

# **BORROLOOLA WEST PROJECT**

# **GROUP ANNUAL MINERAL EXPLORATION REPORT**

# **Tenement Holder: Sandfire Resources NL**

**Operator: Pacifico Minerals Ltd** 

# Group Reporting Number: GR121-13 Report Period:

# 11 April 2017 to 10 April 2018

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Tenement Operator	Pacifico Minerals Ltd
Tenement Holder	Sandfire Resources NL
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# ABSTRACT

This annual report for the period 11 April 2017 to 10 April 2018 covers the mineral exploration completed by Pacifico Minerals Ltd ("Pacifico") on twelve granted Exploration Licences (1784km<sup>2</sup>) of the Borroloola West Project Group, Report Number GR121-13.

The Borroloola West Project, which is under a joint-venture agreement between Sandfire and Pacifico (formerly West Rock Resources Ltd), also includes the Exploration Licence Application ELA26599, and granted Mining Lease MLN624 at Coppermine Creek which lies within EL26938. EL28659 was reduced during the year from 20 blocks to 10 blocks (now 32.9km<sup>2</sup>).

The project area lies within the Batten Trough of the Middle Proterozoic sediments and minor volcanics of the Tawallah, McArthur and Roper Groups of the McArthur Basin, with Cretaceous and Tertiary cover sediments.

During the reporting period in 2017, Pacifico carried out prospect scale geological mapping, and portable X-Ray fluorescence instrument ("pXRF") geochemical reconnaissance and rock chip sampling. A ground EM survey was completed at the Coppermine Creek Prospect. Diamond drilling (total 5 holes, 1403m) was completed at Coppermine Creek (2 holes for 553m), Mariner (2 holes for 550m), and Berjaya (1 hole for 300m) which was designed to test for major primary copper and zinc-lead mineralisation. Metallurgical testwork was completed on drill samples of oxide copper mineralisation from Coppermine Creek and Lorella.

At **Coppermine Creek** two diamond holes were drilled (CCD09 and CCD10). The previous RC and diamond drilling completed during 2015 and 2016 had shown the potential regional importance of stratabound copper mineralisation associated with an evaporite bed within the Amelia Dolomite. A ground EM survey over MLN624 and part of the prospective area of EL26938 did not show new conductive anomalies. The objective of the diamond drilling program was to test for stratiform copper mineralization of Mount Isa or Nifty style, within the McArthur Group sediment and carbonate sequence. The two diamond holes drilled confirmed the model of an extensive, relatively shallow, stratabound, copper mineralised zone at Coppermine Creek, within which there is potential for the development of a copper orebody with economic parameters. Glycine and acid leach testwork on oxidized copper mineralisation in RC hole CCR08, shows that the oxidized near surface copper mineralisation at Coppermine Creek is not economically treatable by leaching.

At **Mariner** two diamond holes were drilled (MND05 and MND06). The objective of the diamond drilling program was to test for SHMS zinc-lead mineralization within the McArthur Group, where it is covered unconformably by Roper Group sediments. Very





strong lead (+ zinc, tellurium, antimony) geochemistry had been obtained during Pacifico's 2016 RC drilling at the base of the Roper Group and top of the McArthur Group sediments in the area. A previously unknown package containing pyritic black carbonaceous shales was intersected in MND06. The close association with observed lead and zinc mineralisation confirms potential for sediment hosted zinc-lead mineralisation. The pyritic black shales intersected by MND06 are probably part of the Barney Creek package, and that the thick underlying dolomite is Mara Dolomite. The shales are anomalous in copper (100's of ppm Cu) indicating that the newly discovered sub-basin may contain significant base metal mineralisation.

At **Berjaya** diamond drill hole BJD04 did not intersect the Barney Creek Formation as planned. The objective was to test for SHMS zinc-lead mineralization within the Barney Creek Formation of the McArthur Group. Previous shallow RC drilling by Pacifico had intersected oxidized Barney Creek Formation up-dip of the proposed diamond drill hole. The diamond drill hole target was a zone of relatively high VTEM conductivity that corresponded to the apparently underlying gently dipping Barney Creek Formation. No significant base metal values were obtained. The hole passed through Cretaceous sediments with coal fragments into the Hot Springs Formation and was still in hanging wall Hot Springs Formation sediments at 300.2m when the hole terminated. It is concluded that the Barney Creek Formation is dipping more steeply than anticipated, and that the conductivity in the VTEM is reflecting wet clayey sediments of the overlying Hot Springs Formation.

Potential for oxide copper mineralisation was identified at the **Lorella Prospect**, using Sandfire's historical drill data, which sub-outcrops beneath 20m to 30m of alluvium. Acid leach testwork on the oxide copper mineralisation from the Lorella prospect indicates that the material could be economically treatable with >90% recoveries and low net acid consumption. An aircore drill program to test for the possibility of significant tonnage was planned to commence in April 2018.



