



## Exploration Activities Report Quarter ended 30 September 2010

### Highlights

#### HEAVY MINERAL (HM) SANDS PROJECTS

##### Cyclone Deposit - Western Australia

- Review and upgrade of mineral resource conducted.
- Cyclone resource estimate 132.1Mt at 2.3% HM (at 1% HM cut-off grade), containing 3.1Mt HM, of which >40% is classified as a Measured Resource.
- 998,000 tonnes of contained Zircon, representing a 6.7% increase over previous estimates.

##### Zephyr Deposit - Western Australia

- Maiden inferred resource estimate of 106 Mt at 1.5% HM (at 1% HM cut-off grade), containing 1.5 Mt HM.

##### Cyclone Prefeasibility Study

- Bulk sampling to define character of “run of mine” mineral concentrates and products.
- Preliminary mine planning commenced.
- Mining reserve being developed.

##### Zircon Update

- Zircon prices now in excess of US\$1,000 per tonne.

#### CORPORATE

- MOU signed with BaoTi Group Ltd, a highly regarded Chinese end user and exporter of HM products.
- MOU signed with Image Resources NL over Cyclone and Cyclone Extended HM deposits.

Diatreme Resources is an Australian based diversified mineral explorer with significant projects in heavy mineral sands, copper, base metals and gold.

The Company owns the zircon rich Cyclone HM Deposit in Western Australia, which is situated within the emerging world class Eucla Basin heavy mineral sands province, along with extensive areas of underexplored ground prospective for heavy mineral sands.

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

Australian Securities Exchange  
Code: DRX

##### Securities

Ordinary shares:

234,864,734

Unlisted 47c options (30 June 2011):

16,800,000

Unlisted 47c options (31 July 2011):

3,000,000

##### Board of Directors

###### Executive:

Tony Fawdon - Chairman/CEO

David Hall - Operations

###### Non-executive:

Lawrence Litzow

George White

Andrew Tsang

###### Company Secretary:

Lawrence Litzow

Leni Stanley

##### Key Projects:

- Eucla Basin Heavy Minerals Project
- Clermont Copper Project
- Anabama Copper Project
- Bellfield Base Metals Project

##### Diatreme Resources Contact:

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##### Share Registry:

Link Market Services

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## Eucla Basin Mineral Sands (Zircon) Project - SA and WA (DRX 100%)

Exploration drilling has taken place within the Eucla Basin both in South Australia and Western Australia (Table 1).

**Table 1: Drilling statistics during July-Sept 2010 quarter**

State	Tenement	Start Date	End Date	No of Drillholes	Total Depth (m)
SA	3614	10/07/2010	26/07/2010	108	3105.5
WA	69/1919	13/08/2010	13/08/2010	2	79
WA	69/2222	26/08/2010	31/08/2010	10	387
WA	69/2427	15/09/2010	15/09/2010	1	18
WA	69/2428	4/09/2010	14/09/2010	14	662.5
WA	69/2429	14/08/2010	1/09/2010	45	2363
<b>TOTAL</b>				<b>180</b>	<b>6615</b>

### South Australia - Eucla Basin

Exploration drilling was undertaken over EL3614 in July 2010 with 108 holes completed for a total of 3,105 metres (Table 1). Since exploration commenced in 2006, the three SA Eucla Basin tenements (which overly the prospective Ooldea Range) have seen 886 drill holes completed totalling 40,413 metres. The exploration programs have confirmed the Ooldea Shoreline as being prospective for mineral sands, but suggest mineralisation may be restricted to local trap sites such as embayments and channels.

Interpretation of the digital elevation modelling (DEM) data continues and together with drilling proves to be a highly useful tool in helping understand the marine influences that shaped the landscape. It is these marine events that helped form and concentrate the heavy minerals within the Eucla Basin.

Given the large areal extent of the exploration licences, further exploration drilling programs are still required to adequately test the prospective zones. The nearby Iluka Resources' HM deposits to the southeast (Jacinth, Ambrosia, Tripitaka) show that broadly spaced drilling can easily miss significant heavy mineral deposits since an individual deposit may be only 3km long. Given that the Company's current line spacing is quite large (up to 35km apart), a reasonable size prospect may well remain undetected between existing traverses.

The southern area of the Ooldea Range within the tenements appears to be the most strongly mineralised area, increasing the likelihood of potentially economic mineral accumulations in this region. The DEM over the area reveals what appears to be normal faulting or slumping on the seaward side of the Ooldea Range, and this may be significant for formation of HM deposits due to the correlation between an oversteepened beach and concentration of heavy minerals.

