CXO has studied the recent investigations undertaken by Geoscience Australia (GA) and the Geological Survey of the Northern Territory, in conjunction with other explorers in the region, all of whom suggest Iron Oxide Copper Gold (IOCG) affinities can be attributed to the Aileron Province. This recently suggested IOCG terrain represents a newly-recognised Proterozoic copper – gold province characterised by a long belt of structurally deformed granite and sedimentary sequences that contain variable amounts of quartz veining, strong iron and fluorite alteration, and outcropping copper- silver- gold mineralisation.

The Irindina Province has become an area of greater interest for mineral exploration in the last decade due to some recent discoveries by exploration companies. Mithril Resources (MTH) have identified a number of Cu-Co and Cu-Ni prospects within the Irindina Province including at Basil where an inferred resource of 26.5 Mt @ 0.57 % Cu, 0.05% Co at a 0.3% Cu cut off was identified (MTH ASX release 21-03-2012). Studies of the Basil Cu-Co deposit (Sharrad et al., 2013) suggest a volcanic – exhalative (VHMS) on the seafloor emplacement history for the deposit which was metamorphosed by the Ordovician Larapinta Event, making it a metamorphosed VHMS style deposit hosted within the Riddock Amphibolite.

Rare earth mineralisation associated with thorium bearing Allanite has been documented at Blueys Folly on EL 28029. It can in a number of settings, local examples being pegmatite dykes (plug-like to lenticular sub-vertical bodies and sheet-like apophasis that intrude the surrounding amphibolite facies metamorphic rocks and within amphibolite and marble (calcsilicate?) units adjacent to these pegmatites (Murrell, 1988). Murrell estimated that Blueys Folly contained several million tonnes of pegmatite grading about of 0.4% allanite. This is a sub-economic grade. The north-east strike extent of the Blueys Folly REE geology continues up EL 28029, where two anomalous areas are identified.

#### **5 PREVIOUS EXPLORATION**

#### Mt Riddock EL29689

The earliest modern exploration in the area was conducted on EL346 by Russgar Minerals NL during the early 1970's. The work included geological mapping and extensive rock chip sampling for base metals and gold. The majority of the work was concentrated on the Oonagalabi prospect which had been discovered in the 1930's.

Kinex held EL1337 over the area between 1977 and 1983. Geopeko, Amoco Minerals and Pan D'Or Mining farmed into the tenement at various times. Most of the work was concentrated on the Oonagalabi prospect where geophysical surveys and drilling were carried out.

White Industries and BHP Minerals jointly explored EL 2648 between 1981 and 1984 primarily for diamond. Stream sediment samples were collected and the silt fraction was analysed for base metals. No significant anomalous values were found.

Astron Resources carried out a heavy mineral survey over EL4462. The aim of the survey

was to determine if gold or gannite (zinc spinel) were present in the stream sediments. Gannite was found in a number of the samples and may indicate the presence of Oonagalabi style mineralisation. No further work was done.

Clarence River Finance Group held the ground under EL 6940 and EL 9420 from 1990 to 2000. They are also the current holders of the mining lease over the Oonagalabi prospect. Exploration was mainly conducted for industrial minerals (garnet). Some minor exploration work was done on the Oonagalabi prospect.

Tanami Gold explored the area under EL10078 and EL22917 between 2001 and 2006. Soil and rock chip sampling, RAB drilling and a hyperspectral airborne survey (Hymap) were completed. Unfortunately, these ELs were part of a project group for a number of years and the group annual reports were not included in the compilation. Work was completed at the Virginia Prospect which was described as "a stratiform copper horizon over 1 km strike hosted by a 3-5 m thick leucocratic garnet gneiss band within mafic gneisses" of the Riddoch Amphibolite. Rock chip sampling of the malachite stained rocks returned values in the 1-5% Cu range. Soil sampling showed a strong copper anomaly extending along strike from the main prospect. The prospect does not appear to have been drilled.

The Copper King prospect was identified from regional 400x40 soil traverses. An area of abundant malachite staining measuring 10x30m returned rock chip assays <1% Cu with a peak gold value of 38.5 g/t Au. Two other prospects lie close to Copper King – Skippy Hole and MR3. Fifty-one RAB holes were drilled on these prospects. Narrow zones of anomalous copper were intersected with the best result being 3m at 0.25% Cu from 6m in hole MRB029 at Copper King.

