30 April 2019

ASX Code:
SFX

Directors:

Mr Will Burbury
Non-Executive Chairman

Mr Bruce McFadzean
Managing Director

Mr Bruce McQuitty
Non-Executive Director

Mr David Archer
Technical Director

Registered Office:

Level 2, 41-47 Colin Street
West Perth WA 6005

Share Registry:

Link Market Services
Level 12, QV1 Building
250 St Georges Terrace
Perth WA 6000

Capital Structure:

Ordinary Shares:	260.5M
Unlisted Options:	10.5M
Unlisted Rights:	9.3M

Market Capitalisation:
A$140 million

Cash Reserves:
A$5.8 million
(as at 31 March 2019)

Investor Relations:

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QUARTERLY ACTIVITIES REPORT FOR THE PERIOD ENDED 31 MARCH 2019

HIGHLIGHTS

Thunderbird Mineral Sands Project

- Execution of LNG gas supply agreement
- Woodside LNG truck loading facility opens with Sheffield as foundation customer
- Mining Proposal, Mine Closure Plan and Stage 1B Works Approval expected to be approved in Q2 2019

Exploration

- Maiden Night Train Inferred Mineral Resource announced
  - 130Mt @ 3.3% HM, containing 3.6Mt of VHM at a 1.2% HM cut-off, which includes 50Mt @ 5.9% HM, containing 2.6Mt of VHM at a 2.0% HM cut-off
  - High grade component contains in-situ grades of 0.82% zircon, 0.33% HiTi leucoxene and rutile, 2.9% leucoxene, 1.06% ilmenite comprising a total of 87% VHM; see ASX announcement dated 31 January 2019 for further details
- Outstanding mineral assemblage results from the Dampier 2018 aircore program
  - Confirms high-value zircon-rich mineral assemblage is widespread in the region around Thunderbird
  - New prospects characterised by coarser grained zircon, high VHM and high leucoxene contents
- Mineralisation now outlined along a 160km prospective horizon
- Multiple broad stacked mineralised horizons represent exciting new targets
- New discoveries emphasise strategic value of Sheffield's tenements at the Dampier Project

Corporate Activities

- Appointment of UBS AG to facilitate the third party strategic partner process to advance the development of the Thunderbird Mineral Sands Project

OPERATIONAL AND EXPLORATION SUMMARY

During the quarter, Sheffield Resources Limited ("Sheffield" or "the Company") progressed its fully permitted and construction ready, world class Thunderbird Mineral Sands Project (Thunderbird or Project) toward being fully funded with the appointment of UBS AG, Australia Branch (UBS), a leading global investment bank, to act as corporate adviser to the Company. UBS is assisting the Company in considering third party strategic partner interest for the funding and development of the Thunderbird Mineral Sands Project.

During the quarter, the Company secured a 15-year agreement with Woodside Energy Limited (Woodside) and Energy Developments Pty Ltd (EDL) for the supply and delivery of 1,950 terajoules per annum of liquified natural gas (LNG) to the Thunderbird Mineral Sands Project.

LNG will be supplied from Woodside's Pluto LNG Truck Loading Facility near Karratha in Western Australia and transported to Thunderbird's LNG storage facility by a newly formed joint venture between Woodside and EDL. The joint venture will own and operate a purpose-built road tanker fleet to safely and reliably deliver the LNG to Thunderbird, as is customary with gas logistic arrangements for the towns of Broome and Derby and for communities in the Kimberley. The advantage of using LNG at Thunderbird is three-fold, providing Sheffield with a low cost, low emission fuel source that is also ideally suited to the ilmenite low temperature roast (LTR) process proposed for the Thunderbird processing plant.

Subsequent to the end of the quarter, the LNG Truck Loading Facility was opened by the Premier of Western Australia Mr Mark McGowan, where Sheffield was acknowledged as its foundation customer consuming approximately 24% of the initial facility capacity.

Figure 1: Premier Mr Mark McGowan with Sheffield Managing Director Mr Bruce McFadzean at the LNG Truck Loading Facility opening.

Figure 2: Launch of the LNG Truck Loading Facility, with the Premier, Sheffield, Woodside and EDL.

The Company held the first Implementation Committee meeting with representatives of the Traditional Owners after the signing of the Thunderbird Project Co-existence Agreement during the previous quarter. The Implementation Committee is the key forum where the Company and Traditional Owners representatives meet to ensure the benefits around sustainable employment and business outcomes and protections of Aboriginal heritage and the environment, agreed in the Co-existence Agreement are delivered.

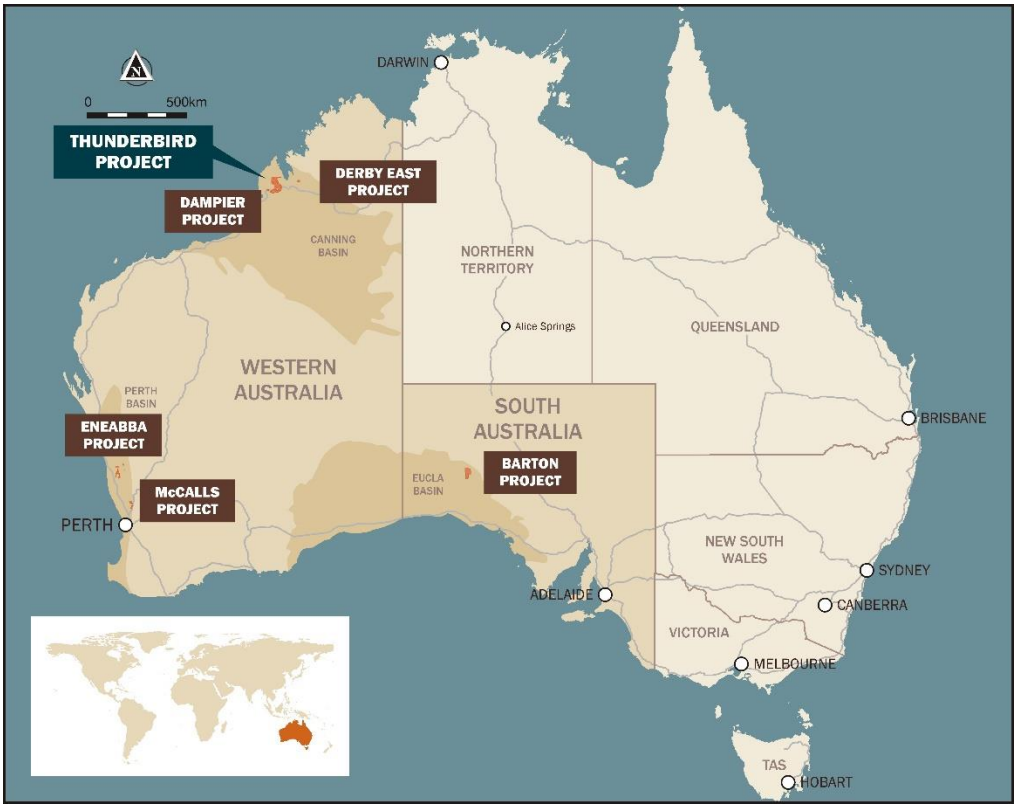

Figure 3: Location of Sheffield Mineral Sands Projects

Work on locking down key infrastructure to minimise damage during the wet season was completed early in the quarter, along with final demobilisation of non-core hired infrastructure and local Kimberley businesses associated with Early Works activities. The Company retained a small team of local and

Aboriginal employees to perform care and maintenance activities over the wet season. These activities included regular inspections of key infrastructure and continuing minor works around the Thunderbird accommodation village.

Figure 4: (above) Construction Ready Thunderbird accommodation village

Thunderbird has experienced lower than expected weather events during the wet season with approximately 327mm of rain recorded for the quarter. The accommodation village, communications equipment and the site access road remain in excellent condition and ready to support the start of construction activities upon the completion of the strategic partner process. Community engagement continued during the quarter in Derby, Broome and on the Dampier Peninsula, including the Resources Industry presentation with the Broome Chamber of Commerce (BCCI) (Figure 5).

Figure 5: (left) Thunderbird Care and Maintenance works around accommodation village and inspections of key infrastructure. (right) Resources Industry presentation with the Broome CCI

During Q1 2019, the zircon market price was preserved by major producers, although some smaller producers started to reduce pricing to maintain market share and to ensure continued cash flow. The expectation remains that the zircon market will be under some minor price pressure in the short term however, the mid to long term view is unchanged with consensus supporting significant supply deficit expected in the foreseeable future. TiO_2 feedstock markets have seen improvement in recent months due to the end of de-stocking by many of the pigment groups. With this new position and the pending northern hemisphere summer the expectation is for a buoyant period during the remainder of 2019.

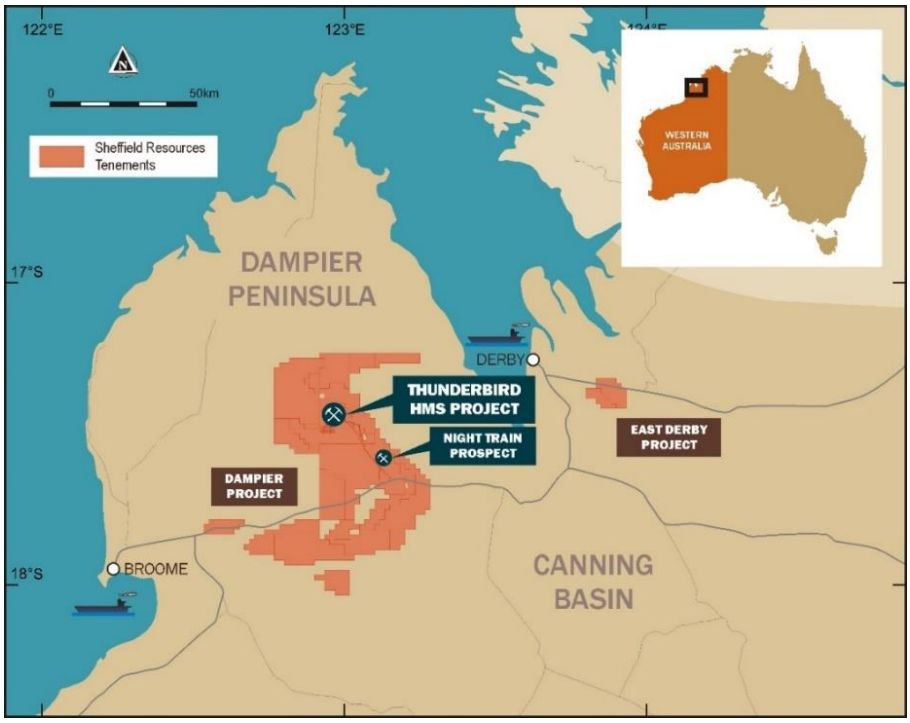

Figure 6: Location of Thunderbird Mineral Sands Project

During the quarter Sheffield announced a maiden Inferred Mineral Resource of 130 million tonnes (Mt) @ 3.3% heavy mineral (HM), above a 1.2% HM cut-off at its 100% owned Night Train mineral sands deposit, on the Dampier Project near Derby in northern Western Australia (refer to ASX announcement dated 31 January 2019). This includes a high-grade component above a 2.0% HM cut-off, of 50Mt @ 5.9% HM. This high-grade component of the Inferred Mineral Resource contains significant in-situ grades of 0.82% zircon, 0.33% HiTi leucoxene and rutile, 2.9% leucoxene, 1.06% ilmenite for a total of 5.11% valuable heavy mineral (VHM) (Table 1). Night Train is located just 20km south of the world class Thunderbird Mineral Sands deposit and 2km from the recently constructed Thunderbird mine access road.

