

# HIGHLIGHTS

## EXPLORATION ACTIVITIES REPORT QUARTER ENDED 31 DECEMBER 2016

### HIGHLIGHTS

- \* **Cyclone Project environmental approval receives Ministerial consent**
- \* **Cape Bedford Project Compensation and Conduct Agreement negotiations finalised**
- \* **Preliminary metallurgical testwork shows Cape Bedford dune material highly amenable to standard mineral sands process methodologies and equipment**

### CYCLONE ZIRCON PROJECT (WA)

Currently the largest undeveloped zircon project in the Eucla Basin, the Cyclone Zircon Project continued to advance towards development in the December quarter. The project environment approval has cleared the appeals process with no significant change in conditions and was awaiting final ministerial consent at quarter end. A Ministerial Statement giving consent for the project was issued on 9 January 2017, delivering a key project milestone for Cyclone which completes an extensive identified key risk mitigation and permitting/regulatory approval process.

Diatreme is now able to advance discussions with potential project partners, funders and product offtakers for direct project participation so the final aspects of the DFS can be funded and completed in a timely fashion to capitalise on the upturn in mineral sands prices and forecast constrained supply and progress development of the project.

### CAPE BEDFORD SILICA/HEAVY MINERALS PROJECT (QLD)

A Compensation and Conduct Agreement with the traditional owners, Hopevale Congress, to facilitate land access and exploration activity has been negotiated and execution of documents is awaited. Diatreme has identified high potential targets within the EPM for silica sands and once agreements are signed and weather conditions are suitable a targeted exploration program will commence.

Preliminary metallurgical testwork on a 90kg sample of dune material immediately south of Elim Beach reported highly encouraging processing characteristics and readily produced a range of saleable HM concentrates with acceptable grades and recoveries.

Diatreme Resources Limited is an Australian based diversified mineral explorer with significant projects in WA and QLD.

Key Projects:

- Cyclone Zircon Project
- Tick Hill Gold Project
- Cape Bedford Silica/HMS Project
- Clermont Copper Project

The Company seeks to develop the Cyclone Zircon Deposit in WA, through a joint venture arrangement, and conducts exploration over several project areas prospective for heavy mineral sands, silica sand, gold and copper.

The Board and senior personnel exhibit wide experience, ranging through the exploration, development and financing phases of resource project management.

Australian Securities Exchange  
Codes: DRX

Board of Directors - Non-executive:  
William Wang - Chairman  
Andrew Tsang  
Daniel Zhuang

Executive:  
Neil McIntyre – Chief Executive  
Tuan Do – CFO & Co. Secretary  
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### CYCLONE ZIRCON PROJECT (WA)

Currently the largest undeveloped zircon project in the Eucla Basin, the Cyclone Zircon Project continued to advance towards development in the December quarter. The project now awaits final ministerial consent as part of a de-risking process which is nearing completion, pending the award of the necessary environmental approvals.

During 2016 DRX engaged Sedgman Limited, a leading provider of mineral processing and associated infrastructure solutions to the mineral sands industry, to undertake a Project Enhancement and Update Study. Sedgman reviewed work undertaken for the PFS and subsequent studies and provided an updated assessment of the process plant, some infrastructure and shipping costs and assumptions at a technical and commercial level.

This has provided Diatreme with a greater understanding of the project's potential commercial returns while current industry and market conditions provide an opportunity for cost savings on key capital and operating expenditures, compared to the Prefeasibility Study. The joint study has confirmed the viability of the Cyclone Project and provides DRX with an independent consultant's financial analysis which shows improvements to the project economics.

An update to the Probable Ore Reserve was completed as part of the Project Enhancement and Update Study, with a Probable Ore Reserve estimate for the Cyclone Project now reported as 138 Mt at 2.6% HM, including 0.72% Zircon, containing 3.5 Mt of HM, including 1 Mt of Zircon (ASX Announcement 15 June 2016). The revised estimate primarily relates to the adoption of a revised mining schedule which reduces the amount of lower grade "Nearshore" mineralisation (and associated interburden) mined from the deeper parts of the mine path and omits some lower grade "Beach" mineralisation on the western batter of the mine path in the first three years of operation.