Limestone was encountered at shallow depths along the southwestern margin of EL3615 and was not able to be penetrated by the contract drill. The limestone is interpreted as being younger than the Ooldea Sands, and may therefore overlie prospective beach sands. The limestone is likely to be thin at its landward edge. However, it proved to be quite competent and a larger drill rig than previously used is required to test this area adequately. The Company's drill rig should have the ability to drill through the limestone unit if it is not too thick.

As indicated above, the current drill hole spacing along the strike of the Ooldea Range is quite large and there remains room for mineralisation to lie within embayments between the current drill holes. Several embayments have been interpreted from the DEM that will be followed up in subsequent drilling, along with the re-drilling in limestone areas as mentioned above.



Additionally, the area where the large dune field intersects the Nullarbor Plain, in the southern part of EL3616, is considered prospective as this feature lies along the inferred strike of the Jacinth/Ambrosia deposits. Drilling will progressively continue building on the extensive knowledge already gained since exploration commenced.

### Western Australia - Eucla Basin

Diatreme currently has nine granted exploration licences in Western Australia and an additional five exploration licence applications. All licences are considered prospective for heavy mineral sand deposits.

Exploration drilling is planned and underway over the granted tenements, with the Wanna area considered the most prospective area. A total of 72 air-core drill holes were completed during the quarter for 3,510m of drilling. Drilling commenced in August over the western tenements of the Eucla Basin following on from previous drilling in 2009. The reconnaissance drilling has been successful in that a number of beaches have been discovered along the interpreted Barton shoreline system. However, due to the depth and low grade nature of these beaches their prospectivity has been downgraded.

Very little previous mineral exploration activity has been undertaken within much of the area contained in the project tenements and therefore little is known about the geology. However, the original geological model used to peg the tenements seems to be correct with beach sands and HM mineralisation discovered along the Barton Shoreline feature as modelled.

Directly to the south of the Wanna tenements are located the five tenement applications along the Ooldea Shoreline (which hosts the Jacinth/Ambrosia deposits to the southeast in SA). Although these tenements fall within a conservation park and are yet to be granted, prospectivity is considered very high due to the presence of 140km of potential multiple beach strand systems along the interpreted shoreline feature.

### Cyclone Deposit

During the first round of exploration carried out in 2007, a large heavy mineral sand resource (Cyclone) was discovered at Wanna Lakes. This resource has undergone a number of drilling programs along with regular updates of resource estimates. During the quarter, the deposit was remodelled and the resource currently stands at **132 million tonnes (Mt) at 2.3% HM at a 1% HM cut-off grade, containing 3.1Mt HM** (within Diatreme ground), of which >40% is classified as Measured (Table 2).

The majority of the Cyclone resource has been drilled to 50m drill hole spacings and drill lines are generally 250m apart with some lines spaced at 400-600m. Mineralisation within the Cyclone Deposit has resulted from beach placer and dune deposition within the Barton Sands. These sands are believed to have formed during the Eocene in a littoral environment. A number of separate episodes of deposition have occurred at Cyclone resulting in reworking and concentration of heavy minerals.

To date over 42,500 metres of drilling has been completed at Cyclone, with the mineralisation covering an area up to 5km long and up to 2km wide averaging 15 metres thick with 10 - 15 metres of weakly mineralised overburden. The deposit extends southeast across the tenement boundary with Image Resources NL, where it continues into their ground for approximately 3km. To the north the deposit lenses out, but is expected to redevelop further north along the 30km postulated shoreline within the Wanna Lakes tenement.

Slimes levels within the Cyclone Deposit system are generally very low and are not considered to pose any problem to a potential mining operation. Similarly, oversize is not considered to be a problem within the main body of mineralisation, although the overburden material displays minor induration and some zones with high levels of oversize.