In addition, a large Exploration Target of between 80Mt to 100Mt at 3.0% to 4.0% HM has been estimated at Night Train for the region along strike to the north and south, as well as down-dip to the west of the Inferred Mineral Resource boundaries. Exploration Targets are conceptual in nature, as there has been insufficient exploration to estimate a Mineral Resource and it is uncertain if further exploration will result in the estimation of a Mineral Resource.

Regional mineral assemblage results from the 2018 aircore drilling program at the Dampier Project have shown that the zircon-rich mineral assemblage typical of the Thunderbird and Night Train deposits, are widespread throughout the district and have been replicated at all targets drilled along the 160km long target horizon (Figure 7, Table 2). The mineral assemblage results also exhibit variability in VHM content, grain size, titanium minerals and mineralisation style.

Key outcomes and observations from the mineral assemblage data include:

- Identification of multiple new high-value, zircon-rich mineral assemblage targets
- Delineation of coarser grained regions with potential for higher zircon quality (ie Night Train to Nomad, Cisco Upper and Concorde to Buckfast regions)
- Identification of domains where different TiO_2 minerals dominate (ie ilmenite at Thunderbird, Leucoxene at Night Train and Cisco Upper and altered ilmenite at Concorde to Buckfast regions)
- Variations in thickness of the mineralised horizons (ie exceptionally thick intervals at Thunderbird, thick intervals at Buckfast, moderate thicknesses at Bohemia and narrow thicknesses at Nomad)

- Variations in the valuable heavy mineral (VHM) grade of the HM and its relationship to iron oxide grade of the HM
- Outlining priority one targets at Night Train, Buckfast, Bohemia, Concorde, Nomad Upper and Cisco Upper
- Outlining priority two targets at Night Train South East and Porphyry Pearl

The regional mineral assemblage results follow on from those associated within the maiden Night Train Inferred Resource estimation (refer to ASX 31 January 2019) and includes the new prospects of Buckfast, Bohemia, Cisco, Cold Duck, Concorde, Porphyry Pearl and the previously drilled prospect of Nomad (refer to ASX 17 October 2018, and ASX 13 November 2018). These results identify multiple new high-value, zircon-rich mineral assemblage targets and have delineated coarser grained regions with potential for higher zircon quality (i.e. Night Train to Nomad Upper, Cisco Upper and Concord to Buckfast regions).

Sheffield has put these results into context with all existing mineral assemblage QEMSCAN™ data including that from the Thunderbird and Night Train Mineral Resources, to identify domains with similar mineralisation characteristics (Table 2, Figure 12 to Figure 15). The regional mineral assemblage results from the 2018 program confirm the discovery of multiple new zircon-rich targets exhibiting a variety of mineralisation styles, located in multiple stacked mineralised horizons.

In total five domains have been recognised based on mineral assemblage by particle classification, scale and thickness, zircon grain size (D_{50}) and stratigraphic setting. These vary from fine grained, zircon and ilmenite dominant mineral assemblage with high iron oxide content (i.e. Thunderbird), to mineralisation with very high VHM content which is rich in leucoxene and zircon and with a coarse zircon D_{50} grain size (i.e. Night Train). Mineralisation is of variable average thickness (applying HM 1% cut-off) from exceptionally thick broad sheet-like to lobate deposits at Thunderbird (47m)[1] and Buckfast (42m) to moderate thickness at Bohemia (29m) and narrow thicknesses at Nomad upper (4m)[2].

Metallurgical test-work at the Dampier Project (including historic test-work by Rio Tinto Exploration Pty Ltd (RTE) at Argo)[3] has shown that premium ceramic grade zircon can be produced at all deposits tested to date including Thunderbird, Night Train[4] and Argo. As observed in other mineral sands provinces, certain key impurities levels (ie U and Th) reduce as the zircon grain size increases.

The mineral assemblage testwork results highlight Night Train, Buckfast, Bohemia, Concorde, Nomad Upper and Cisco Upper as priority targets containing high VHM in the assemblage, high zircon in the assemblage, good mineralisation thicknesses and exhibit a coarser zircon grain size. A correlation between an increase in D^{Zr}_{50} grainsize and VHM content also exists and potentially relates to deposition in a more turbulent, high energy and shallower setting.

[1] Based on Thunderbird Measured, Indicated and Inferred Resource (Refer to ASX 5 July 2016) calculated from block model at HM 1% cut-off
[2] Based on average length of drilled intersect at HM 1% cut-off
[3] Muggeridge G. D. (2008) Combined Annual Report (C96/2003 Mt Jowlaenga) for the Period 21 July 2007 to 20 July 2008 E04/1373 Jowlaenga 1, E04/1375 Jowlaenga 3, E04/1376 Jowlaenga 4 and E04/1378 Jowlaenga 6 Western Canning Basin West Australia. Rio Tinto Exploration Pty Ltd statutory annual report to the Department of Mines, Infrastructure and Regulatory Safety (a79432) Appendix 4 – Yaxley and Germain (2007) Metallurgical Investigation of Zircon Quality in a 420kg Composite Drill Hole Sample Using Conventional Processing Methods. Downer EDI Mining Report MS. 07/81633/1 for Rio Tinto Exploration Pty Ltd; 18 October 2007
[4] Metallurgy at Thunderbird refer to ASX release 24 March 2017 and for metallurgy at Night Train refer to ASX release 14 April 2016

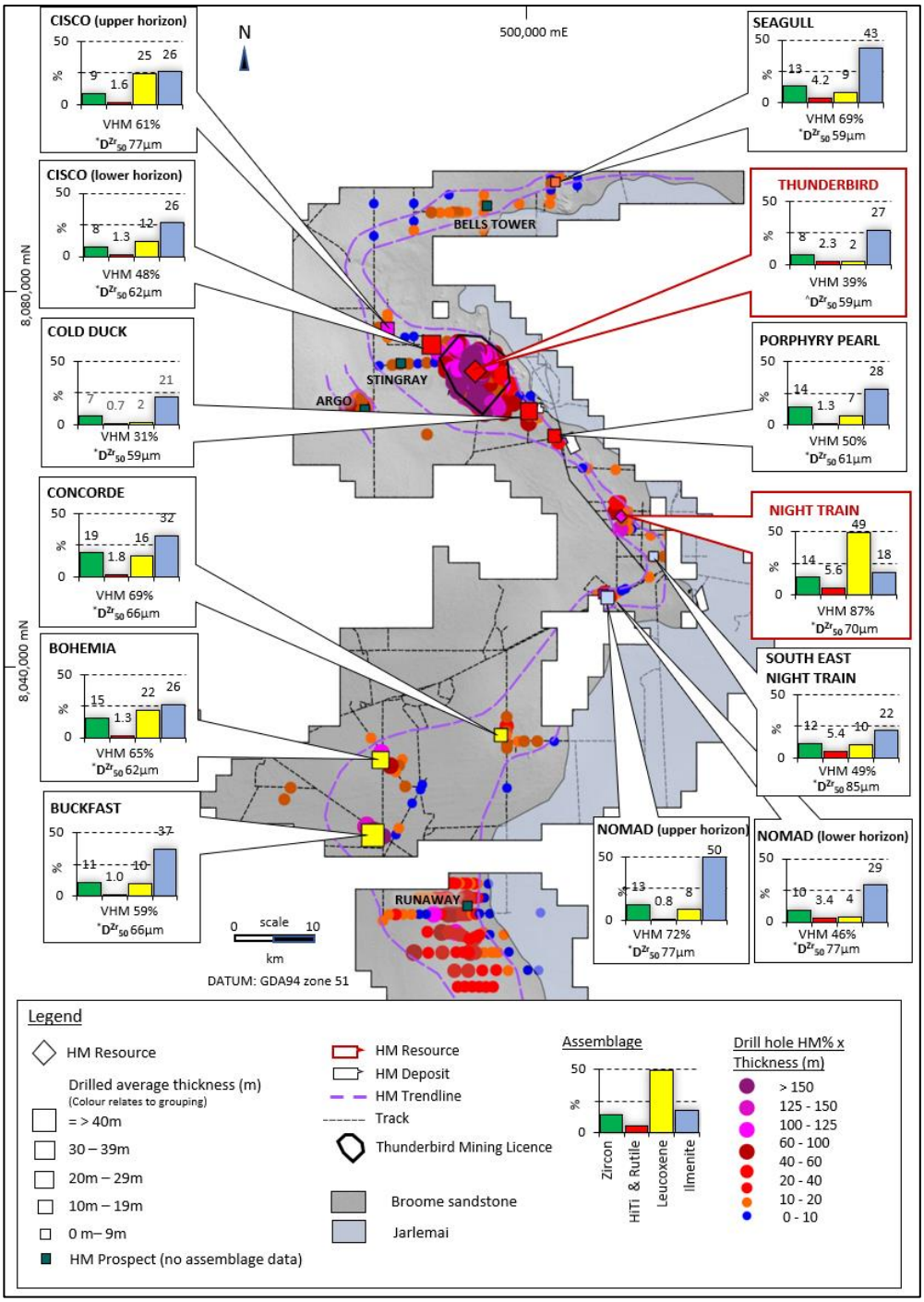

Figure 7: Regional prospect compilation assemblage [5] showing grade times thickness[6] for drill holes

The multiple new mineral sand prospects identified during the 2018 regional exploration program confirm the Canning Basin as a major new mineral sand province. Sheffield's regional exploration strategy remains focused on delineating shallow, large, high-grade, zircon-rich deposits, containing high quality zircon such as those recently discovered in 2018. The discovery of such deposits complements the

[5] Refer to Appendix 1 and Table 2, Table 3 for details of assemblage by particle classification. VHM grades have been rounded to reflect the relative uncertainty of the estimate, thus sum of columns may not equal. Night Train (Refer to ASX 31 January 2019) and Thunderbird data (Refer to ASX 5 July 2016) sourced from Resource estimations. Zircon D^{50} diameter sourced from QEMSCAN™ and is indicative of grainsize, Thunderbird zircon D_{50} grainsize screened (Refer to ASX 24 March 2017). Grouping relates to similar characteristics based on stratigraphy, particle classification, grainsize and proximity. Average prospect thickness weighted average of intersects above a 1% HM cut-off of drilled intervals, Thunderbird and Night Train determined for Mineral Resource block model calculated at 1% HM cut-off

[6] For details of grade times thickness refer to ASX release 13 November 2018 and Appendix 1. Additional information shown at the Runaway prospect sourced from Iluka open file DMIRS report Taylor and Koch, 2018 refer to Appendix 1 for details

Thunderbird Mineral Sands Project, one of the largest and highest-grade mineral sands discoveries in the last 30 years with a projected mine life of 42 years (refer to ASX 24 March 2017).