The Ore Reserve estimate is based on the Cyclone Mineral Resource estimate (refer ASX announcement 9 April 2015). The Cyclone Mineral Resource comprises 211 Mt at an average grade of 2.3% HM. The Probable Ore Reserve has been estimated at 138 Mt at an average grade of 2.6% HM, representing a 75% conversion rate for contained HM tonnes. The pit design includes 83 Mbcm of overburden with a strip ratio of 1:1. The strip ratio is considerably lower in the early years of the mine operation.

### Environmental Approval

The EPA released recommended approval terms and conditions (positive) for the grant of the Lost Sands "Cyclone Project" environmental approvals to the WA Environment Minister in early August 2016. The Minister's final approval process involves a further public comment period of two weeks, which closed in late August 2016. During this period two appeals were received. The response to those appeals is being managed and examined for merit or dismissal within the Minister's office independently by the "Office of the Appeals Convenor" (OAC).

Lost Sands as part of the process with the OAC drafted submissions specifically responding to the matters raised within the two appeals. This was straightforward as these matters had been raised previously and dealt with within the original EPA public comment period. Feedback received from the OAC has been very positive and the appeals were subsequently upheld with a slight variation in one of the environmental conditions attached to the proposed recommendation for approval. The OAC's final report was subsequently forwarded to the Minister for his final approval late in 2016.

Final ministerial consent (approval) was received on 9 January 2017 as Ministerial Statement No:1052, which allows the Cyclone Project to; *"Develop and operate the Cyclone Mineral Sands Mine, including open cut pits, mining and processing infrastructure, airstrip, accommodation camp, bore fields and haul road construction from the mine site to the Forrest rail siding."*

The ministerial approval is an important step in a project de-risking process undertaken by Diatreme, which has included securing an agreement with the traditional owners, the identification of suitable water supplies and the expansion of the project's forecast mining life following the acquisition of the adjacent Cyclone Extended tenement area.

## QUARTERLY REPORT

### CAPE BEDFORD SILICA/HMS PROJECT (QLD)

The Cape Bedford EPM17795 is located approximately 200km north of Cairns in North Queensland, and covers the extent of a large Quaternary sand dune field, part of which is currently being mined by Cape Flattery Silica Mines Pty Ltd (CFSM), a wholly owned subsidiary of Mitsubishi Corporation. Cape Flattery has operated since 1967 and is the world's largest silica sand mining operation.

The Cape Bedford / Cape Flattery region of north Queensland is dominated by an extensive Quaternary sand mass and dune field that stretches inland from the present coast for approximately 10km and extends 50km from north to south (see figure below).

Previous exploration has focussed on the Cape Flattery area, within the Mining Leases of CFSM, but reconnaissance exploration has been carried out over the entire dunefield in the late 1960's and again in the early 1980's. This exploration confirmed the presence of both silica sand and heavy mineral sands, and Diatrema intends to build on the existing data and initially target those areas (e.g. Nob Point) where prospective silica sand dunes have been identified and access is readily available.

A program of geological / geomorphological mapping, drilling and sample assaying is anticipated to quickly define silica sand resources. Bulk sample collection will allow process flowsheet development and product quality analysis, with scoping studies then undertaken.

The company has completed negotiations with the traditional owners, the Hopevale Congress to formalise a Conduct and Compensation Agreement (CCA), and awaits execution of the agreements. The CCA will allow access for ground disturbing exploration activity and ensure the traditional owners share in the potential economic benefits of this new project.