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Appendices provided as separate pdf files

**APPENDIX 1** – Pascoe D, June 2017; Fieldwork report and current status. Coppermine Creek, Berjaya and Mariner Prospects, Borroloola West Joint Venture, NT

**APPENDIX 2** – Pascoe D, October 2017; Diamond Drilling Program Coppermine Creek, Mariner, and Berjaya Prospects, Borroloola West Joint Venture, NT

**APPENDIX 3** – Kim Frankcombe, 2017. Coppermine Creek EM Survey, Borroloola Project, Interpretation Report. ExploreGeo for Pacifico Minerals Ltd

**APPENDIX 4** – Tim Newton July 2017. Metallurgical test report – leaching of copper ore, Borroloola Project. MPS.

**APPENDIX 5A** – Chad Czerny, October 2017. 0794BH Bottle Roll Leach Data Client\_271017, Borroloola Project. SGS.

**APPENDIX 5B** – Chad Czerny, October 2017. Bottle Roll Leach Data\_Liquor Analyses\_ draft\_311017, Borroloola Project. SGS.

**APPENDIX 5C** – Chad Czerny, October 2017. Pacifico\_Feed Sizing\_271017, Borroloola Project. SGS.

**APPENDIX 5D** – Chad Czerny, October 2017. 0794BH\_Proposed Test Flowsheet, Borroloola Project. SGS.

**APPENDIX 5E** – Chad Czerny, October 2017. 0794BH\_WM179591\_Interim-Assays\_Pacifico \_Client\_241017, Borroloola Project. SGS.

**APPENDIX 5F** – Chad Czerny, October 2017. 0794BH\_WM179636\_Interim\_AssayData\_ Pacifico\_241017, Borroloola Project. SGS.





MapInfo Files, - geological mapping at Coppermine Creek and Mariner. Attached with report



# 1.0 LOCATION

The project is centered about 650 km southeast of Darwin in the 'Gulf Country" of the Northern Territory, Australia. On the eastern side is the township of Borroloola, the McArthur River (HYC) Mine and its loading facility at Bing Bong on the Gulf of Carpentaria. To the south is Cape Crawford and to the northwest is Roper Bar.

Access to the project area is by sealed roads from Darwin about 590 km southwards along the Stuart Highway to the Hi-Way Inn and then 270 km eastwards along the Carpentaria Highway to Cape Crawford, and then to Borroloola. The unsealed Ryan's Bend Road crosses the southern part of the Project area from west to east, and the Nathan River Road runs south to north through the Project area to where it joins the Roper Bar Road to Mataranka.

Access deteriorates significantly on unsealed roads in the north of the Project area where multiple creek crossings are negotiated. Each wet season results in substantial damage to most creek crossings that need to be re-established.





Figure 1-1. Borroloola West Project Location and tenements



#### 2.0 TITLES

#### 2.1 Tenements

The Borroloola West Project is under a joint-venture agreement between Sandfire and Pacifico (formerly West Rock Resources Ltd). The Borroloola West Project now consists of 13 granted tenements: EL28508, EL28534, EL28540, EL28541, EL28657, EL28658, EL28659, EL30157, EL26938, EL30302, EL26939, EL30305, MLN624, and one application: ELA26599. These tenements were farmed-out to West Rock Resources Limited in an agreement executed on 1 July 2013. Pacifico Minerals Ltd ("Pacifico"), a public company listed on the Australian Stock Exchange (ASX: PMY), acquired 100% of West Rock Resources Ltd on 19 August 2013, now West Rock Resources Pty Ltd ("West Rock"). A Strategic Alliance Agreement with Cliffs Natural Resources Inc. was terminated in February 2014 and Pacifico executed the Deed of Settlement in January 2015. Pacifico has now earned a 51% interest in the project with Sandfire (49%) and in April 2016 an unincorporated joint venture was formed, with Pacifico continuing as operator. On 21 June 2016 Pacifico Minerals Ltd, with the agreement of Sandfire Resources NL ("Sandfire"), withdrew from three licences (ELs 24401, 26587 and 26837) of the joint venture, and these no longer form part of the Borroloola West Project GR121-13.

EL28659 was reduced during the reporting year from 20 blocks to 10 blocks (now 32.9km<sup>2</sup>).

As of 10 April 2018, the Borroloola West Project Group Report Number GR121-13 of twelve granted Exploration Licenses covered an area of approximately 1784km<sup>2</sup>. Details of the respective block sizes, application and grant dates, and tenure for all tenements, are shown in Table 2-1.

All exploration work conducted on the stated tenements throughout the reporting year was undertaken by Pacifico Minerals Ltd. The tenement holder Sandfire Resources NL completed no exploration activities during this period.



		Applation			Area
Tenement	Status	Date	Grant Date	Tenure (yrs)	(km2)
EL28508	Granted	10/12/2010	20/07/2011	6	39.37
EL28534	Granted	29/12/2010	7/09/2011	6	13.13
EL28540	Granted	29/12/2010	7/09/2011	6	13.11
EL28541	Granted	9/12/2010	7/09/2011	6	9.85
EL28657	Granted	8/03/2011	27/10/2011	6	147.86
EL28658	Granted	8/03/2011	27/10/2011	6	303.96
EL28659	Granted	8/03/2011	27/10/2011	6	32.88
EL30157	Granted	24/06/2008	9/06/2009	8	85.7
EL26938	Granted	3/09/2008	9/06/2009	8	460.5
EL30302	Granted	3/09/2008	9/06/2009	8	372.32
EL26939	Granted	3/09/2008	9/06/2009	8	229.98
EL30305	Granted	3/09/2008	9/06/2009	8	75.68
MLN624	Granted	22/09/2004	1/01/2007	10	0.16
ELA26599	Application	22/01/2008			854.35
TOTAL					2638.845
TOTAL GRA	NTED				1784.495

# Table 2-1. Borroloola West Project Tenement Status



# 2.2 Native Title

The Borroloola project area granted tenements are subject to several undetermined Native Title Claims that have been registered with the Federal Court. The names, distribution and extent of these claims (NDTA Registered) are shown in Figure 2-1.