Sheffield's annual Statement of Mineral Resources and Ore Reserves will be updated during H2 2019 to incorporate the current Night Train Inferred Mineral Resource. Sheffield's total Ore Reserve estimate remains unchanged at 680.5 million tonnes @ 11.3% HM (Proved and Probable) which is contained within the Mineral Resource at the Thunderbird deposit (refer to ASX 3 October 2018).

THUNDERBIRD MINERAL SANDS PROJECT

Early Works Program

Work in locking down key infrastructure for the wet season was completed early in the quarter by local Kimberley businesses associated with the Early Works activities. All contractors, power generators and fuel storage tanks not required over the wet season were demobilised.

The Company retained a small team of local and Aboriginal employees to perform care and maintenance activities over the wet season. These activities included regular inspections of key infrastructure to identify and correct any impact of the wet season, vermin or pests and continuation of minor works around the Thunderbird accommodation village. The Project has experienced lower than expected weather events during the wet season with the only cyclone passing to the west of the Project and the weather station recording approximately 327mm of rain during the quarter.

The accommodation village, communications equipment and the site access road remain in excellent condition and ready to support the start of construction activities upon the completion of the strategic partner process.

Engineering, Procurement and Construction

Engineering and design activities were placed on hold with GR Engineering Services (GRES) during the quarter. The engineering works have progressed to a position where equipment and services orders are ready to be placed once the Company has completed the strategic partner process.

The Company continues to keep key commercial partners updated on the strategic partner process, the mineral sands industry and markets.

Aboriginal Engagement

Since the graduation of four trainees from the Thunderbird Group Training Program in November 2018, all graduates have been fully employed on the Thunderbird Project care and maintenance works and other projects, including the Bungarun reflection courtyard community project in Broome. A further two Aboriginal trainees are currently completing a Certificate 3 in Civil Construction through Nirrumbuk Aboriginal Corporation.

The Company continues to achieve strong levels of Aboriginal employment, as demonstrated in the figure below.

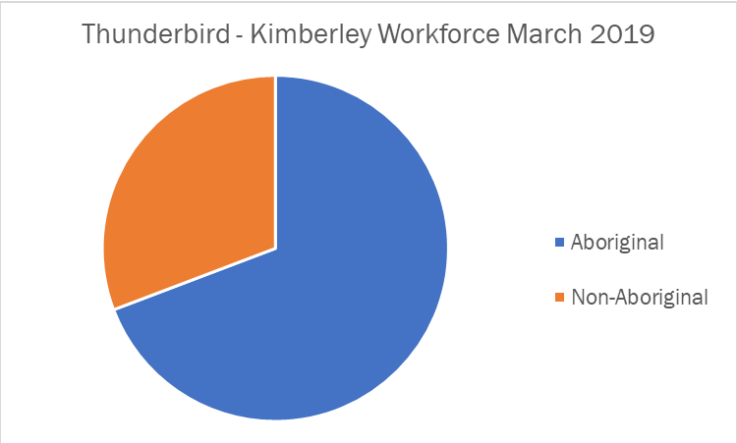

Figure 8: Thunderbird's employment breakdown by Aboriginal and Non-Aboriginal people

Sustainability

The Company held the first Implementation Committee meeting with representatives of the Traditional Owners after the signing of the Thunderbird Project Co-existence Agreement in the previous quarter. The Implementation Committee comprises four Traditional Owner representatives and three Thunderbird Operations representatives and is the key forum where the Company and Traditional Owners meet to ensure the benefits around sustainable employment and business outcomes and protections of Aboriginal heritage and the environment, agreed in the Co-existence Agreement are delivered. The Implementation Committee is establishing governance charters and engaging administration resources.

Marketing and Offtake

Zircon markets have kept steady during the quarter with major suppliers maintaining the pricing levels of late 2018. However there has been evidence of some price pressure during the quarter as smaller producers have reduced their pricing marginally to maintain market share and a positive cash flow. The short-term expectation is that smaller producers will continue to keep pricing at a lower level which will potentially flow onto major suppliers. This price pressure is expected to be relieved by year end or early 2020 as the market moves towards the pending supply shortage.

The longer-term view for zircon remains unchanged, with significant supply constraints expected. As previously reported, depletion of existing mines and lack of new development has not abated the upward pricing pressure. The predicted supply deficit and growth in zircon demand enhances Thunderbird's project economics over the projected 42 year mine life.

In the latter part of 2018, the TiO_2 feedstock market had softened slightly impacting pricing marginally. However, during the quarter it was observed that many pigment producers reduced inventories, resulting in increased demand during the latter part of the quarter, resulting in marginal price increases particularly for higher quality feedstocks. With pigment producers de-stocking over the past months and the pending northern hemisphere summer, demand for TiO_2 feedstock is expected to be strong and should result in favourable pricing.

Trade tension between the US and China has eased in the past few months and the expectations are that there will be no further tariffs applied to Chinese goods imported into the US. This is expected to have a positive impact on both the zircon and TiO_2 industries.

Discussions continued during the quarter with several potential parties for the supply of both ilmenite and titano-magnetite. Sheffield has continued to engage with ilmenite suppliers without commitment due to the current strategic partner process. There has been positive feedback from steel making groups who

have shown interest in the titano-magnetite product as a regular feedstock into their steel plants. Further test work and discussions are required, and expected to occur over the coming months.

Project Financing and Funding Strategy

Following a successful 2018 which saw the Company fully permitted, debt funded and construction ready, Sheffield has continued to hold confidential discussions with a broad range of interested parties with a view to strategic investment.

During the quarter, Sheffield announced the appointment of UBS as its corporate advisor, initiating a structured, formal process to evaluate and progress this interest and identify whether the introduction of a strategic party would assist in achieving the Company's objective of optimising the outcome to shareholders through Thunderbird's development.

The confidential strategic partner process is well underway and where appropriate, the Company will provide updates in relation to these matters.

EXPLORATION ACTIVITIES

During the quarter, Sheffield announced a maiden Inferred Mineral Resource of 130 million tonnes (Mt) @ 3.3% HM, above a 1.2% HM cut-off, for its 100% owned Night Train Mineral Sands Deposit (refer to ASX 31 January 2019). This includes a contiguous high-grade component of 50Mt @ 5.9% HM, above a 2.0% HM cut-off. Night Train is located just 20km from Thunderbird and 2km from the recently constructed Thunderbird mine access road. Sheffield also received final QEMSCAN™ mineral assemblage results from the 2018 regional aircore drilling program.

Dampier Project

Night Train Inferred Mineral Resource

Sheffield announced a maiden Inferred Mineral Resource of 130 million tonnes (Mt) @ 3.3% HM containing 3.6Mt of VHM, above a 1.2% HM cut-off at its Night Train Mineral Sands deposit. This includes a high-grade component of 50Mt @ 5.9% HM containing 2.6Mt of VHM, above a 2.0% HM cut-off. The high-grade component of the Inferred Mineral Resource contains high in-situ grades of 0.82% zircon, 0.33% HiTi leucoxene and rutile, 2.9% leucoxene, 1.06% ilmenite for a total of 5.11% VHM (Table 1).

The Night Train deposit is located just 20km south of the world class Thunderbird Mineral Sands deposit and 2km from the recently constructed Thunderbird mine access road. Refer to ASX 31 January 2019 for information relating to the Night Train Inferred Mineral Resource estimate.

Table 1: Mineral Resource for Night Train

Summary of Mineral Resource[7],					In-situ Assemblage [8]					
Deposit	Mineral Resource Category	Cut off (THM%)	Material Tonnes Millions (Mt)	THM (%)	Zircon (%)	HiTi Leuc-Rt (%)	Leuco-xene (%)	Ilmenite (%)	Oversize (%)	Slimes (%)
Night Train	Inferred	1.2	130	3.3	0.45	0.18	1.5	0.71	2.2	8.7
	Inferred	2.0	50	5.9	0.82	0.33	2.9	1.06	2.2	10.2

The maiden JORC Code (2012) Inferred Mineral Resource at Night Train incorporates results from 44 air core drill holes for a total of 1,882m drilled during 2014, 2015 and 2018. This includes 24 new holes drilled during the 2018 Dampier drilling campaign (refer to ASX 09 October 2018).

The Night Train Inferred Mineral Resource, at a 1.2% HM cut-off, defines an area approximately 4.0km long by 0.8km to 1.6km wide and remains open to the north, south and down dip to the west. The mineralisation occurs as a thick, broad sheet-like body striking northwest. The average depth to the top of the mineralisation is 26m and ranges from 2m to 53m. Mineralised thickness ranges from 1.5m to 34m, with an average of 11m. The deposit is very flat-lying with a gentle dip of between 2° to 5° to the southwest.

At a 2.0% HM cut-off the Inferred Mineral Resource covers an area approximately 4.0km long by 0.4km to 1.6km wide and remains open to the north, south and down dip to the west. This higher-grade mineralisation is enclosed within the 1.2% cut-off Inferred Mineral Resource envelope and has a north-northwest trending long axis orientation which is sub-parallel to the regional strike. The higher-grade

[7] Data is sourced from ASX announcement dated 31 January 2019. The Mineral Resource estimate was prepared by Optiro Pty Ltd and disclosed under the JORC Code (2012)

[8] In-situ assemblage grade is determined by multiplying the percentage of HM by the percentage of each valuable heavy mineral within the heavy mineral assemblage at the resource block model scale. Rt – rutile, Leuc - leucoxene

mineralisation ranges in thickness from 1.5m to 22.5m, with an average thickness of 6m. The depth to the top of the high-grade mineralisation ranges from 1.5m to 55m, with an average depth of 28.5m

In addition to the Inferred Mineral Resource at Night Train, an Exploration Target[9] of 80 to 100 million tonnes at 3.0 to 4.0% HM has been estimated at Night Train. This Exploration Target comprises interpreted extensions to the mineralisation along strike to the north and south as well as down-dip to the west of the Inferred Mineral Resource. The potential quantity and grade of the Exploration Target is conceptual in nature, as there has been insufficient exploration to estimate a Mineral Resource and it is uncertain if further exploration will result in the estimation of a Mineral Resource.