**Table 2: Cyclone Resource Estimate**

Category	HM cut-off %	Material Mt	HM %	HM Mt	Slimes %	Oversize %	Percentage in HM				Zircon Kt	Rutile Kt
							Zircon %	Rutile %	HiTi %	Alt Ilm %		
MEASURED	2.0	29.5	3.4	1.02	3.7	4.4	31.4	11.9	17.7	10.2	319	121
MEASURED	1.5	40.1	3.0	1.20	4.1	4.8	31.7	12.3	17.4	10.1	381	147
MEASURED	1.0	49.7	2.7	1.32	4.5	5.3	32.2	12.7	16.8	10.0	426	169
INDICATED	2.0	30.9	3.2	0.98	3.7	5.0	32.5	13.1	17.5	12.6	319	129
INDICATED	1.5	48.8	2.6	1.29	4.0	5.5	32.3	13.0	17.8	12.9	417	168
INDICATED	1.0	72.2	2.2	1.59	4.2	6.0	32.3	12.7	18.0	12.8	513	202
INFERRED	2.0	2.2	2.4	0.05	2.9	8.4	32.7	12.8	21.5	19.5	17	7
INFERRED	1.5	6.3	2.0	0.12	3.3	9.0	33.3	11.3	22.8	21.3	41	14
INFERRED	1.0	10.2	1.7	0.17	3.6	8.9	33.6	10.9	23.0	21.4	58	19
TOTAL	2.0	62.6	3.3	2.05	3.7	4.8	32.0	12.5	17.8	11.7	655	257
TOTAL	1.5	95.1	2.7	2.61	4.0	5.5	32.1	12.6	17.9	12.3	840	329
TOTAL	1.0	132.1	2.3	3.08	4.3	5.9	32.4	12.6	17.9	12.4	998	388

**Table Notes**

- A constant SG of 1.7 has been used to derive material tonnes
- Slimes refers to material <53um
- Oversize refers to material >2mm

Exploration drilling has been carried out to the north, east and south of the Cyclone Deposit and over the Hurricane Prospect and Wanna East and Wanna South tenements (E69/2408 and E69/2425 respectively). This drilling has outlined an additional heavy mineral sands resource named Zephyr (discussed below).

**Zephyr Deposit**

A maiden resource estimate has been announced for the Zephyr HM Deposit in the Wanna East tenement (E69/2408) situated around 2km to the east of the Cyclone Deposit. Zephyr is estimated to contain **106 Mt at 1.5% HM (at a 1% HM cut-off grade)** and is classified as an Inferred Resource (Table 3). The mineralisation exhibits very low slimes (clay) and oversize contents, but has up to 30m of overburden. The mineralogy of the Zephyr heavy mineral is different from that observed at Cyclone, as expected from the contrasting geological setting, with the HM assemblage dominated by Leucoxene (HiTi) and Altered Ilmenite, with minor Zircon.

**Table 3: Zephyr Resource Estimate**

Category	HM cut-off %	Material Mt	HM %	HM Mt	Slimes %	Oversize %
INFERRED	1.0	106	1.5	1.54	3.1	2.4

**Table Notes**

- A constant SG of 1.7 has been used to derive material tonnes
- Slimes refers to material <53um
- Oversize refers to material >2mm

Mineralisation within Zephyr is relatively uniform and is believed to have formed in a relatively low energy sedimentary environment, interpreted as a gently sloping beach within a large estuary/lagoon developed behind the Cyclone barrier beach system.

The announcement of the Zephyr resource demonstrates the Company's exploration success within the general Cyclone area and indicates there is potential for satellite deposits to be located within close proximity to the Cyclone Deposit. While Cyclone remains the focus of the Company's attention, additional HM resources in the area strengthen the long term potential of the project.



Although mineralisation within Zephyr is lower in grade and relatively deep, a number of other drill intersections and interpreted accumulations of heavy minerals exist between Cyclone and Zephyr. The area remains prospective for delineation of small satellite resources that could incrementally increase the Cyclone resource base, and additional drilling is proposed.

### **Shell Lakes**

Recent drilling has highlighted that the Shell Lakes tenement (E69/1919) is deemed unprospective and therefore the tenement has been surrendered.

### **Summary**

Diatreme is continuing to carry out “green fields” exploration over unexplored areas of the Eucla Basin in WA over ground considered highly prospective (Figure 1). Additional “brown fields” drilling will also be undertaken around the Cyclone and Zephyr deposits along with the Hurricane Prospect to further define mineralisation known to occur in these areas. Considerable geological modelling has been undertaken over the Wanna area which hosts the Cyclone and Zephyr deposits and Company geologists are confident further mineralisation will be discovered in this prospective area of the Eucla Basin.

The potential for discovery of deposits of accumulations of heavy minerals within the WA sector of the Eucla Basin Project is considered to be high. The Company has already discovered two sizable deposits with a number of other discoveries of heavy minerals located. More discoveries are expected to be made with further drilling.

## **Cyclone Deposit Prefeasibility Studies**

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Prefeasibility study work to date has concentrated on a revision of the resource statement based on a review of the geology and additional analysis of mineralogy and mineral products. A 500kg bulk sample has now been provided to an Australian laboratory to better define the character of any “run of mine” mineral concentrates and products that could be expected at Cyclone. Preliminary mine planning has commenced with development of a model to optimise the mining limits within the resource and minimise low grade dilution. A mining reserve is being developed as more detailed information on mine services, and capital and operating costs are established.