Six grab samples of silica sand (locations marked on map below) were collected during a recent reconnaissance site visit to the dunefield at Cape Bedford as part of low impact exploration activity permitted prior to a CCA being signed. All samples were submitted for HM analysis and the two samples (D1686, D1687) that displayed visible HM mineralisation subsequently returned HM assays of 3.3% HM and 1.6% HM, respectively. Together with the observation of HM slicks on some of the exposed beaches, this suggests that HM mineralisation may be present at several locations within the EPM.

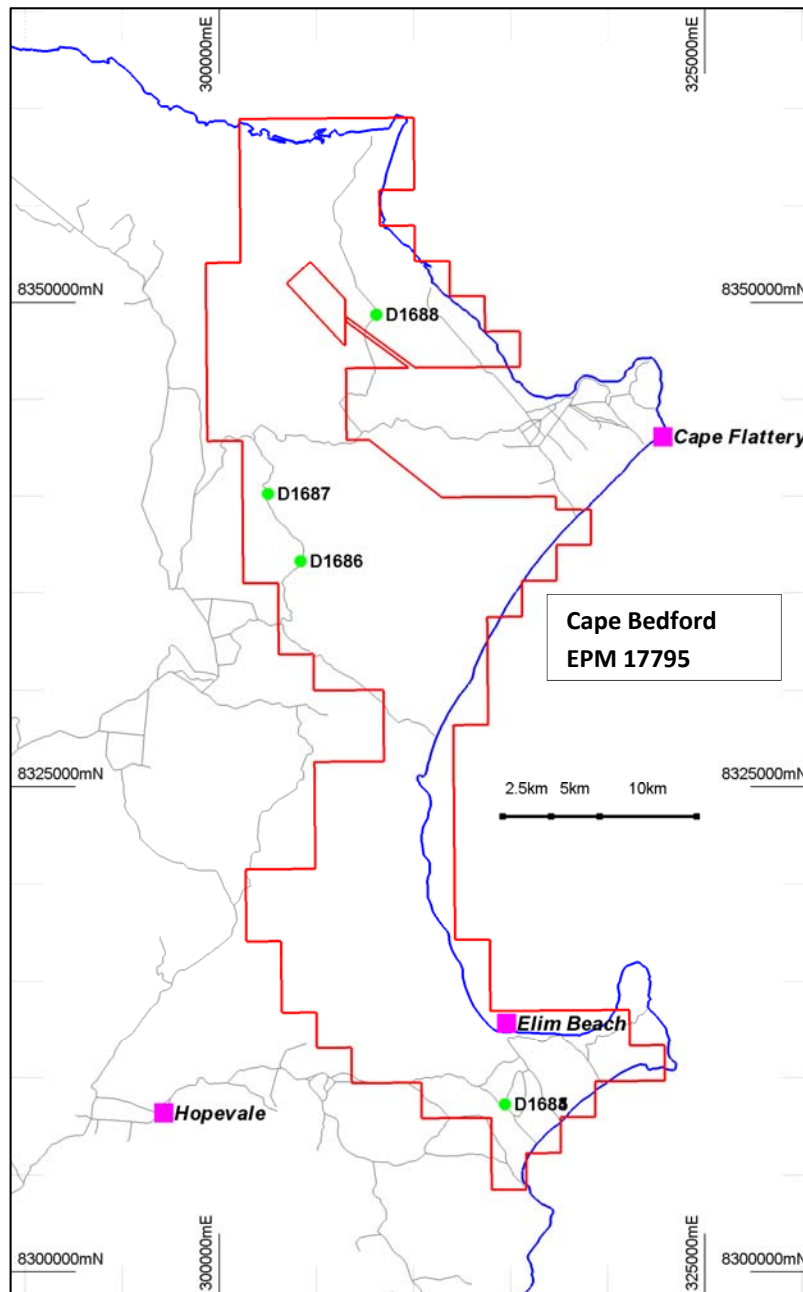
The silica "float" fraction of the reconnaissance grab samples was then submitted for XRF analysis, and all reported  $\geq 99.8\%$   $\text{SiO}_2$  with low levels of  $\text{Fe}_2\text{O}_3$  (average 0.014%) and  $\text{Al}_2\text{O}_3$  (average 0.043%). This preliminary work confirms the potential of the widespread silica sand dune material to generate high-quality silica sand.