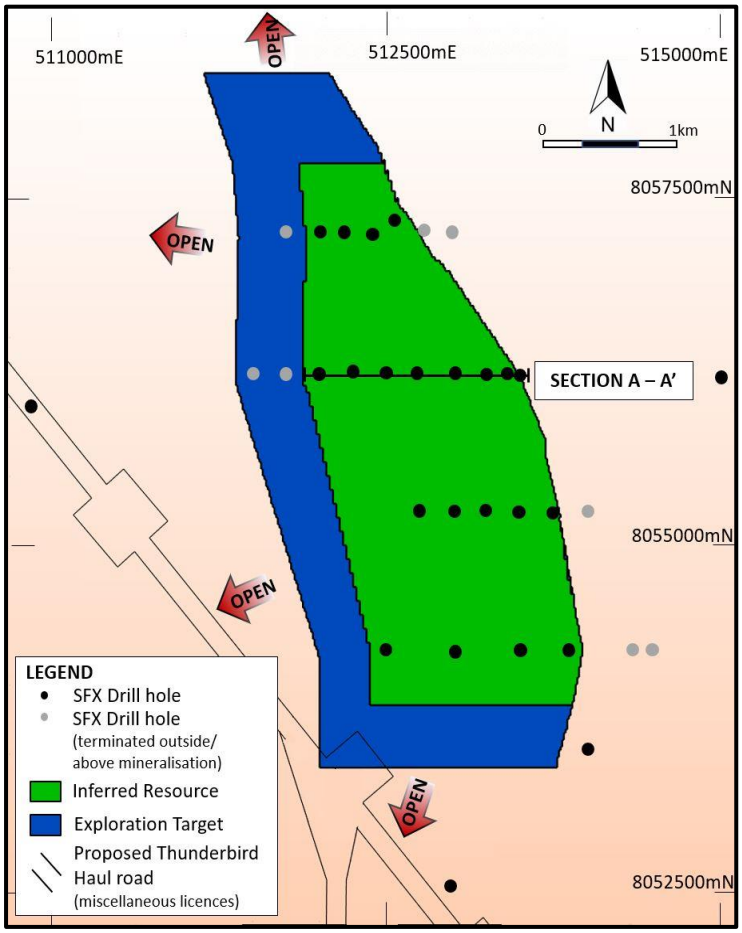

Figure 9: Night Train plan showing Mineral Resource Category and an Exploration Target with drill hole locations

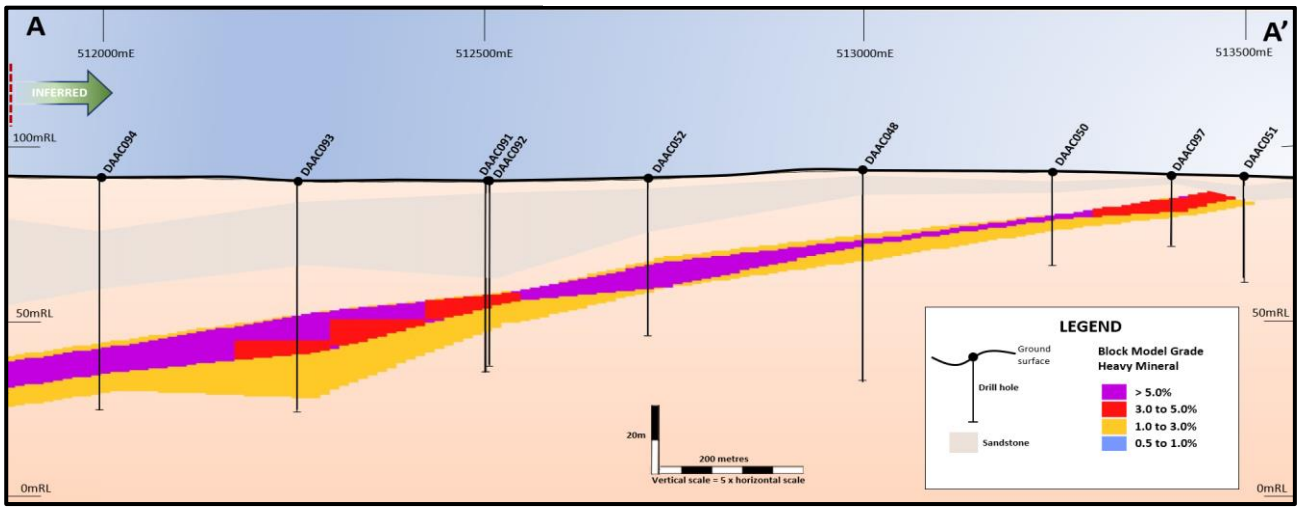

Figure 10: Section A-A': Night Train Mineral Resource block model showing HM grade

[9] The potential quantity and grade of the Exploration Target is conceptual in nature, as there has been insufficient exploration to estimate a Mineral Resource and it is uncertain if further exploration will result in the estimation of a Mineral Resource

The Night Train Inferred Mineral Resource and the additional Exploration Target outline a mineralised zone with a strike length of over 5km and a width which varies between 1km and 2km. The mineralisation dips at between 2° and 5° to the west, with depths to the top of the mineralisation ranging from 0.5m to 71m.

The Inferred Mineral Resource and Exploration Target estimates at Night Train were prepared by Optiro Pty Ltd and disclosed under the JORC Code (2012). For further information relating to the Mineral Resource and Exploration Target estimates refer to ASX 31 January 2019.

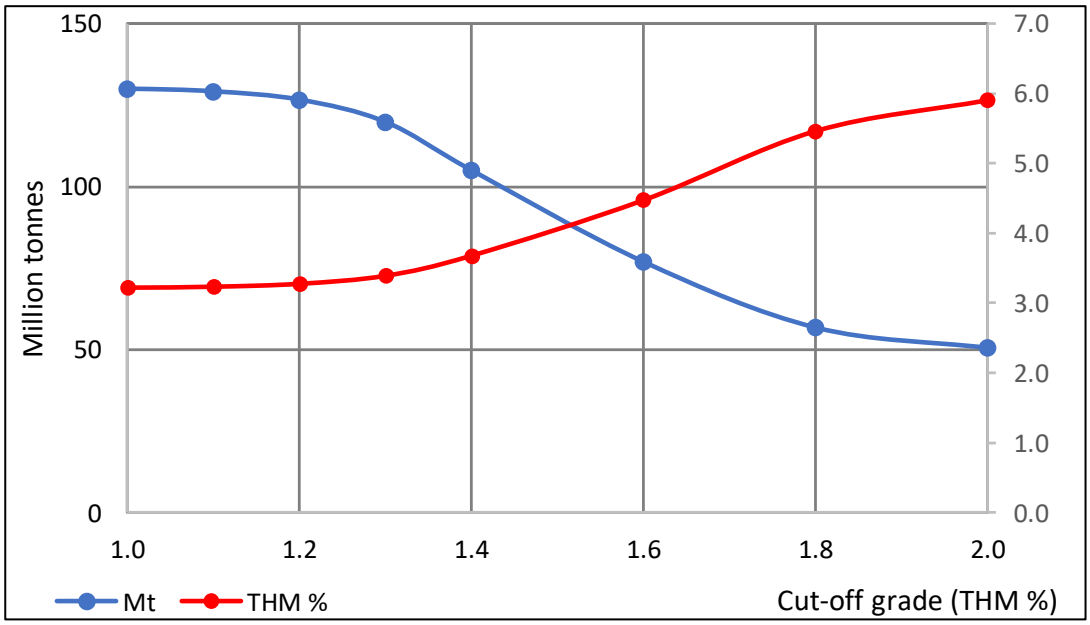

Figure 11: Night Train Mineral Resource grade-tonnage curve

Regional Mineral Assemblage

During the quarter Sheffield received mineral assemblage QEMSCAN™ results for both the regional aircore drilling program undertaken in 2018 and for the Night Train deposit. In total, mineral assemblage by particle classification data for 44 composite samples (956m) from 54 holes was received, of which 11 composite samples (195m) from 17 holes are sourced from Night Train (refer to ASX 31 January 2019) and 33 composite samples (761m) from 37 holes are sourced from the seven regional prospects of Buckfast, Bohemia, Cisco, Cold Duck, Concorde, Nomad and Porphyry Pearl (Figure 7,Table 2, Table 3).

These are the final results to be reported from the Dampier Project regional exploration program completed in late 2018. The program has enabled Sheffield to identify multiple new high-value, zircon-rich mineral assemblage targets and delineate regions with coarser grained zircon with potential for higher zircon quality.

All prospects targeted during the 2018 program returned significant HM intersections with diverse mineral assemblage composition and geological characteristics. Regional mineral assemblage results have shown that the high-value zircon-rich mineral assemblage, typical of the Thunderbird and Night Train deposits, is widespread throughout the district. This has been replicated at all targets drilled along the 160km long mineralised trend from Seagull in the north to Buckfast in the south (Figure 7, Figure 14, Figure 15, Table 2, Table 3). In addition, the mineral assemblage results show that there is a variability in VHM content (Figure 13), grain size, (Figure 12) titanium minerals (Figure 7, Figure 15) and mineralisation style (Figure 7).

Table 2 Average mineral assemblage[10] by particle classification and zircon D_{50} grainsize (QEMSCAN™)

Prospect Resource*	Zircon %	Ilmenite %	Leucoxene, HiTi & Rutile %	VHM %	Zircon Grain Size (D^{ZR}_{50}) µm
Concorde	19	32	18	69	66
Bohemia	15	26	23	65	62
Buckfast	11	37	11	59	66
Nomad (upper)	13	50	9	72	77
Nomad (lower)	10	29	7	46	77
South East Night Train	12	22	15	49	85
Night Train*	14	18	55	87	70
Porphyry Pearl	14	28	8	50	61
Cold Duck	7	21	3	31	59
Thunderbird*	8	27	4	39	59
Cisco Lower	8	26	13	48	62
Cisco Upper	9	26	27	61	77
Seagull	13	43	13	69	59

*Night Train Resource assemblage at HM 2.0% cut-off (refer to ASX 31 January 2019), Thunderbird Resource at HM 7.5% cut-off (refer to ASX 5 July 2016 and 24 March 2017

Sheffield has put these regional results into context with all existing mineral assemblage QEMSCAN™ data sourced from the Thunderbird and Night Train Mineral Resources and the Seagull, Nomad and South East Night Train prospects.