The CSIRO undertook some investigations of the Oonagalabi prospect in 2004, and showed that the mineralisation had a distinct geochemical signature – Au-Bi-Cd-Cu-Pb-Sn-W-Zn.



Figure 5.1: Mt Riddock VTEM areas (2014)



Figure 5.2: Virginia Prospect drill hole location plan



Figure 5.3: Copper Royals drill hole location plan on RTP Magnetic Imagery

Most of the previous exploration work conducted in this area has been concentrated on the Oonagalabi Prospect. The mineralisation at Oonagalabi is stratabound in a distinct package of rocks which also trends southwest. Primary mineralisation consists of chalcopyrite and sphalerite patches, disseminations and veinlets in calc-silicate rocks, minor pyrrhotite, pyrite and galena are also found. The mineralisation is thought to have either a syngenetic volcanogenic or epigenetic origin. Soil sampling should identify any outcropping zones of mineralisation. Blind zones of mineralisation may be detectable by IP or EM surveys.

On EL 29689 CXO has undertaken historical literature and data reviews including

reconnaissance field visits and meetings with landholders. Rock-chip sampling and four lines of IP were collected at Virginia and Copper Queen. In the second year CXO collected 176 line kilometres of VTEM over Virginia and the Copper Royals area and completed 18 RC holes for 1,745 metres (12 holes at Virginia & 6 holes at Copper Royals). Whilst low tenor copper mineralisation was encountered at Virginia the results were generally disappointing.

#### Mt Russell EL27369

A summary of the first five years' exploration on EL27369 is detailed as follows:

After reviewing relevant literature and the additional interest in REE's during 2011, it was decided to follow up this previous work, and at the same time, hopefully generate a new target. Some of the reports on the Arltunga area documents the historic quartz veins, (<1m wide) which carry upto 40 g/t Au. Some of these veins and workings extend onto EL27369 near Claraville, but given their small size (<1m) and likelihood of being uneconomic, these were not followed up in any great detail.

The REE potential is highlighted by a report from Pontifex and Associates (1989), they describe three rocks and associated thin sections identified as Paradise Well 1, 2 and 3. No locations are given for these samples in this or the annual report it was appended too (Murrell, 1989). Pontifex describes the samples as being monazite rich (up to 40%) with significant allanite and magnetite. Monazite is also a source of REE and provides an interesting target to explore.

A total of 35 soils (PWS series) and 5 rock chips (PWR series) were taken during the second year. The soils comprised the -80mesh fraction from about 30cm depth. Soils were taken from roadside and across an east-west traverse amongst the granites. The samples were then sent to the ALS sample preparation facility in Alice Springs. The rocks chips comprised mostly samples seen from alongside the road cutting, they were not in situ, but had probably been exposed and transported a little during the track building. Some mapping and traversing with a scintillometer was undertaken.

Twenty-three new soil samples were taken across the central area of the tenement. The aim was to confirm the second-year results and provide greater detail. Most of the outcrops in the survey were identified as gneiss and amphibolite. Additional work was completed by acquiring new magnetic and radiometric airborne data. The survey was undertaken by Daishsat Pty Ltd and processed by Baigent Geosciences Pty in May 2012. Flight lines were 100m spaced along a 135/315 flight line.

La te in the third year of the EL27369 license (2013) the tenement holders (Riding Resources Pty Ltd (50%) & Bralich Holdings (50%) entered into a joint venture agreement with DBL Blues PL which is a fully owned subsidiary of CXO Exploration Pty Ltd ('CXO'), with CXO earning into the tenement. CXO's exploration model for the broader Arunta Region (Aileron Province within EL 27369) is focused on the Iron Oxide Copper Gold (IOCG) potential of the area within the Proterozoic basement in line with the results of Geoscience Australia IOCG report (Schofield et al; 2013).