On application tenement ELA26599, which overlaps the Marra Aboriginal Trust Land Portion 2099 along the coast southeast of Roper Bar, a VETO ALRA Moratorium was removed on the 13 of November 2013. The application tenement is subject to Native Title freehold land, administered by the Northern Land Council (NLC) under the Aboriginal Land Rights (Northern Territory) Act 1976 (ALRA) on behalf of the respective Native Title Groups, and require agreement with all parties prior to grant and exploration.

A meeting was held in September 2016 in Borroloola between Pacifico personnel and consultants and a group of the Alawa people elders and representatives who have a Native Title claim DC2000/029 over the southern portion of the Limmen National Park. Site inspections were subsequently carried out in 2016 and 2017 with a selected Traditional Owner and it was agreed that no sites of cultural significance were to be affected by Pacifico's planned aircore, RC or diamond drill programs.

Berjaya (EL28508) lies in McArthur River Station and is covered by granted Native Title DCD2015/008 registered Native Title dated 26/11/2015. It is divided into 11 estates. As a result of an Authority Certificate, applied for by MIM in 1993, a Restricted Works Area was put over Berjaya. The condition on the Restricted Works Area is that West Rock must consult with the Traditional Owner ("TO") before undertaking any significant work.

Site inspections were made in 2016 and 2017 with a nominated representative of the TO of the area. The areas around the hot springs in the central part of the licence were regarded as sensitive and siting of the drill collars was adjusted to avoid these areas. It was agreed that the remaining access tracks and drill sites to be cleared did not interfere with any site of cultural significance.

Registered and recorded heritage sites within the project's licence areas have been identified on plans sourced from the Aboriginal Areas Protection Authority (AAPA).

#### 2.3 Landholders

During 2012 the Limmen Nation Park ("LNP") was formalised. The park area overlies the majority of the Borroloola West Project. Agreement was made in 2017 with Parks and Wildlife to rehabilitate all access roads and drill sites according to the provisions of the MMP within the Limmen National Park.

Figure 2-1 shows the Aboriginal Freehold Land owners, Pastoral Lessees and Native Title Claims. The LNP covers former leases Billengarrah (NT Por. 1323), Nathan River (NT Por. 1334) and part of St Vidgeon (NT Por. 819).



EL28508 lies on the McArthur River Station which is now owned and managed by Glencore. An access agreement was made with the registered owner Mount Isa Mines (Glencore). We also liaised during our program with the station manager.



Figure 2-1: Borroloola West Project - Native Title Claims and Pastoral Leases



# 3.0 GEOLOGICAL SETTING

The McArthur Basin is a large sedimentary basin with an exposed area of about 180,000 km<sup>2</sup>. Most of it lies within the northeastern Northern Territory, and it extends over the border into the state of Queensland. Thick marine and non-marine sedimentary rocks were deposited from the late Palaeoproterozoic to the early Mesoproterozoic (1800 -1430 Ma). The Borroloola Project area lies within the Batten Fault Zone (BFZ) where sediments of the Tawallah, McArthur and Roper Groups rest unconformably on the Scrutton Volcanics, and are partially concealed by Cretaceous and Tertiary sediments.

The McArthur Basin is a prime target area for SHMS type economic sulphide deposits. This style of deposit contains 50% of the world's zinc and lead reserves, and make up around 25% of world zinc and lead production. The McArthur Basin hosts the world class McArthur River (HYC) zinc-lead-silver deposit in close proximity to the northerly trending Emu Fault Zone near the eastern margin of the Project area.

The Batten Fault Zone setting is also considered prospective for red-bed and Mt Isa style copper deposits and Mississippi Valley Tri-State (MVT) styles of base metal mineralisation.

In the north of the Borroloola Project tenements, targets have been considered for uranium mineralisation where the McArthur Basin basal sediments partly overlie coeval sequences of acid volcanics and granites, analogous to the host settings for major unconformity related uranium deposits, e.g., Westmoreland, Queensland.

Diamonds have been the target of previous exploration over the area covered by the southern part of the Borroloola West Project where there has been recovery of multiple macro diamonds, as well as microdiamonds and kimberlitic indicator minerals from alluvial samples. The diamonds and indicators were recovered from creeks surrounding a remnant Cretaceous plateau within surrounding McArthur Group sediments. This situation is analogous to the Merlin deposit kimberlite cluster where Devonian aged kimberlite pipes occur beneath Cretaceous cover rocks.

During the Cretaceous Period, around 90 to 100 million years ago, a shallow sea inundated the coastal areas along the Gulf of Carpentaria. Manganese accumulations were formed in embayments close to the shoreline of this sea in a series of depositional episodes. The largest of these is at Groote Eylandt within the Gulf of Carpentaria, 130kms northeast of the tenements. This style of manganese occurrence is the target of exploration in the northern part of the Borroloola West Project.