A number of different mineralisation styles and domains have been identified based on mineral assemblage via particle classification, scale and thickness, zircon grain size (D^{ZR}_{50}) and stratigraphic setting (Figure 12 to Figure 15).

Sheffield has recognised five main domains to date. These comprise:

1. Thunderbird, Cold Duck, Porphyry Pearl and Cisco Lower – Very large scale (average thickness between 13m and 47m), very high HM grades, high iron oxide content in the mineral assemblage, VHM content between 31% and 48%, fine grained (D^{Zr}_{50} between 59µm and 62µm), high proportion of ilmenite relative to altered ilmenite and leucoxene. Higher slimes content between 15% to 18% and oversize between 3% to 12%. Greater induration near surface due to higher iron content and hosted by fine grained yellow-brown sands.
2. Buckfast, Bohemia and Concorde - Large scale (average thickness between 17m and 42m), high to moderate HM grades, minor iron oxides at Buckfast, VHM content between 59% and 69%, fine-medium grained (D^{Zr}_{50} between 62µm and 66µm), high proportion of altered ilmenite relative to ilmenite. Slimes content between 7% to 14% and oversize between 3% to 4% with high zircon mineral assemblage (11% to 19%). These are hosted by fine-medium yellow-brown sands at Buckfast, yellow sand (with higher clay) at Bohemia and white sands at Concorde.

[10] Refer to Appendix 1and Table 3, Table 4 for details of mineral assemblage. VHM – valuable heavy mineral grades have been rounded to reflect the relative uncertainty of the estimate, thus sum of columns may not equal. Night Train (Refer to ASX 31 January 2019) and Thunderbird (Refer to ASX 5 July 2016 and 24 March 2017) data sourced from Resource estimations. Zircon D_{50} diameter sourced from QEMSCAN™ and is indicative of grainsize, Thunderbird zircon D^{50} grainsize screened (Refer to ASX 24 March 2017)

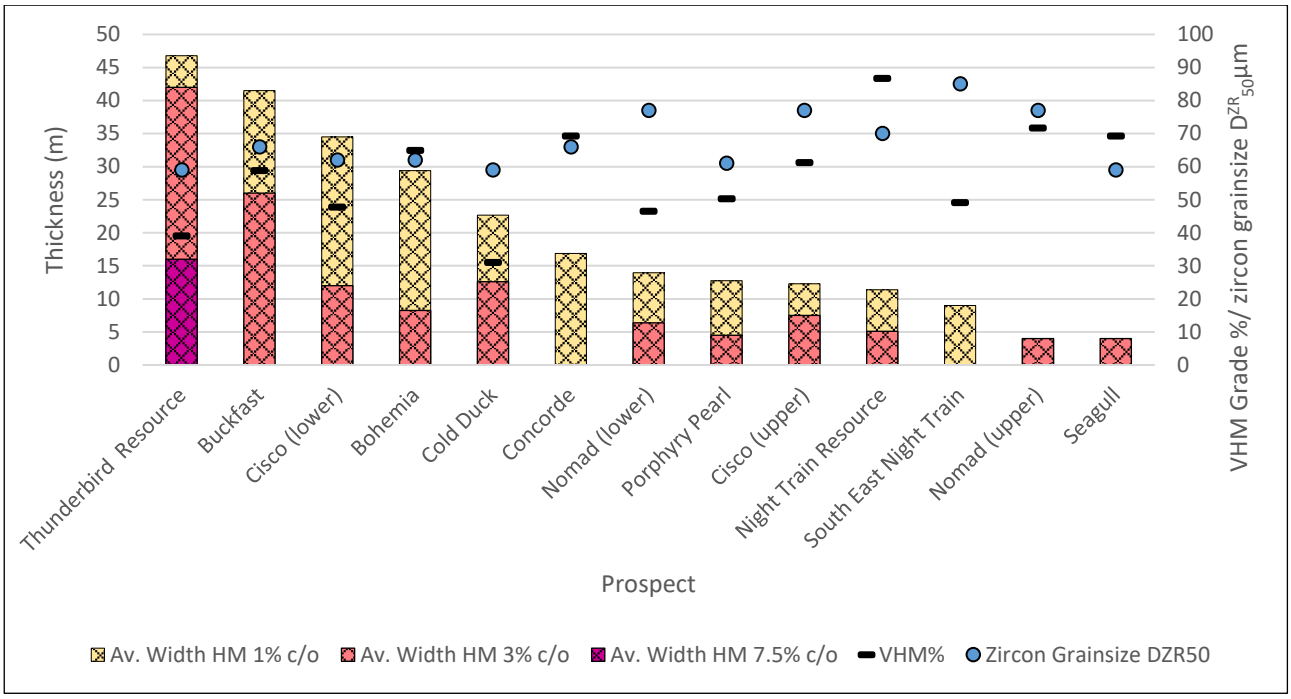

Figure 12: Regional Dampier average thickness (m) of drilled HM intersects against QEMSCAN™ zircon grainsize (µm) and VHM (%) grade[11]

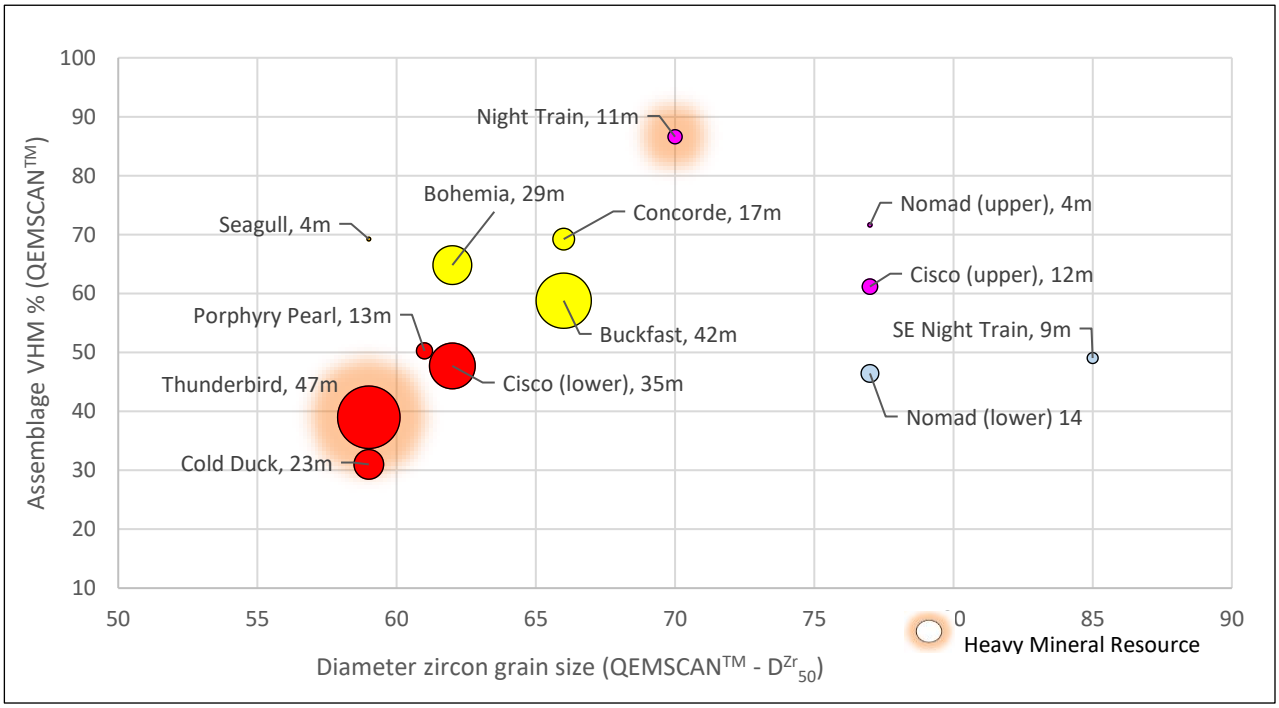

Figure 13: Regional Dampier VHM grade (%) against zircon grainsize (D$^{ZR}_{50}$ µm) (bubble width average thickness (m))[12]

[11] Average thickness at prospects calculated by weighted average of intersects above a 1% and 3% HM cut-off of drilled intervals. Average thickness of Thunderbird and Night Train determined for Mineral Resource block model calculated at 1%, 3% and 7.5% HM cut-off. Grainsize via by QEMSCAN™. particle classification analysis – refer to Table 2, Table 3, Table 4, Table 5 and Appendix 1 for full details.

[12] Notes: Average thickness at prospects calculated by weighted average of intersects above a 1% HM cut-off of drilled intervals. Average thickness of Thunderbird and Night Train determined for Mineral Resource block model calculated at 1% HM cut-off. Grainsize by QEMSCAN™. QEMSCAN™ analysis - refer to Table 2, Table 4 and Appendix 1 for full details.

3. Night Train, Cisco Upper and Nomad Upper - Moderate scale (average thickness between 4m and 12m), moderate (Night Train and Nomad Upper) to low (Cisco Upper) HM grades, very low iron oxide content, clean with no coatings, VHM content between 61% and 87%, medium grained (D^{Zr}_{50} between 70µm and 77µm), high proportion of altered ilmenite and leucoxene relative to ilmenite. Slimes content 10% and oversize between 2% to 7% with high zircon mineral assemblage (9% to 14%). These are hosted by fine-medium grained clean white sands with Melligo sandstone often located just above the mineralisation. Argo and Stingray have similar characteristics to this domain as indicated by historic SEM mineral assemblage data undertaken by Rio Tinto Exploration Pty Ltd ('RTE') (refer to Muggeridge 2008). Argo is hosted in a higher stratigraphic position representing an additional target horizon.

4. South East Night Train and Nomad Lower - Moderate scale (average thickness between 9m and 14m), low to moderate HM grades, moderate iron oxides content, VHM content between 46% and 49%, medium-coarse grained (D^{Zr}_{50} between 77µm and 85µm), high proportion of ilmenite relative to altered ilmenite and leucoxene. Slimes content 14% and oversize 1%. Hosted by fine grained yellow sands and stratigraphically located close to the Jarlemai contact.

5. Seagull – Small scale (average thickness 4m), moderate HM grades, VHM 69% with high proportion of ilmenite. Grainsize fine (D^{Zr}_{50} 59µm). Slimes 20% and 7% oversize. Hosted by very fine to fine sand near the Jarlemai contact. Visual assessment of Sheffield's drilling at Bells Tower suggest that this prospect has similar characteristics to Seagull.