Conceptual pit designs for Cyclone suggest around 75% conversion of resources to reserves, with a total strip ratio around 1:1. However, the west strand displays as little as 10m of overburden in places, and this coupled with the increased thickness of mineralization in this strand brings the strip ratio to less than 0.5 over large parts of the resource. The nature of the Cyclone mineralization is favourable for bulk mining methods, as mineralization occurs in unconsolidated sands over significant widths and thickness relative to strandline deposits being mined in the southwest of WA and the Murray Basin of Victoria and NSW.

A preliminary mineral production schedule has been prepared for use in forecasting potential revenue. Zircon is estimated to provide 75% of the project’s revenue. The outlook for the revenue stream continues to improve with zircon demand outstripping supply and ongoing increases in zircon pricing. In light of the recent MOU with Image Resources NL, the impact of additional resource tonnes defined by that company in their adjoining tenement is being modelled.

Bulk samples from Cyclone are undergoing metallurgical testwork to correlate zircon and titanium mineral product recoveries using standard mineral sands separation equipment with the Qemscan mineralogy. Sample products are being produced in the laboratory to develop an understanding of the wet and dry processing requirements prior to more detailed work on the process flowsheet design. A bulk sample of higher grade mineralised overburden is being processed to evaluate the possibility of mining this material as part of the ore zone. If product recovery and quality tests are positive then samples of the lower grade areas of the mineralised overburden will also be tested for potential mineral production.