# 4.0 WORK UNDERTAKEN BY PACIFICO MINERALS LTD

During the reporting period in 2017, Pacifico carried out prospect scale geological mapping, and portable X-Ray fluorescence instrument ("pXRF") geochemical reconnaissance and rock chip sampling. A ground EM survey was completed at the Coppermine Creek Prospect. Diamond drilling (total 5 holes, 1403m) was completed at Coppermine Creek (2 holes for 553m), Mariner (2 holes for 550m), and Berjaya (1 hole for 300m) which was designed to test for major primary copper and zinc-lead mineralisation. Metallurgical testwork was completed on drill samples of oxide copper mineralisation from Coppermine Creek and Lorella.

Sandfire Resources NL ("Sandfire") is the current tenement holder; Sandfire undertook no exploration activities during this period.



*Figure 4–1: Prospect Index - Exploration activities during 11 April 2017 to 10 April 2018* 





Figure 4-2: Major prospects of the Borroloola West Project

<sup>1</sup>Pacifico Minerals Ltd – ASX announcements of 23 Nov 2016

<sup>2</sup>Mount Carrington Mines Ltd - Northern Territory Geological Survey open file report, January 1994. Eupene Exploration Enterprises for Mount Carrington Mines Ltd.

# 4.1 Geological Prospect Mapping and pXRF reconnaissance

Prospect scale geological mapping was carried out at Coppermine Creek and Mariner. A pXRF was employed to test selected rocks for base metal mineralization. Copper and lead geochemistry of selected surface rock chips are regarded as the most useful in this highly weathered terrain, with anomalous values that could be related to copper and zinc-lead mineralisation.



¢	Lab	pXRF
Tenement	analyses	analyses
EL28508		
EL28534		
EL28540		
EL28541		
EL28657		
EL28658		
EL28659		
EL30157		
EL26938		74
EL30302		
EL26939		
EL30305		
MLN624		
TOTAL	0	74

 Table 4-1. Borroloola West Project – Number of Samples by tenement

# Coppermine Creek Prospect

At Coppermine Creek the area to the east of the current drilling was partially mapped, to establish if the copper mineralized horizon within the Amelia Dolomite could extend to the east, and if there could be potential foci for the development of significant copper mineralisation. The eastern faulted contact of the basin against the Scrutton Volcanics is of interest because of its similarity to the geology at Mount Isa (associated with a major fault against the Eastern Volcanics).

Extensive barite veining was observed along the faulted eastern contact with the Scrutton Volcanics but no significant copper values were obtained with the pXRF. There are still large unexplored areas along the contact that will be subject to geological mapping and reconnaissance sampling with a pXRF during 2018.





Figure 4-3: Interpreted geology and drilling, including location of diamond drill holes CCD09 and CD10 at Coppermine Creek, also showing huge area potentially underlain by gently dipping mineralised horizon.

# Mariner Prospect

The Mariner prospect lies in an area of McArthur Group sediments faulted against older Tawallah Group rocks, and partially overlain by the younger Roper Group sequence (Figure 2). In the prospect area the McArthur Group, as mapped on the Bauhinia Downs 1:250,000 sheet, consists of Tooganinnie Formation dolomitic shale, siltstone, sandstone and dolomite. The adjacent Tawallah Group consists largely of coarse sandstone. The partially overlying Roper Group sediments consist of conglomerate, siltstone, sandstone and quartz wackes.



At the Mariner Prospect, outcropping, and drill intersected lead (minor zinc) mineralization (up to 25m thick) occurs at the top of the McArthur Group sediments in a chert breccia. All observed mineralization is oxidized with mostly cerussite mineralisation.

Diamond drilling in 2017 at the Mariner Prospect established the presence of the Barney Creek Formation carbonaceous and pyritic shales and siltstones. The Barney Creek Formation is host to the world class McArthur River zinc-lead deposit and therefore of potential for the discovery of further zinc-lead deposits. It had never been previously recognised or mapped in the Mariner prospect area. The Barney Creek Formation sub-basin could extend to the north beneath the younger Roper Formation.

Recent geological mapping and portable X-Ray Fluorescence instrument reconnaissance was carried out over the Mariner Prospect, to plan further diamond drill sites, and to determine the possible extent of the Barney Creek Formation intersected in MND06. The fieldwork identified anomalous lead and zinc rock chip geochemistry (values to 0.21% Pb and 510ppm Zn) 2km north of the previous diamond drilling, confirming the prospectivity of the sub-basin of Barney Creek Formation, that extends north beneath Roper Group sediments (figure 1).





Figure 4-4: Mariner Prospect –interpreted geological plan showing diamond hole collars MND05 and MND06

# 4.2. Ground EM Survey, Coppermine Creek Prospect

A ground EM survey was designed at Coppermine Creek to try and provide a clearer picture of the sulphide distribution, highlight any mineralisation away from the drilling and potentially provide drill targets.

A sample of mixed dolomite and massive sulphide core from Pacifico diamond drill hole CCD03 was sent to Systems Exploration in NSW for petrophysical analysis. The results were reported in the previous Annual Report (2017) and showed that the conductivity contrast should be sufficient to be detectable with ground EM.



The ground EM data were acquired by Fender Geophysics, initially using an in-loop coil and Slingram fluxgate, but because of slow production with both arrays, the Slingram reading was dropped from the programme. The survey area was relatively flat and open although rocky outcrops, rubble and deeply incised creeks slowed vehicle progress.