The regional mineral assemblage results confirm the discovery of multiple new zircon-rich targets exhibiting a variety of mineralisation styles, located in multiple stacked and often contiguous mineralised horizons. These horizons form sheet like or lobate shaped accumulations of heavy mineral sand located within a marine target sequence along a 160km mineralised trend within the Lower Cretaceous Broome sandstone of the Dampier Peninsula.

Metallurgical test work at the Dampier Project (including historic test work by RTE, Yaxley & Germain, 2007) has shown that premium ceramic grade zircon can be produced at all deposits tested to date, including Thunderbird, Night Train and Argo. As observed in other mineral sands provinces, certain key impurities levels (ie U and Th) reduce as the zircon grain size increases. The mineral assemblage test work results highlight Night Train, Buckfast, Bohemia, Concorde, Nomad Upper and Cisco Upper as priority targets containing high VHM in the assemblage, high zircon in the assemblage, good mineralisation thicknesses and all exhibit a coarser zircon grain size than Thunderbird. A correlation between an increase in D^{Zr}_{50} grainsize and VHM content also exists and may be potentially related to deposition in a more turbulent, higher energy and shallower marine setting.

Key outcomes and observations from the mineral assemblage data include:

- Identification of multiple new high-value, zircon-rich mineral assemblage targets
- Delineation of coarser grained regions with potential for higher zircon quality (ie Night Train to Nomad, Cisco Upper and Concorde to Buckfast regions)
- Understanding domains where different TiO_2 species dominate (ie ilmenite at Thunderbird, Leucoxene at Night Train and Cisco Upper and altered ilmenite at Concorde to Buckfast regions)
- Variations in thickness of the mineralised horizons (ie exceptionally thick intervals at Thunderbird, thick intervals at Buckfast, moderate thicknesses at Bohemia and narrow thicknesses at Nomad)
- Variations in the valuable heavy mineral grade of the HM and its relationship to iron oxide grade of the HM

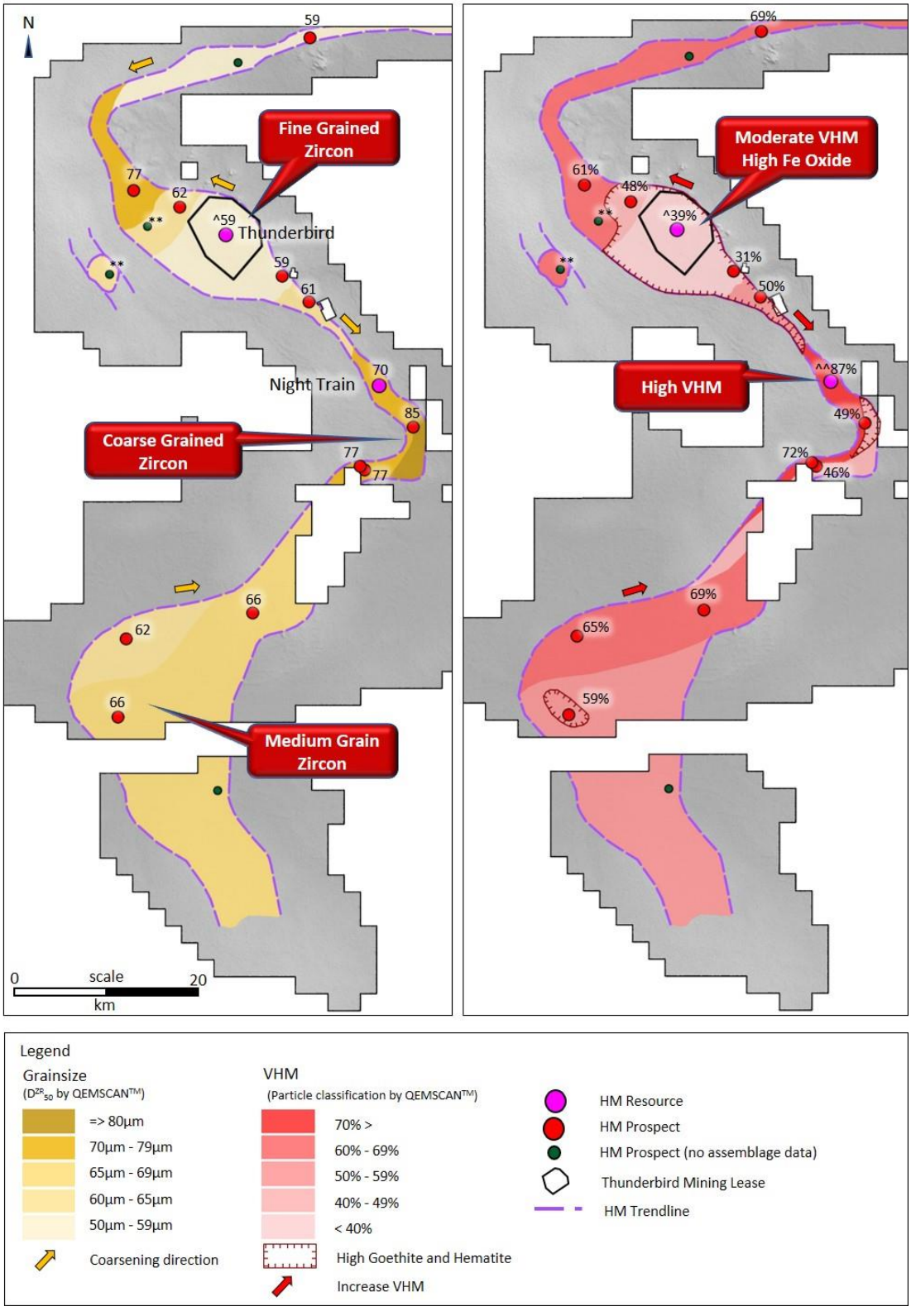

Figure 14: Dampier Regional[13] zircon grainsize (D^{ZR}_{50}) (left), VHM grade (right)

[13] Notes: Grainsize and VHM grade by QEMSCAN™ interpretative between prospects. Refer to Table 2, Table 3, Table 4, Table 5 and Appendix 1 for full details. ^ Thunderbird grainsize determined by screening (Refer to ASX 24 March 2017) and assemblage determined by Mineral Resource estimation (Refer to ASX 05 July 2016). ^^ Night Train assemblage determined by Mineral Resource estimation (Refer to ASX 31 January 2019). ** Assemblage data sourced from historic SEM data analysis (Muggeridge 2008), without D^{ZR}_{50} grainsize information available and therefore this is interpretative for notated historic prospects.

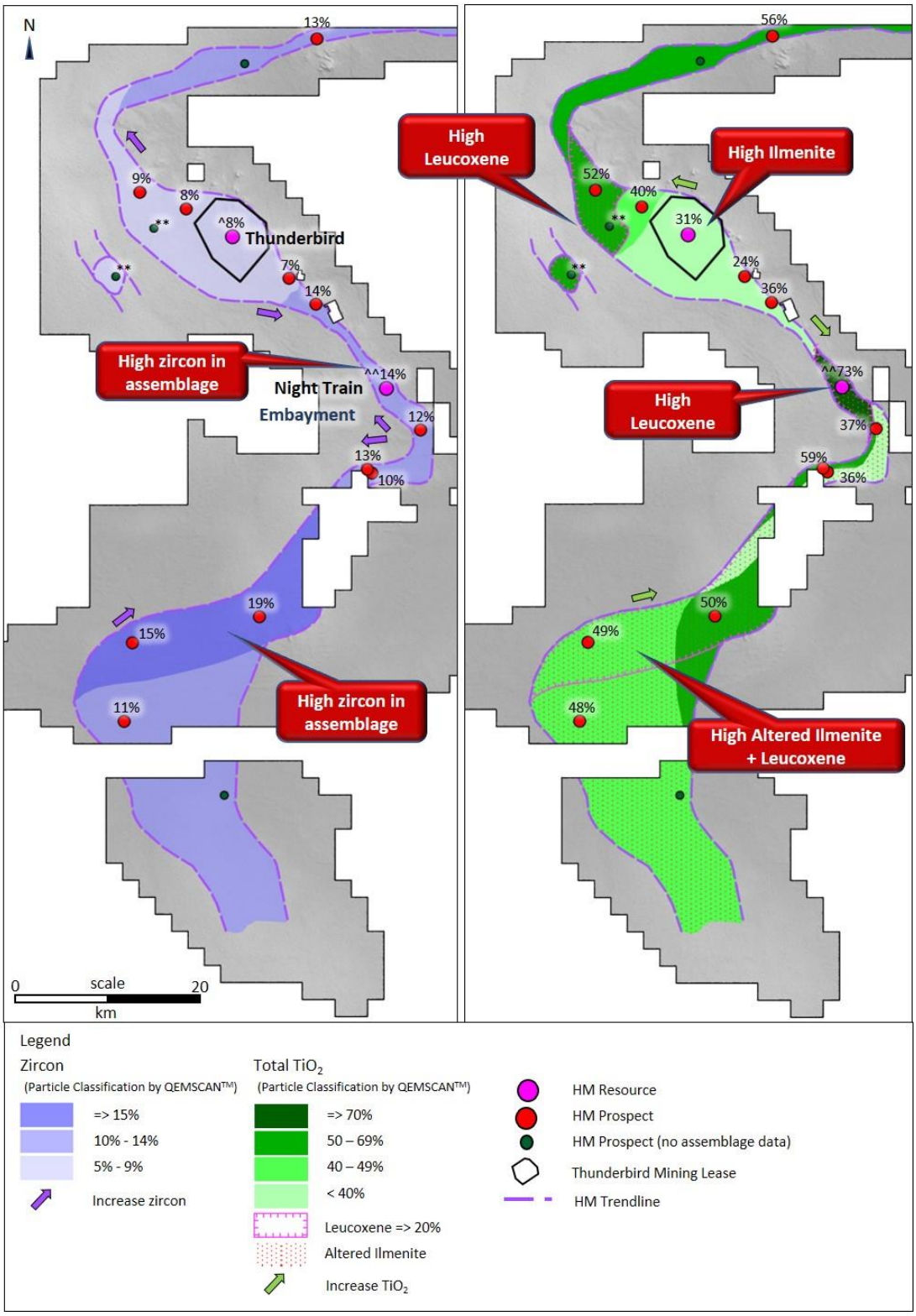

Figure 15: Dampier Regional[14] zircon assemblage (left), total combined titanium minerals assemblage (right)

[14] Notes: Zircon and total TiO_2 by QEMSCAN™ interpretative between prospects. Refer to Table 2, Table 3, Table 4, Table 5 and Appendix 1. ^Thunderbird grainsize determined by screening (Refer to ASX 24 March 2017) and assemblage determined by Mineral Resource estimation (Refer to ASX 05 July 2016). ^^ Night Train assemblage determined by Mineral Resource estimation (Refer to ASX 31 January 2019). ** Assemblage data sourced from historic SEM data analysis (Muggeridge 2008)

- Outlining priority one targets at Night Train, Buckfast, Bohemia, Concorde, Nomad Upper and Cisco Upper
- Outlining priority two targets at Night Train South East and Porphyry Pearl

Sheffield's regional exploration strategy is focused on delineating shallow, large, high-grade, zircon-rich deposits, containing high quality zircon.