A preliminary metallurgical test was also undertaken on a 90kg sample of dune material collected from a road cutting immediately south of the Elim Beach campsite. The sample contained low levels of slimes ( $-45\mu\text{m}$ ) and oversize ( $+1.0\text{mm}$ ), and Heavy Mineral content was determined at 2.6%. The sample processed readily and initial work indicates the sands to be amenable to the use of standard mineral sands process methodologies and equipment.

Wet tabling produced a HMC which was then processed using a simple combination of magnetic separation, further wet tabling, electrostatic separation and magnetic separation to produce a primary ilmenite product, a potential secondary ilmenite concentrate, HiTi/Rutile concentrate and zircon concentrate.

The primary ilmenite product contained 54%  $\text{TiO}_2$  and low levels of contaminants, particularly  $\text{Cr}_2\text{O}_3$  and U+Th. The other titanium concentrates display positive characteristics suggesting that chloride grade ilmenite and HiTi products could be produced with further detailed processing. The zircon concentrate returned 60% zircon with the major contaminant being silica, and importantly low levels of  $\text{Fe}_2\text{O}_3$  and U+Th. Recoveries were deemed appropriate for the level of testwork.

The testwork was not aimed at process development or product development, but is extremely encouraging and indicates that processing of the material into a HMC and final products could be achieved using conventional process equipment and possibly simple process stages.



### TICK HILL GOLD PROJECT (QLD)

The Tick Hill Gold Project comprises three granted Mining Lease No's 7094, 7096 and 7097 (totaling 390ha). The Tick Hill Gold Deposit was mined between 1991 and 1995 by Carpentaria Gold Pty Ltd (a subsidiary of MIM Holdings Limited) for the production of 513,333 ounces of gold from 705,000 tonnes of ore at a recovered grade of 22.6 g/t gold (source: MIM – Annual Reports). This makes it one of the highest grade gold deposits in Australia's recent gold producing history.

The transfer of the three ML's to Diatreme Resources was confirmed by the Department in March 2015, triggering the commencement of the DRX Farm-In and Joint Venture Agreement with Superior Resources Limited (ASX:SPQ) over the Tick Hill Gold Project. Under the Joint Venture Agreement, Superior Resources has the right to earn a 50% interest in the project by:

- Completing \$750,000 of exploration expenditure;
- Making a payment to DRX of \$100,000; and
- Lodging 50% of the Queensland Government security bond on the tenements.

Exploration and assessment of the surface material within the leases (including alluvials, tailings and waste dumps) is to be conducted as a joint operation, with each party contributing 50% of the costs.

## QUARTERLY REPORT

The Tick Hill Gold Mine operated from August 1991 through to March 1995, with commissioning of the site processing plant in December 1991. The plant comprised crushing and milling circuits delivering a product with a p80 of 70µm to a CIL circuit. Tailings were discharged into a tailings dam comprising two paddocks of a “turkeys nest” construction in which a perimeter embankment with a clay core retains tailings. Wall heights range from 6m to 10.5m. Since decommissioning the surface has been capped and both the surface and batters seeded, with good vegetation cover now present.

The total reported production for the Tick Hill Gold Mine was 705,000t at 22.6 g/t Au for 15,900kg Au at 97% gold recovery. Some high grade open pit ore was mined and transported to the Carpentaria Gold operations at Ravenswood to provide early cash flow to the project, this has been estimated at 20,000t based on the reported 19,000oz produced at Ravenswood in the 1991/1992 financial year (with head grades for that year of 30.2 g/t Au). This suggests that approximately 685,000t of tailings remain on site, with an estimated grade of around 0.7 g/t Au.