Contractor	Fender Geophysics
Receiver	Monex TerraTEM
Transmitter	2 x Monex TX50
Coil – in loop	Monex TRC3
Fluxgate - Slingram	Emit Fluxgate
Loop size	100m x 100m single turn
Slingram offset	100m to the south of loop centre
Mode	Time domain
Transmitter Frequency, Duty cycle	25 Hz, 50%
Line spacing	200m
Station Spacing	50m
Transmitter current turns	75 – 97.8A, Avg 82A
Number of lines and stations surveyed	5 lines, 175 stations – in loop 1.5 lines, 51 stations – Slingram
Line kilometres surveyed	8.5 km - in loop, 2.45 km - Slingram
Survey date	27/5 - 12/6/2017, 11 production days

# Table 4-2 Survey Specifications

The EM survey at the Coppermine Creek prospect did not define any massive sulphide targets and indicates that the copper mineralisation is not electrically connected over any significant volume.

However, it was considered that these results did not preclude the possibility of substantial disseminated copper mineralisation, that may not be electrically connected.





Figure 4-5: Contours of first order conductivity from the fast CDI (white high, grey low) overlain on an image of the 1st VD of terrain corrected Bouguer gravity (density 2.67 t/m3)

# 4.3. Leach testwork – Coppermine Creek

A series of metallurgical leach tests was conducted on a sample of mineralisation supplied by Pacifico Minerals Ltd from the Coppermine Creek Prospect.

The samples were taken from CCR08, an RC hole drilled in 2016, mixed equally from the intervals 50-51m and 57-58m.

It was considered that because of the association with dolomite host rocks, that the acid consumption would be too high for conventional acid leaching. The testwork was a preliminary attempt to show whether the ore was amenable to copper extraction using the GlyLeachTM process. Table 3 and Figure 3 below summarise the findings.

Results from the mineralogical examination, sequential assay and bottle roll tests all indicate that the ore is not amenable to leaching by either acid or alkaline glycine methods. It appears that most of the copper is locked in solid solution with iron oxides, and would require very intensive conditions to extract.

	1	2	3	4	
Method:		GlyLeach™	Acid	GlyLeach™	Acid
Particle size:		6 mm	6 mm	20 micron	20 micron
Duration	h	48	48	48	48
Assay head grade (Cu)	%	1.03	1.03	1.03	1.03
Residue grade (Cu)	%	0.92	0.82	<mark>0.8</mark> 9	0.75
Copper extraction (of total Cu)	%	12.2	24.8	13.3	30.5





# 4.4. Leach testwork - Lorella

Preliminary acid leach test work carried out at SGS Metallurgy in Perth has returned highly positive results and indicates that leaching the oxide copper material could be economically viable. Acid consumption is relatively low and copper recoveries better than 90% were obtained.

Two composite samples from Sandfire's drill core were sent to SGS Metallurgy in Perth for acid leach testwork, which comprised acid leach bottle roll tests performed on two composite samples. The preliminary test results show encouraging copper leach extractions at relatively low acid additions (37kg/t and 44kg/t) for both samples. The key results are summarised below:

	Sample Composite Hole No and interval	Head grade	Acid addition	Residue	% Cu extraction
Composite A	11BLD0006 35-37m	1.68% Cu	44 kg/t	0.07% Cu	94.1
Composite B	11BLD0006 37-39m	1.16% Cu	37 kg/t	0.08% Cu	92.8

Table 4-4	Copper	leach	testwork	results
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# 4.5. Diamond Drilling – Coppermine Creek, Mariner and Berjaya Prospects

A diamond drill program of 5 holes for 1403.2m was completed at the Coppermine Creek, Mariner, and Berjaya Prospects.

The drill program was contracted to Mitchell Services who used a Sandvik 1200 truck mounted diamond drill rig. Double shifts were worked. Drill hole collar locations and orientations are listed in Table 4-6.

Drill Hole ID	Prospect	Туре	Easting	Northing	Elevation	Total depth	Dip	Azimuth
CCD09	Coppermine	DD	557443	8234668	99	252.5	-80	225
CCD10	Coppermine	DD	556602	8235441	87	300.6	-80	000
MND05	Mariner	DD	559709	8227434	106	249.6	-70	090
MND06	Mariner	DD	559167	8225460	123	300.3	-70	090
BJD04	Berjaya	DD	588722	8185966	108	300.2	-80	225

# Table 4-6: Drillhole Collars (GDA94 Zone 53)

Single shot directional surveys were carried out every 30m on the diamond drilling to maintain control on the hole. An ACT Mk2 NQ core orientation tool was used on every diamond drill core run (< or 3m). Successful readings and marks were made on about 80% of the runs.

The core was logged for rock types, structure and mineralization.

Using the orientation marks the core was orientated where possible. Structural measurements of bedding, veining and fault breccias were measured (true dip and dip direction using a 'rocket launcher') where the features were unambiguous.

A single pXRF reading was taken on the core every 1m (results are plotted on figure 4). More detailed readings were taken if veining or mineralisation was observed, and those readings averaged.

The portable XRF instrument used was an Innov-X Systems Delta DP 2000. Calibration was carried out using the Innov-X Systems Standard 316 before commencing readings sessions. Because of the very small sampling window and possible interference errors inherent with the instrument, the values are regarded as qualitative. There is a constant routine monitoring for gross errors with the instrument, which should be apparent when comparisons can be made on sending core or rock chips to a laboratory for more representative and accurate analyses.