CXO began it exploration program in year 4 on the tenement with reconnaissance fieldtrips to the area to access the Cu rock chip and soil anomaly at Paradise Well identified by the joint

venture partners in years 2 and 3 of the license period. CXO then organized Euro Exploration Services to undertake a soil sampling program over the identified Paradise Well target and extend the survey into the surrounding area. A total of 314 soil samples were collected generally at 100m spacing with a 50m spacing central section at the Paradise Well Prospect. The samples were assayed for Ag, Cu, Pb and Zn.

CXO then engaged a contract geologist to map at prospect scale the Paradise Well Prospect and rock chip sample the area to access its Cu-Au potential. A total of 42 rock chip samples were collected sampling both observed mineralisation and the variations in rock type. After contract mapping, had been completed CXO reassessed results at Paradise Well and interpreted the Paradise Well Prospect to be formed from remobilization of copper along structures as demonstrated by the copper being commonly found with fractures or with late stage silica rich melts within the structural trend. The contract geologist report also briefly touched on mineralisation south of Hale River which is also thought to have formed during a similar or equivalent remobilization event.

CXO followed up this work with further rock chips and soil sampling over a broader area encompassing the Paradise Well – Hale River region. A further 27 rock chip samples and 134 soil samples were collected. Two new areas of observed malachite mineralisation were identified. The first loosely termed Paradise Well South follows a NE-SW striking trend with malachite associated with coarse (2-3mm) garnets, commonly within a micaeous schist. This target is once again interpreted to be formed as a result of late stage copper remobilization along an existing NE-SW striking structural zone (Figure 3). The second new target, loosely termed ('New Paradise Well') comprises a NW-SE striking, generally <1m wide, very coarse garnet (4-5mm) + quartz ± carbonate unit with abundant malachite grading up to 6.16% Cu with 0.84g/t Au. The unit sporadically outcrops of approximately 150m and has at least one local repetition striking parallel approximately 15m to the south possibly due to a faulted offset. This malachite rich unit is found within foliated amphibolite and is thought to represent a metamorphosed primary mineralized layer, possibly with a calc-silicate or skarn related proto-lith. CXO believes this is an encouraging discovery increasing the prospectivity of subunits within the commonly outcropping amphibolites within the tenement.

During year 4 of the license CXO has collected 72 rock chip samples and 449 soil samples within EL27369. CXO has identified four separate copper bearing (malachite) at surface prospects. Three of these occurrences are interpreted to be the result of a late remobilization of copper rich fluid along existing structures whilst the forth occurrence is interpreted to be a metamorphosed primary mineralized lithology/layer within a foliated amphibolite.

Whilst in isolation these occurrences appear to be small in scale their relatively small distance to each other coupled with the interpretation that three of them formed during remobilization of copper rich fluid, means the area remains prospective for a currently unknown larger scale mineralized body or bodies. The 'New Paradise Well' discovery of Cu  $\pm$  Au within mineralized unit(s) within a foliated amphibolite increases the prospectivity of the amphibolites within the region. Whilst little direct evidence of IOCG style alteration or mineralisation has been identified to date within EL27369, CXO's initial prospecting and sampling has identified previously unknown copper occurrences making it still a priority Cu + Au tenement for the company.



Figure 5.4: Copper in soils at the Greater Paradise Wells Project

# Blueys Folly EL 28029

Bluey's Allanite Prospect (also known as Bluey's Folley) is located in the middle of EL 28029. An area about  $2.5 \times 3.0$  km was identified where pegmatite and amphibolite units have unusually high abundances of allanite. In CR1988-0452, a non-JORC resource estimate of 200,000 tonnes at >1 % allanite, or several million tonnes at >0.4 % allanite is reported. Allanite is an important source of REE at Arafura Resources' Nolans Bore Project.

The archive information about Bluey's Allanite Prospect is very patchy. There was clearly a lot of work preceding the first report about the prospect (CR1988-0452). There are reams of very detailed information, including two comprehensive CSIRO reports about the mineralogy (S-series of rock chips; includes probe work), but basic information, such as sample locations and useful maps, is limited. A number of samples are described in these reports as carbonatites. The only data for the area in STRIKE are the stream sediment samples, although widespread and detailed rock chip sampling and Airtrack (34 holes REAT-1 to -34), RC (26 holes RERC-1 to -26), RAB and diamond (1 hole REDDH-1) drilling were completed.