In January 2016 Diatreme announced a maiden Mineral Resource estimate for tailings material located within the rehabilitated tailings dam at Tick Hill (refer *ASX announcement 19 Jan 2016*). The Indicated Resource is estimated at 630kt at 1.08 g/t Au (at 0.5 g/t Au cut-off) containing 680kg (22,000 troy ounces) of gold.

In March 2016, Diatreme announced that a scoping study completed by an independent external consultant (Metcor) confirmed the viability of a standalone operation processing the identified tailings resource. Tick Hill has the potential for a 20-month operation processing the tailings via re-grinding and a standard CIP/CIL circuit.

Metallurgical studies were undertaken to help determine the optimal grain size required to balance leach extraction rates with energy requirements for re-grinding of the tailings. The cyanide leach testwork showed that gold extraction increases with increasingly finer grind size, but gold extraction of ~90% or higher can be achieved at grind sizes of around P<sub>80</sub> 35 µm and finer.

Ultra-fine grinding testwork utilising an Isamill™ was conducted to determine the likely energy requirements, with results reported slightly higher than parameters used in the Scoping Study, but further work is required to generate data suitable for use in feasibility studies.

A 50kg sample was processed through a Knelson concentrator during the September quarter to assess the efficiency of gravity separation on the Tick Hill tailings material. Although a gravity concentrate with free gold was produced, the overall gold recovery to concentrate was too low for gravity separation to be considered as an alternate or complementary processing method.

Additional metallurgical testwork is required to allow detailed design of a process flowsheet, determination of capital and operating costs, and development of a financial model to further assess the economic potential for mining and processing of the tailings material.

### **EUCLA BASIN HM PROJECT (WA)**

No field work was undertaken during the quarter, and a full surrender of the remaining exploration tenure E69/2408 has been lodged with the DMP following the failure to secure exemptions from exploration expenditure.

### **CLERMONT COPPER PROJECT (QLD)**

A review of the Clermont project, primarily the Rosevale Porphyry Corridor (RPC), is continuing, with development of a proposed exploration strategy. A review of the regional exploration potential has resulted in a decision to not seek renewal of EPM19189 immediately south of the RPC, and full surrender of EPM19544 immediately north of the RPC.

### **GRAYS HILL PROJECT (QLD)**

The company has identified a number of topographic features within Quaternary sediments on the coastal plain in the eastern part of EPM25117 that may represent targets for HM accumulation. An agreement with the primary landholder is required to facilitate access for reconnaissance exploration and this has not been advanced during the quarter.

## QUARTERLY REPORT

### CASH POSITION

The Company's cash position at 31 December 2016 (Appendix 5B) was \$313,000.

(Final drawdown on convertible note amount of \$500,000 was only progressively drawn to the amount of \$200,000 during the December 2016 quarter. The balance of \$300,000 is expected to be fully drawn down by early February 2017. This will bring convertible note facility total to \$3.0 million).

### APPENDIX 1

Appendix 1 provides information required under ASX listing rule 5.3.3 for mineral exploration entities.

Dated 27 January 2017

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Chief Executive

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### Competent Person Statements

The information in this report that relates to Exploration Results from the Cape Bedford Project is based on information compiled by Mr. Ian Reudavey, a Competent Person who is a Member of the Australian Institute of Geoscientists. Mr. Reudavey is a full-time employee of Diatreme Resources Limited. Mr. Reudavey has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity being undertaken to qualify as a Competent Person as defined in the 2012 Edition of the 'Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves'. Mr. Reudavey consents to the inclusion in the report of the matters based on his information in the form and context in which it appears.