Selected intervals showing significant amounts of visible sulphides and/or with significant pXRF copper, lead or zinc geochemistry, were halved with a core saw and delivered to ALS in Mount Isa for preparation. Pulps were then sent to ALS Townsville for ICP-MS multi-element analysis. The following preparation and analytical procedures were carried out at ALS:

#### Preparation



CRU-31 fine crushing, 70% to <2mm PUL-32 pulverise 1000g to 85% < 75um

# Analytical Procedures

ME-MS41 Ultratrace Aqua Regia ICP-MS:

Elements, units (detection limit): Ag ppm (0.01), Al pct (0.01), As ppm (1), Au ppm (0.02), B ppm (10), Ba ppm (10), Be ppm (0.1), Bi ppm (0.1), Ca pct (0.1), Cd ppm (0.01), Ce ppm (0.1), Co ppm (1), Cr ppm (1), Cs ppm (0.05), Cu ppm (1), Fe pct (0.1), Ga ppm (0.05), Ge ppm (0.05), Hf ppm (0.02), Hg ppm (0.01), In ppm (0.005), K pct (0.01), La ppm (0.2), Li ppm (0.1), Mg pct (0.1), Mn ppm (5), Mo ppm (0.05), Mn ppm (5), Mo ppm (0.05), Na pct (0.01), Nb ppm (0.05), Ni ppm (0.05), P ppm (10), Pb ppm (0.2), Rb ppm (0.1), Re ppm (0.001), S pct (0.01), Sb ppm (0.05), Sc ppm (0.1), Se ppm (0.2), Sn ppm (0.2), Sr ppm (0.2), Ta ppm (0.01), Te ppm (0.01), Th ppm (0.2), Ti pct (0.02), U ppm (0.05), V ppm (1), W ppm (0.05), Zn ppm (2), Zr ppm (0.5). ME-OG46 Ore grade elements – Aqua Regia ICP AES Cu-OG46 Ore grade Cu, Aqua Regia Pb- OG46 Ore grade Pb, Aqua Regia

For QA/QC apart from lab standards inserted for internal monitoring, certified standards were inserted as every 10<sup>th</sup> sample. Analyses values of this standard were within an acceptable range.

# Coppermine Creek (copper-cobalt-silver)

Two holes were drilled at Coppermine Creek, CCD09 and CCD10, and both intersected visible copper mineralisation over significant widths. Drilling of CCD09 and CCD10 was conducted from the 11th August to the 22<sup>nd</sup> August 2017. CCD09 was drilled HQ3 to 35.4m and then NQ2 to the end of the hole at 252.5m. CCD10 was drilled HQ3 to 20.4m and then NQ2 to the end of the hole at 300.6m.

The drilling target was for a major deposit of 50Mt of >3%Cu (+Co, Ag). It is considered that the thickness and continuity of the copper mineralised intersections obtained to date still strongly indicate the potential for a major deposit in the area south (and possibly north of) of the Coppermine Creek Fault, within gently dipping underlying Amelia Dolomite, and at relatively shallow depths (<400m). This is supported by the widespread brecciation, intense fracturing, dolomitisation and quartz – dolomite veining, with associated copper mineralisation, that is mapped at surface and intersected by drilling.

The copper-cobalt-silver mineralisation at Coppermine is essentially stratabound, spatially associated with an evaporite horizon which is a dolomitised and quartz-dolomite veined bed of ex-gypsum crystals that is folded and brought to surface outcrop by the east-west Coppermine Creek thrust fault.

CCD09 and CCD10 were designed to step back south from the previous drilling concentrated around the Coppermine Creek Fault and to test this broader zone.



copper mineralisation from 123m depth. The hole was drilled 1.4km south of the Coppermine Creek Fault and confirms Pacifico's mineralisation model, developed from previous exploration drilling and ground EM survey conductivity profiles, that the copper mineralisation is stratabound, gently dipping and that there are large areas where the depths of this layer are at only 100m to 250m depth.

CCD10 intersected a broad zone of approximately 48m of visible copper mineralisation from 170m.

The following intervals of half-core were selected for analyses:

- CCD09 53m to 63m, and 121m to 138m
- CCD10 174m to 242mThe intervals selected to be sampled were based on observations of mineralization and the pXRF readings. Sample length was 1m of sawhalved core.

		0.1%0	Cu cut off		
<u>Hole</u>	From	То	Length	%	
<u>No</u>	(m)	(m)	(m)	Cu	
CCD09	55	58	3	0.4	Includes 1m @ 0.7% Cu from 55m
	132	135	3	0.2	
CCD10	174	192	18	0.2	Includes 2m @ 0.4% Cu from 190m
	237	240	3	0.2	

# Table 1: Summary of diamond drill analyses at Coppermine Creek

While visible copper mineralisation is widespread the actual concentrations intersected to date are low. All the copper mineralisation is hosted by the Amelia Dolomite which consists typically of finely bedded dolomite with carbonaceous laminae. It is concentrated within the evaporite rich (now dolomitised) part of the sequence, consisting of ex-anhydrite nodules and masses of ex-gypsum crystals, now dolomitised, and often with zones of abundant carbonaceous laminae or crenulated carbonaceous algal mats. The copper mineralisation is present as chalcopyrite and minor bornite which forms disseminations, blebs and lenses throughout the mineralised zones.