Eneabba Project

The Eneabba Project comprises seven deposits with a combined Mineral Resource totalling 193 million tonnes @ 3.0% HM (Measured, Indicated and Inferred) containing 4.8 million tonnes of VHM, across seven deposits. These include Yandanooka, Durack, Drummond Crossing, Robbs Cross, Thomson, West Mine North, and Ellengail (refer to ASX 3 October 2018).

During the quarter, Sheffield completed geological interpretation and technical appraisal to identify additional HM targets in the region.

McCalls Project

The McCalls Mineral Sand Project (McCalls), located 110km to the north of Perth near the town of Gingin, has a combined Mineral Resource totalling 5.8 billion tonnes @ 1.4% HM (Indicated and Inferred) containing 75 million tonnes of VHM across two deposits McCalls and Mindarra Springs (refer to ASX dated 3 October 2018). These deposits are large chloride ilmenite resources.

A Technical Report for the Mindarra Springs deposit was completed during the quarter.

Derby East

Derby East Project comprises a large deposit of construction quality sand, located 24km east of the Port of Derby. During H2 2018, nine aircore drill holes were completed for 416m, with holes up to a maximum depth of 66m.

Samples from the drilling have been relocated to Sheffield's warehouse in Perth where sample compositing and further evaluation will be undertaken to assess suitability for end-use commercial requirements.

Barton

The Barton Project, located in the Eucla Basin region of South Australia, comprises exploration licence application ELA 2018-00046. No work was carried out during the quarter.

Further Work

Sheffield will undertake additional metallurgical and process flow test work for the Night Train deposit, with bulk sample mineral characterisation test work at Night Train planned to commence in H2 2019.

Further infill drilling is required to increase confidence at the Night Train Inferred Mineral Resource and additional extensional drilling is required to test the Exploration Target. In addition, a follow-up drilling program will be designed for priority one targets including Night Train, Buckfast, Bohemia, Concorde, Nomad Upper and Cisco Upper and at priority two targets including Porphyry Pearl and South East Night Train.

Geotechnical and geochemical test work on the Derby East silica sands samples is planned for Q3 2019.

Sheffield's annual Statement of Mineral Resources and Ore Reserves will be updated during H2 2019 to incorporate the current Night Train Inferred Mineral Resource.

CORPORATE ACTIVITIES

As at 31 March 2019, Sheffield held cash reserves of approximately A$5.8 million (unaudited).

In December 2018, the Company announced that it had successfully completed an equity raising of approximately A$16.2 million before costs, by way of a share placement (Placement) to professional, sophisticated and other institutional investors. Additionally, a share purchase plan (SPP) launched in conjunction with the Placement closed on 25 January 2019, raising a further A$0.7 million from shareholders. The proceeds of the Placement and SPP will enable the Company to formally evaluate and progress the strategic partner process with UBS AG and fund the Company's corporate administration costs (including transaction costs).

Amendment to Managing Director's Executive Services Agreement

Mr Bruce McFadzean entered into a fixed term Executive Services Agreement with the Company on 23 October 2015 and has agreed to enter into an amended Executive Services Agreement (Agreement) with the Company with effect from 1 May 2019. In accordance with ASX Listing Rule 3.16.4, the Company provides the following material terms of Mr McFadzean's amended Executive Services Agreement:

- The Agreement is effective 1 May 2019 and has no fixed term;
- No amendment to Total Fixed Remuneration (TFR). TFR remains $383,250 per annum (inclusive of superannuation).
- Notice Period:
    - Either Sheffield or Mr McFadzean may terminate the agreement upon three months' notice. The Company may dispense with the notice period and immediately terminate the employment agreement by making a payment equal to 12 months TFR to Mr McFadzean;
    - Following the Board's final investment decision (FID) for the development of the Thunderbird Mineral Sands Project, Mr McFadzean's termination entitlement shall be 12 months TFR in lieu of notice.

Mr Bruce McFadzean
Managing Director
30 April 2019

Schedule 1: Interests in Mining Tenements at the end of the quarter as required under ASX Listing Rule 5.3.3

Project	Tenement	Holder	Interest	Location[3]	Status
Mineral Sands	E04/2455	Sheffield Resources Ltd	100%	Canning Basin	Granted
Mineral Sands	E04/2456	Sheffield Resources Ltd	100%	Canning Basin	Granted
Mineral Sands	E04/2081[2]	Thunderbird Operations Pty Ltd	100%	Canning Basin	Granted
Mineral Sands	E04/2083[2]	Thunderbird Operations Pty Ltd	100%	Canning Basin	Granted
Mineral Sands	E04/2084[2]	Thunderbird Operations Pty Ltd	100%	Canning Basin	Granted
Mineral Sands	E04/2159[2]	Thunderbird Operations Pty Ltd	100%	Canning Basin	Granted
Mineral Sands	E04/2171[2]	Thunderbird Operations Pty Ltd	100%	Canning Basin	Granted
Mineral Sands	E04/2192[2]	Thunderbird Operations Pty Ltd	100%	Canning Basin	Granted
Mineral Sands	E04/2193[2]	Thunderbird Operations Pty Ltd	100%	Canning Basin	Granted
Mineral Sands	E04/2194[2]	Thunderbird Operations Pty Ltd	100%	Canning Basin	Granted
Mineral Sands	E04/2348[2]	Thunderbird Operations Pty Ltd	100%	Canning Basin	Granted
Mineral Sands	E04/2349[2]	Thunderbird Operations Pty Ltd	100%	Canning Basin	Granted
Mineral Sands	E04/2350[2]	Thunderbird Operations Pty Ltd	100%	Canning Basin	Granted
Mineral Sands	E04/2390[2]	Thunderbird Operations Pty Ltd	100%	Canning Basin	Granted
Mineral Sands	E04/2399[2]	Thunderbird Operations Pty Ltd	100%	Canning Basin	Granted
Mineral Sands	E04/2400[2]	Thunderbird Operations Pty Ltd	100%	Canning Basin	Granted
Mineral Sands	E04/2554[2]	Thunderbird Operations Pty Ltd	100%	Canning Basin	Pending
Mineral Sands	E04/2571[2]	Thunderbird Operations Pty Ltd	100%	Canning Basin	Pending
Mineral Sands	E04/2596[2]	Thunderbird Operations Pty Ltd	100%	Canning Basin	Pending
Mineral Sands	E04/2597[2]	Thunderbird Operations Pty Ltd	100%	Canning Basin	Pending
Mineral Sands	L04/84[2]	Thunderbird Operations Pty Ltd	100%	Canning Basin	Granted
Mineral Sands	L04/85[2]	Thunderbird Operations Pty Ltd	100%	Canning Basin	Granted
Mineral Sands	L04/86[2]	Thunderbird Operations Pty Ltd	100%	Canning Basin	Granted
Mineral Sands	L04/92[2]	Thunderbird Operations Pty Ltd	100%	Canning Basin	Granted
Mineral Sands	L04/93[2]	Thunderbird Operations Pty Ltd	100%	Canning Basin	Granted
Mineral Sands	E04/2478	Sheffield Resources Ltd	100%	Canning Basin	Granted
Mineral Sands	L04/82	Sheffield Resources Ltd	100%	Canning Basin	Granted
Mineral Sands	L04/83	Sheffield Resources Ltd	100%	Canning Basin	Granted
Mineral Sands	E04/2494[2]	Thunderbird Operations Pty Ltd	100%	Canning Basin	Granted
Mineral Sands	M04/459[2]	Thunderbird Operations Pty Ltd	100%	Canning Basin	Granted
Mineral Sands	E70/3762	Sheffield Resources Ltd	100%	Perth Basin	Granted
Mineral Sands	E70/3813	Sheffield Resources Ltd	100%	Perth Basin	Granted
Mineral Sands	E70/3814	Sheffield Resources Ltd	100%	Perth Basin	Granted
Mineral Sands	E70/3929	Sheffield Resources Ltd	100%	Perth Basin	Granted
Mineral Sands	E70/3967	Sheffield Resources Ltd	100%	Perth Basin	Granted
Mineral Sands	E70/4190	Sheffield Resources Ltd	100%	Perth Basin	Granted
Mineral Sands	E70/4584	Sheffield Resources Ltd	100%	Perth Basin	Granted
Mineral Sands	E70/4292	Sheffield Resources Ltd	100%	Perth Basin	Granted
Mineral Sands	E70/4719	Sheffield Resources Ltd	100%	Perth Basin	Granted
Mineral Sands	E70/4747	Sheffield Resources Ltd	100%	Perth Basin	Granted
Mineral Sands	M70/872[1]	Sheffield Resources Ltd	100%	Perth Basin	Granted
Mineral Sands	M70/965[1]	Sheffield Resources Ltd	100%	Perth Basin	Granted
Mineral Sands	M70/1153[1]	Sheffield Resources Ltd	100%	Perth Basin	Granted
Mineral Sands	R70/35[1]	Sheffield Resources Ltd	100%	Perth Basin	Granted
Mineral Sands	E70/4922	Sheffield Resources Ltd	100%	Perth Basin	Granted
Mineral Sands	E70/3859	Sheffield Resources Ltd	100%	Perth Basin	Pending
Mineral Sands	E04/2509[2]	Thunderbird Operations Pty Ltd	100%	Canning Basin	Granted
Mineral Sands	E04/2510[2]	Thunderbird Operations Pty Ltd	100%	Canning Basin	Pending
Mineral Sands	ELA 2018-00046	Moora Talc Pty Ltd	100%	Eucla Basin (SA)	Pending
Mineral Sands	E04/2540[2]	Thunderbird Operations Pty Ltd	100%	Canning Basin	Pending

Notes:
[1]Iluka Resources Ltd (ASX: ILU) retains a gross sales royalty of 1.5% in respect to tenements R70/35, M70/872, M70/965 & M70/1153.
[2]Thunderbird Operations Pty Ltd is a 100% owned subsidiary of Sheffield Resources Ltd.
[3]Moora Talc Pty Ltd is a 100% owned subsidiary of Sheffield Resources Ltd.

Details of tenements and/or beneficial interests acquired/disposed of during the quarter are provided in Section 10 of the Company's accompanying Appendix 5B notice.