Mr Pu Yuan completed his PhD thesis in 2002 at James Cook University; A study of allanite mineralogy and mineralisation in Bluey's Folley, Arltunga area, Central Australia (supervisor Professor PJ Stevenson). The thesis is listed on the JCU library website. None of Pu's work is in the historic report archive except for three 1:500-scale geology maps covering Bluey's Folley (CR1990-0005; Section 35). The maps show the detailed geology, but also the

location of rock chip samples (D-series) and RAB drill holes (RAB08-24). Unfortunately, the map has a local grid, but given the amount of detail it would be possible to relocate the map and recover the data. Moreover, if the local grid can be reclaimed into UTM then much of the previous work could be reclaimed.

The ASTER multi-spectral imagery does not show anything distinct in any channel for the general Bluey's Allanite Prospect, though this should be revisited once the actual mineralised outcrops have been located.

During the Year 4 2014 reporting period CXO acquired 100% ownership of EL28029 from the joint venture partners Gempart Pty Ltd. CXO also had a partial relinquishment of 18 blocks of EL28029 during the reporting period. CXO assessed the exploration potential of the tenement utilizing ASTER data and other regional datasets assessing the uranium allanite potential as well as its potential for Pb-Zn mineralization within intensely deformed Bitter Springs Formation. A reconnaissance field trip was undertaken to assess the Blueys Folley Allanite prospect. CXO's determination is that the allanite prospect is currently not a high priority.

Comments from CXO's Exploration Manager after his visit to Blueys Folley were; Colin Skidmore visited the Blueys Folly Prospect area during the reporting period. Impressions were not particularly positive with only scant outcrops of an altered pegmatitic allanite bearing granitoids in contact with amphibolites and calc-silicate facies that no doubt host the REE mineralisation. There was little evidence of historical work aside from small pad earthworks that probably relate to the early drilling (reported as 34 airtrack holes, 26 RC holes and 1 diamond hole). At this stage, it is difficult to contemplate doing anything with this project especially in this commodity space.

Activities undertaken in 2015 was a desktop study by Dr James Austin at CSIRO, as part of the "Research-in-Business" collaborative study that was finalised in late 2014. This study used existing Open File magnetic datasets to generate and model targets for future exploration work. Even though the study was scheduled for completion in July 2015 much of the originally proposed work was not undertaken and to date the company has only received a draft report of Dr Austin's work

# 6 EXPLORATION WORK 2016

During the 2016 reporting period, minimal work was undertaken on the Albarta North Project.

Ongoing review of exploration potential and prospectivity was conducted by CXO's new exploration manager of the existing data held. CXO has decided to become more active in the lithium commodity space and in particular considers the pegmatites of the Arunta Block prospective.

Minimal work was conducted over the Albarta North Project in this reporting period due to CXO being successful in applying for and obtaining grant over 8 out of 9 Exploration Licences, and successfully acquired 100% of a joint venture held with the focus of Lithium based exploration around Bynoe and Barrow Creek regions of the NT.

In July 2016, approval for three Drilling programs was received with the first commencing in July. Two of these programs are ongoing, currently delayed by the wet season. Each drilling program has independent approval which has absorbed the majority of CXO's resources and funding over this time.

# 7 CONCLUSIONS & RECOMMENDATIONS

It is anticipated exploration work will recommence on GR359 during 2017 and will likely include soil geochemistry and geological mapping to assess targets identified by the CSIRO study and assist generating new targets. As discussed above, CXO will have a focus on the lithium potential of the Arunta pegmatites, largely within the Barrow Creek-Anningie pegmatite fields. An assessment of the Albarta North pegmatites suggests most are of the REE style and therefore do not have potential for lithium. However, further field investigation would need to be completed to confirm this. EL30793 also has come potential for hardrock-style uranium. The uranium market appears to be picking up and if this continues there may be impetus to begin exploration on this tenement in the coming year. This is likely to entail rockchip sampling and investigation of the uranium deposit style in the area.

## 8 REHABILITATION

No ground disturbing work was undertaken in the reporting period on GR 359.

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