The current drilling program has confirmed that the main control of copper mineralisation is stratigraphic, and that copper mineralisation is not confined to the area of the Coppermine Creek Fault. There is major potential in the undrilled extension towards the south and east (30km2) of the copper mineralisation for copper mineralisation at depths less than 400m. Targets for large economic concentrations of copper mineralisation could be defined adjacent to major north-south or north-westerly trending faults that run through the area.





Figure 4-7: Geology and drilling, including location of recently drilled diamond holes CCD09 and CCD10 at Coppermine Creek, also showing huge area potentially underlain by gently dipping mineralised horizon.



Figure 4-8: Section through diamond holes CCD09 and CCD10 at Coppermine Creek





Figure 4-9: Coppermine Creek Prospect – Summary log and pXRF geochemistry CCD09





Figure 4-10: Coppermine Creek Prospect – Summary log and pXRF geochemistry CCD10



# Mariner (zinc-lead-silver)

Two diamond drill holes, MND05 and MND06, were completed at the Mariner prospect. Drilling of MND05 and MND06 was conducted from the 23<sup>rd</sup> August to the 3<sup>rd</sup> September 2017, working double shifts. Drill hole collar specifications are listed in Table 2. MND05 was drilled HQ3 to 117.40m and then NQ2 to the end of the hole at 249.6m. MND06 was drilled HQ3 to 23.60m, then NQ2 to the end of the hole at 300.30m.

The target at Mariner is a McArthur style SHMS deposit within McArthur Group sediments, of >50 million tonnes with >10% Zn + Pb. Lead anomalism (up to 21m of 1% Pb in MNR01) was intersected by a previous RC drill program at the top of the McArthur Group which indicated a possible major base metal source from the underlying McArthur Group sediments in the vicinity. Significant pathfinder elements Tl, Sb, and Zn occurred in black shale of the Tooganninie Formation (McArthur Group) intersected in RC hole MNR04. Mariner is adjacent to a major regional north-south fault.

MND05 passed from Roper Group sediments, through a fault breccia zone, and into moderately fractured dolomite interpreted as being part of the Mara Formation. The fractures were often oxidised and contained limonite and cerussite (lead carbonate).

MND06 drilled through a sequence of black carbonaceous, very pyritic siltstone and dolomitic siltstone to 204m depth where the hole passed into coarse sandstone and grits. Pyrite is mostly finely disseminated in bedding parallel bands. The carbonaceous black shales in MND06 fit stratigraphically to be part of the Barney Creek Formation, lying beneath the Roper Group sediments, and above a dolomite that could be regarded as the Mara or Teena Dolomite.

Hole No	From (m)	To (m)	Length (m)	Anomalous geochemistry	
MND05	106	112	6	502ppm Pb	Thin fractures in dolomite mineralised with cerussite
MND06	190	196	6	312ppm Cu	Pyritic black shale with minor chalcopyrite veinlets

# Table 4-7: Summary of analyses of anomalous geochemistry from diamond drill holes MND05 and MND06 at Coppermine Creek

The structural measurements (Appendices 3 and 4) were used in the construction of the sections.

The combination lead mineralisation in the Mara Dolomite of MND05, and the Barney Creek Formation carbonaceous pyritic shale host rock in MND06 are strong indications of potential for significant zinc mineralisation in the Mariner prospect area.

BHP Exploration Ltd previously had the similar concept of Barney Creek Formation concealed by the Roper Group and drilled diamond holes at Mariner North - McA06, and beneath the Roper Group north of Coppermine Creek – McA15. Both drill holes were abandoned and did not get through the Roper Formation.



The Barney Creek Formation is host to the world class McArthur River zinc-lead deposit and therefore of potential for the discovery of further zinc-lead deposits. It has never been previously recognised or mapped in the Mariner prospect area. A growth fault is indicated by the coarse sandstone unit which is only developed on the western side of the fault intersected in MND05 (figures 9 and 10). Also the observed lead mineralisation in MND05, supported by the geochemistry in Table 2, supports the prospectivity of this Barney Creek Formation sub-basin, that could extend to the north of the Mariner Prospect beneath the younger Roper Formation.

Recent geological mapping and portable X-Ray Fluorescence instrument reconnaissance has identified anomalous lead and zinc rock chip geochemistry (values to 0.21% Pb and 510ppm Zn) 2km north of the previous diamond drilling, confirming the prospectivity of the sub-basin of Barney Creek Formation, that extends north beneath Roper Group sediments (figure 1).



Drilling in the area of BHP's abandoned McA06 is planned for 2018.

Figure 4-11: Mariner Prospect –interpreted geological plan showing diamond hole collars MND05 and MND06





Figure 4-12: Section through diamond hole MND05 at Mariner, BCF = Barney Creek Formation



Figure 4-13: Section through diamond hole MND06 at Mariner, BCF = Barney Creek Formation



Log for MND05



Figure 4-14: Mariner Prospect – Summary log and pXRF geochemistry MND05



Log for MND06



Figure 4-15: Mariner Prospect – Summary log and pXRF geochemistry MND06



# Berjaya (zinc-lead-silver)

Access to the Berjaya tenement is gained via the Carpentaria Hwy from a station track leading off to the west from near the McArthur River Mine. The Berjaya prospect area lies within EL28508 (figure 1), on the McArthur River station which is owned by Glencore. Access tracks were cleared previously in 2016 by Pacifico for a 3 hole RC program, and only limited additional access track clearing was required for the 2017 diamond drill hole BJD04.