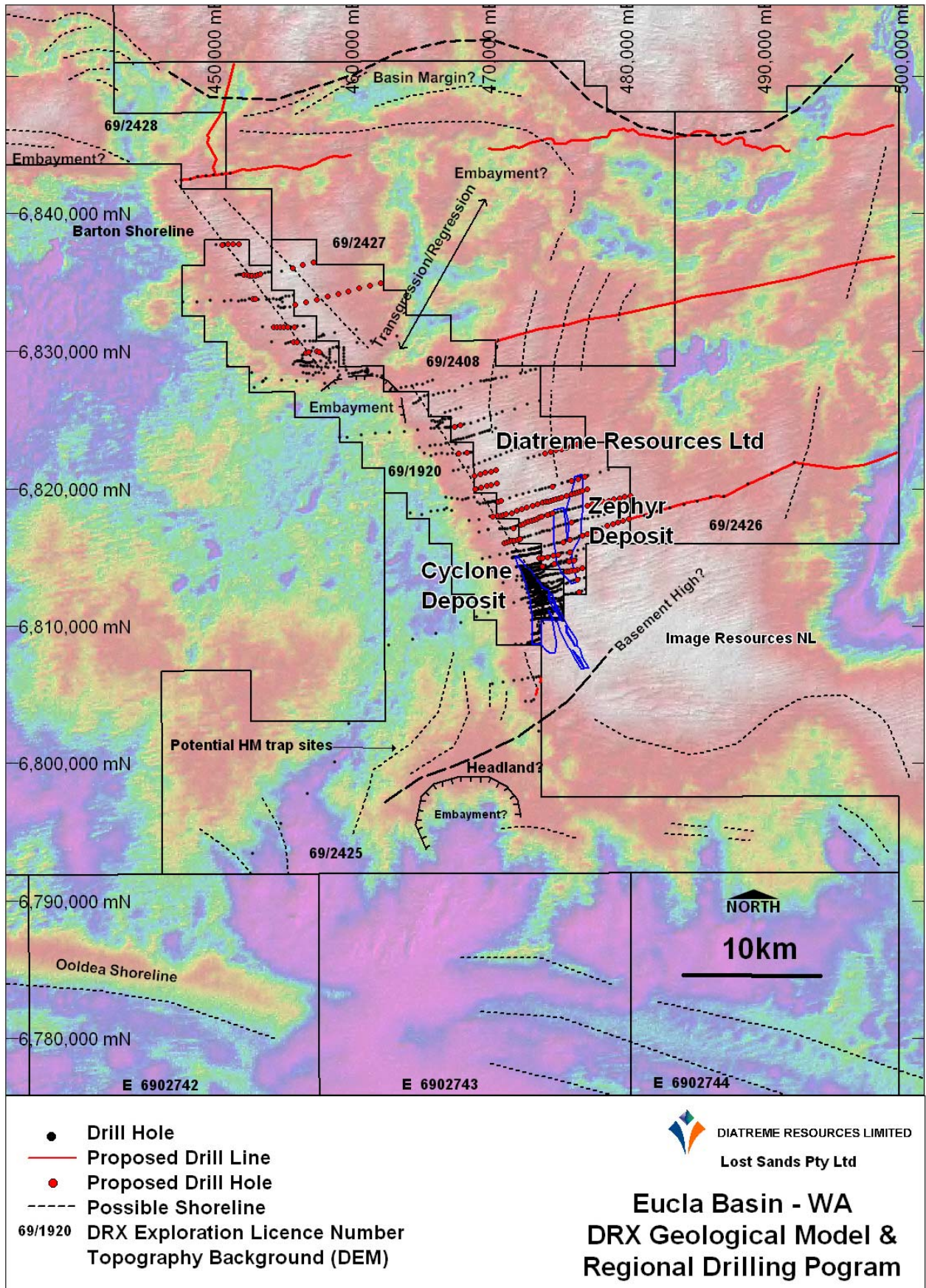


Figure 1: Location Map of Eucla Basin (WA) Regional Drilling Program



The mining method being used in the evaluation is a standard bulldozer and trap dry mining system, with a mining rate currently set at 1250tph. Other dry mining methods are being investigated for higher mining rates and lower unit costs. There is potential for inclusion of part of the low grade mineralised overburden to be incorporated into the mining plan.

The current processing strategy is to produce a heavy mineral concentrate at the mine site and transport the concentrate to a mineral separation plant ("MSP") close to a port where zircon, rutile, and other titanium mineral products would be produced for export. A combination of road and rail freight is being investigated to transport the concentrate from the mine to port options in WA and SA. There is also potential for an offshore MSP in a country seeking to secure a large portion of product offtake.

A hydrogeological study has commenced with priority on shallow paleochannel aquifer targets. Deeper aquifers in the sedimentary basin will also be considered. The study will initially define groundwater targets and develop a plan for test bores to confirm the quantity and quality of the potential water sources.

Site work currently being planned includes an overburden test pit to determine the most suitable earthmoving method for removing overburden. Flora and fauna research has commenced and a site survey will be undertaken to collect preliminary field data.

## Corporate

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### **MOU with BaoTi Group Ltd – August 2010**

The BaoTi Group, based in Shaanxi Province, central China, is the leading zircon and titanium fabrication company in China and presently dominates Chinese exports in zircon and titanium end user products, having an 80% market share. It is China's biggest production, research and development base for titanium and its alloys, with its output of titanium mill products ranked second in the world.

Under the terms of an MOU signed in August 2010, and following the completion of a due diligence process, BaoTi intends reaching agreement with Diatreme to:

1. Undertake an equity investment in Diatreme to secure a position as a substantial shareholder;
2. Jointly develop the Cyclone Project, through a joint venture in which BaoTi can earn a significant stake in the project,

subject to approvals from the central Chinese government(s) and/or the Australian Foreign Investment review Board ("FIRB").

Following agreement between the parties, the terms and conditions would be incorporated into a Heads of Agreement ("HOA"), including earn-in provisions, management of the joint venture, the location of an MSP and any product offtake entitlements.

Diatreme and BaoTi have agreed to negotiate and seek to sign a HOA within three (3) months of the MOU. Once a HOA has been signed, a Joint Venture Management Committee would be established. However, if the conditions of the MOU are not met within 100 days from the date of the MOU, then Diatreme and/or BaoTi have the option of terminating or renegotiating renewal of the MOU.

### **MOU with Image Resources NL – September 2010**

During the quarter, Diatreme and Image Resources NL (ASX:IMA) signed an MOU in respect of the "Cyclone" and "Cyclone Extended" heavy mineral deposits located in Western Australia ("the Assets").



Both companies have indicated their agreement to cooperate with each other with the aim of entering into a joint venture agreement, or similar arrangement, in respect of the two deposits which are contiguous over a common mineral tenement boundary.

The purpose of the transaction is to initially advance the Assets to feasibility, and if warranted, to production with the aim of adding substantial value for both Diatreme and Image. Such cooperation may include collective negotiations with third parties who may wish to enter into an agreement or arrangement to invest in or to purchase the Assets.

**Dated 27 October 2010**

**Anthony J Fawdon**  
Executive Chairman/CEO

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**Competent Person Statement**

The information in this report, insofar as it relates to Exploration Results and Mineral Resources is based on information compiled by company personnel under the supervision Mr David Jelley, of David Jelley Pty Ltd, who is a Member of the Australasian Institute of Mining and Metallurgy. Mr Jelley 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 2004 Edition of the 'Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves'. Mr Jelley consents to the inclusion in the report of the matters based on the information in the form and context in which it appears.