The information in this report that relates to Exploration Results and Mineral Resource from the Tick Hill Gold Project is based on information compiled by Mr. Ian Reudavey, a Competent Person who is a Member of the Australian Institute of Geoscientists. Mr. Reudavey is a full time employee of Diatreme Resources Limited. Mr. Reudavey has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity being undertaken to qualify as a Competent Person as defined in the 2012 Edition of the 'Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves'. Mr. Reudavey consents to the inclusion in the report of the matters based on his information in the form and context in which it appears.

The information in this report, insofar as it relates to Mineral Resources from the Cyclone Zircon Project is based on information compiled by Mr Ian Reudavey, who is a full time employee of Diatreme Resources Limited and a Member of the Australian Institute of Geoscientists. Mr Reudavey has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity which he has undertaken to qualify as a Competent Person as defined in the 2012 Edition of 'The Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves'. Mr Reudavey consents to the inclusion in the report of the matters based on the information in the form and context in which it appears.

The information in this report, insofar as it relates to Ore Reserves from the Cyclone Zircon Project is based on information compiled by Mr Phil McMurtrie, who is a director of Tisana Pty Ltd (a consultant to Diatreme Resources Limited), and a Member of the Australasian Institute of Mining and Metallurgy. Mr McMurtrie has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity which he has undertaken to qualify as a Competent Person as defined in the 2012 Edition of 'The Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves'. Mr McMurtrie consents to the inclusion in the report of the matters based on the information in the form and context in which it appears.

APPENDIX 1

Appendix 1 provides information required under ASX listing rule 5.3.3 for mineral exploration entities.

Mining tenements held at the end of the quarter and their location

State	Tenement Name	Tenement ID	Location	Interest	Holder	Comments
WA	Wanna Lakes East	E69/2408	Eucla Basin	100%	LSPL	Granted
WA	Cyclone	M69/141	Eucla Basin	100%	LSPL	Granted
WA	Cyclone Extended	R69/1	Eucla Basin	100%	DRX	Granted
QLD	Clermont	EPM17968	Clermont	100%	CHAL	Granted
QLD	Grays Hill	EPM25117	Yeppoon	100%	DRX	Granted
QLD	Cape Bedford	EPM17795	Hopevale	100%	DRX	Granted
QLD	Tick Hill	ML7094	Duchess	100%	DRX	Granted
QLD	Tick Hill	ML7096	Duchess	100%	DRX	Granted
QLD	Tick Hill	ML7097	Duchess	100%	DRX	Granted

Mining tenements acquired and disposed of during the quarter and their location

State	Tenement Name	Tenement ID	Location	Interest	Holder	Comments
QLD	Parapet	EPM19189	Clermont	100%	CHAL	Expired
QLD	Expedition Creek	EPM19544	Clermont	100%	CHAL	Surrendered

Beneficial percentage interests held in farm-in or farm-out agreements at end of the quarter

State	Project Name	Agreement Type	Parties	Interest held at end of quarter by exploration entity	Comments
WA	Cyclone Zircon Project	Farm-out Heads of Agreement	LSPL and Perpetual Mining Holding Limited	94%	HoA announced Jan 2014, initial 6% farm-out completed 18 Sept 2014
QLD	Tick Hill Gold Project	Farm-out and Joint Venture Agreement	DRX and Superior Resources Limited	100%	Proposed JV announced Aug 2011, formal Agreement announced Jun 2013, Joint Venture commenced Jan 2015

Beneficial percentage interests in farm-in or farm-out agreements acquired or disposed of during the quarter

State	Project Name	Agreement Type	Parties	Interest held at end of quarter by exploration entity	Comments
-	-	-	-	-	-

Abbreviations:

E	Western Australia	Exploration Licence	DRX - Diatreme Resources Limited
M	Western Australia	Mining Lease	CHAL - Chalcophile Resources Pty Ltd
R	Western Australia	Retention Licence	LSPL - Lost Sands Pty Ltd
EPM	Queensland	Exploration Permit for Minerals	
ML	Queensland	Mining Lease	