Berjaya lies in McArthur River Station and is covered by granted Native Title DCD2015/008 registered Native Title dated 26/11/2015. It is divided into 11 estates.

As a result of an Authority Certificate, applied for by MIM in 1993, a Restricted Works Area was put over Berjaya. The condition on the Restricted Works Area is that we must consult with the TO before undertaking any significant work. There is a consensus that Ronnie Raggett speaks for that area. A site inspection was made with Nelson Raggett, son of Ronnie Raggett. David Pascoe was the Pacifico representative. Nelson Raggett agreed that the access tracks and drill site to be cleared did not interfere with any site of cultural significance.

An access agreement was made with the land owner Glencore with an understanding that Pacifico will rehabilitate all access roads and drill sites according to the provisions of the MMP. Discussions were held with the station manager David Daniells who advised on access and indicated that the proposed drill program would not interfere with property activities.

The Berjaya Prospect lies west and northwest of the world class McArthur River zinc-lead mine and Teck's zinc-lead resource at the world class Teena deposit (Figure 4). The Barney Creek Formation package within the Berjaya tenement has been intersected in previous drilling by Mount Isa Mines Ltd, and recognised in mapping and RC drilling by Pacifico. A major north-east trending possible growth fault is indicated by Pacifico's geological mapping.

In 2016 three RC holes, BJR01 to 03, were drilled for 450m (figure 2) by Pacifico. All three RC drill holes intersected shales and siltstones of the Barney Creek Formation (oxidised in BJR01 and BJR02). BRJ01 was drilled to test an area of possible thickening of the Barney Creek indicated by the outcrop pattern. The hole intersected 60m of oxidised Barney Creek Formation (low base metal geochemistry) before passing into Mara Dolomite. The Mara Dolomite was extensively brecciated with dolomite veining and disseminations of specular hematite, but contained no anomalous base metal geochemistry.

The diamond drill hole was designed to test a Versatile Time Domain Electromagnetic ("VTEM") conductive horizon, that appears to correspond to the position of the overall gently dipping Barney Creek Formation beneath the Hot Springs Formation and therefore potentially Zn-Pb mineralised. Drilling of BJD04 at Berjaya was conducted from the 4 September to the 14 September 2017. BJD04 was drilled HQ3 to 134.1m and then NQ2 to the end of the hole at 300.7m.

The hole passed through probable Cretaceous sediments with coal fragments into the Hot Springs Formation. It was Pacifico's original intention to continue the hole, at least into the underlying Barney Creek Formation to provide stratigraphic control for any future drilling program. The drilling contractors pulled the rig off the hole at this point without Pacifico's agreement. The hole however had passed through the projected VTEM conductive horizon and it is not now recommended that the hole be continued.



Figure 4-16: Berjaya Prospect – VTEM apparent resistivity section 8186000N through BJR01 and diamond hole BJD04 (planned diamond hole)



Figure 4-17: Berjaya EL28508 – Geology and location of diamond hole BJD04





Figure 4-18: Berjaya Prospect – Summary log and pXRF geochemistry BJD04



# 5. CONCLUSIONS AND RECOMMENDATIONS

It is regarded that the potential remains high at both Coppermine Creek and Mariner. Now that the stratigraphy defined better by the diamond drilling, there is a considerable area that can be meaningfully geologically mapped at surface, both stratigraphically and structurally. This information, together with rock chip geochemistry, should result in the development of RC and diamond drill targets.

# Coppermine Creek -

- surface mapping over the prospective area of 30km2, identify structure and geochem that may lead to targets where ore grade thicknesses and grades of copper may be developed.

#### Mariner –

 surface mapping to define the potential area underlain by Barney Creek Formation pyritic black shales intersected in MND06. The Barney Creek Formation may lie beneath the Roper Group sediments which are semi-conformable and of which surface measurements should give an indication of structure and thickness.

For both prospects we are currently evaluating several methods, including pyrite and hydrocarbons as vectors to ore grade mineralisation. The existing geophysics will be reviewed to better understand the role of structure in controlling mineralisation and sediment thickness e.g. growth faults that may have led to thickening of key stratigraphic traps and been a focus for mineralising fluids.

# Berjaya -

The diamond drill hole BJD04 has passed through the projected VTEM conductive horizon and as it is uncertain now at what depth the Barney Creek Formation will be intersected, it is not recommended that the hole be continued.

# Lorella-

An aircore program (2000m) is planned for November to test the strike extensions to the NW and SSE of previously intersected oxide copper mineralisation, and also for indications of significant down-dip primary sulphide mineralisation. Holes will be drilled on lines 1km apart, with a hole spacing along the lines of 100m, to an average depth of 50m.

If this preliminary program is successful, the entire strike length will then be explored with aircore drilling. RC drilling programs, some PQ diamond drill holes, and more comprehensive testwork on the drill chips and core would then be planned to define inferred and indicated resources.





Figure 5-1: Areas of estimated oxide copper mineralisation, 0.1, 0.25 and 0.4% Cu cut-offs, Lorella

#### 6.0 **REFERENCES**

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