COMPLIANCE STATEMENTS

COMPETENT PERSONS AND COMPLIANCE STATEMENTS

The information in this report that relates to Exploration Results and Exploration Targets is based on information compiled by Mr Seb Gray, a Competent Person who is a Member of Australian Institute of Geoscientists (AIG). Mr Gray is a full-time employee of Sheffield Resources Ltd and has sufficient experience that 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 Gray 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 the estimation of the Mineral Resources is based on information compiled by Mrs Christine Standing, a Competent Person who is a Member of the Australian Institute of Geoscientists (AIG) and the Australasian Institute of Mining and Metallurgy (AusIMM). Mrs Standing is a full-time employee of Optiro Pty Ltd and has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity which she is undertaking 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'. Mrs Standing consents to the inclusion in this report of the matters based on her information in the form and context in which it appears.

PREVIOUSLY REPORTED INFORMATION

This report includes information that relates to Exploration Results, Mineral Resources and Ore Reserves prepared and first disclosed under the JORC Code (2012) and a Bankable Feasibility Study. The information was extracted from the Company's previous ASX announcements as follows:

- Night Train Inferred Resource and Mineral Assemblage results "*HIGH GRADE MAIDEN MINERAL RESOURCE AT NIGHT TRAIN*" 31 January 2019
- Buckfast, Bohemia and Concorde results "*NEW LARGE HIGH GRADE DISCOVERY SOUTH OF THUNDERBIRD*" 13 November 2018
- Cold Duck, Porphyry Pearl, Cisco and Nomad results "*THREE NEW MINERAL SANDS DISCOVERIES NEAR THUNDERBIRD*", 17 October 2018
- Night Train results: "*EXCEPTIONAL RESULTS CONFIRM MAJOR DISCOVERY AT NIGHT TRAIN*", 09 October 2018
- Mineral Resource and Ore Statement "*MINERAL RESOURCE AND RESERVE STATEMENT*" 03 October, 2018
- Drilling commences: "*SHEFFIELD COMMENCES 8,000m REGIONAL DRILLING PROGRAM AT THUNDERBIRD*", 01 August 2018
- Thunderbird Ore Reserve: *"THUNDERBIRD ORE RESERVE UPDATE"* 16 March, 2017
- Thunderbird Bankable Feasibility Study: *"THUNDERBIRD BFS DELIVERS OUTSTANDING RESULTS"* 24 March, 2017
- Thunderbird Mineral Resource: *"SHEFFIELD DOUBLES MEASURED MINERAL RESOURCE AT THUNDERBIRD"* 5 July, 2016
- Night Train metallurgical scoping results: *"PREMIUM ZIRCON AT NIGHT TRAIN",* 14 April, 2016
- Night Train Discovery: "NEW MINERAL SANDS DISCOVERY AT NIGHT TRAIN" 22 September, 2015
- Night Train, Nomad and Seagull Drilling: "THREE NEW MINERAL SANDS DISCOVERIES IN CANNING BASIN" 25 February, 2015

These announcements are available to view on Sheffield's website www.sheffieldresources.com.au

The Company confirms that it is not aware of any new information or data that materially affects the information included in the relevant market announcements and, in the case of estimates of Mineral Resources, Ore Reserves and the Bankable Feasibility Study, that all material assumptions and technical parameters underpinning the estimates in the relevant market announcement continue to apply and have not materially changed. The Company confirms that the form and context in which the Competent Person's findings are presented have not been materially modified from the relevant original market announcements.

CAUTIONARY STATEMENTS AND RISK FACTORS

The contents of this report reflect various technical and economic conditions at the time of writing. Given the nature of the resources industry, these conditions can change significantly over relatively short periods of time. Consequently, actual results may vary from those contained in this report.

Some statements in this report regarding estimates or future events are forward-looking statements. They include indications of, and guidance on, future earnings, cash flow, costs and financial performance. Forward-looking statements include, but are not limited to, statements preceded by words such as "planned", "expected", "projected", "estimated", "may", "scheduled", "intends", "anticipates", "believes", "potential", "predict", "foresee", "proposed", "aim", "target", "opportunity", "could", "nominal", "conceptual" and similar expressions. Forward-looking statements, opinions and estimates included in this report are based on assumptions and contingencies which are subject to change without notice, as are statements about market and industry trends, which are based on interpretations of current market conditions. Forward-looking statements are provided as a general guide only and should not be relied on as a guarantee of future performance. Forward-looking statements may be affected by a range of variables that could cause actual results to differ from estimated results and may cause the Company's actual performance and financial results in future periods to materially differ from any projections of future performance or results expressed or implied by such forward-looking statements. So there can be no assurance that actual outcomes will not materially differ from these forward-looking statements.

Table 3: Regional Mineral Assemblage 2018 composites samples[1] by hole (continued over leaf)

Prospect	Composite	Hole ID	Depth		Composite grade			Mineral Assemblage by Particle Classification				Grainsize[2]
					HM	SL	OS	Zircon	HiTi Leuc & Rutile	Leucoxene	Ilmenite	Zircon D_{50}
			From (m)	To (m)	(wt%)	(wt%)	(wt%)	(%)	(%)	(%)	(%)	(µm)
Cisco (lower)	DACP019	DAAC149	58.5	93	3.5	11.9	3.7	8	1.3	12	26	62
Cisco (upper)	DACP020	DAAC152	49.5	60	1.5	11.3	6.0	9	1.5	18	31	73
		DAAC153	36	57								
	DACP021	DAAC154	18	30	1.5	9.7	5.2	9	1.6	29	19	78
		DAAC155	18	32								
	DACP022	DAAC157	51	66	3.1	8.8	1.5	9	1.6	28	27	81
Porphyry Pearl	DACP023	DAAC140	3	9	6.6	21.6	3.9	14	1.3	7	28	61
		DAAC141	19.5	39								
Nomad (Upper)	DACP024	DAAC118	28.5	31.5	7.1	11.0	6.0	13	0.8	8	50	77
		DAAC119	19.5	27								
		DAAC120	15	18								
		DAAC121	21	24								
Nomad (Lower)	DACP025	DAAC120	51	73.5	3.1	11.4	2.4	9	1.0	2	30	65
Cold Duck (Zone A)	DACP026	DAAC131	6	24	2.5	16.4	11.6	10	0.8	2	32	58
		DAAC139	6	13.5								
	DACP030	DAAC133	7.5	24	3.6	16.0	6.3	10	1.1	3	35	58
	DACP032	DAAC134	3	7.5	1.7	18.2	10.7	10	1.1	2	33	58
		DAAC135	4.5	10.5								
		DAAC136	4.5	10.5								
		DAAC137	9	13.5								
		DAAC138	1.5	9								
Cold Duck (Zone B)	DACP027	DAAC131	24	28.5	8.1	10.8	20.3	3	0.3	1	8	59
		DAAC139	13.5	24								
	DACP029	DAAC132	10.5	24	5.0	18.1	16.7	4	0.3	1	9	60
Cold Duck (Zone C)	DACP028	DAAC131	28.5	39	3.6	11.1	4.5	8	0.9	3	25	59
		DAAC139	24	36								
	DACP031	DAAC132	24	33	2.8	12.5	4.3	6	1.0	2	21	60
		DAAC133	24	31.5								
	DACP033	DAAC134	7.5	22.5	2.0	18.0	7.9	6	1.2	2	26	59
		DAAC135	10.5	18								

[1] Assemblage by particle classification refer to Appendix 1. VHM grades have been rounded to reflect uncertainty of the estimation, thus sum of columns may not equal. For hole locations please refer to ASX release 17 October 2018 for Prospects Cisco, Porphyry Pearl, Nomad, Cold Duck and ASX release 13 November 2018 for Prospects Bohemia, Buckfast and Concorde. For Night Train mineral assemblage results from 2018 please refer Inferred Resource released to the ASX 31 January 2019.
[2]Grainsize Zircon D^{50} diameter sourced from QEMSCAN™ and is indicative of grainsize, Thunderbird zircon D_{50} grainsize screened (refer to ASX 24 March 2017). Measured from cumulative assemblage.

Regional Mineral Assemblage 2018 composites samples[1] by hole (continued)

Prospect	Composite	Hole ID	Depth		Composite grade			Mineral Assemblage by Particle Classification				Grainsize[2]
					HM	SL	Zircon D_{50}	Zircon	HiTi Leuc & Rutile	Leucoxene	Ilmenite	Zircon D_{50}
			From (m)	To (m)	(wt%)	(wt%)	(wt%)	(%)	(%)	(%)	(%)	(µm)
Concorde	NLCP001	NLAC001	34.5	58.5	2.0	13.0	0.4	18	2.0	15	39	67
		NLAC004	55.5	70.5								
	NLCP002	NLAC002	30	48	1.6	12.0	2.0	19	2.2	8	43	64
		NLAC003	25.5	39								
	NLCP003	NLAC006	7.5	24	1.5	14.6	5.5	19	1.3	19	20	65
		NLAC007	4.5	22.5								
	NLCP004	NLAC010	13.5	22.5	1.5	16.2	1.7	19	1.9	20	27	66
		NLAC011	9	24								
		NLAC012	13.5	34.5								
Bohemia	NLCP005	NLAC017	15	66	2.7	20.1	3.7	17	1.5	21	30	61
	NLCP006	NLAC018	7.5	60	3.1	19.6	2.5	15	1.3	24	25	61
	NLCP007	NLAC015	19.5	45	1.7	14.1	3.3	15	1.5	12	32	55
	NLCP008	NLAC019	13.5	42	3.2	16.0	2.8	11	0.7	30	14	73
Buckfast	NLCP009	NLAC023	66	94.5	7.0	7.1	3.8	11	1.2	11	34	62
	NLCP010	NLAC025	64.5	103.5	9.6	5.3	3.7	9	0.8	3	42	68
	NLCP011	NLAC023	57	66	6.2	3.5	3.9	10	0.8	19	32	74
		NLAC025	57	64.5								
		NLAC027	67.5	75								
	NLCP012	NLAC027	75	105	7.3	8.2	4.7	12	1.2	16	34	63

[1] Assemblage by particle classification refer to Appendix 1. VHM grades have been rounded to reflect uncertainty of the estimation, thus sum of columns may not equal. For hole locations please refer to ASX release 17 October 2018 for Prospects Cisco, Porphyry Pearl, Nomad, Cold Duck and ASX release 13 November 2018 for Prospects Bohemia, Buckfast and Concorde. For Night Train mineral assemblage results from 2018 please refer Inferred Resource released to the ASX 31 January 2019.

[2]Grainsize Zircon D^{50} diameter sourced from QEMSCAN™ and is indicative of grainsize, Thunderbird zircon D_{50} grainsize screened (refer to ASX 24 March 2017). Measured from cumulative assemblage.

Table 4: Regional Heavy Mineral Assemblage by Resources[1, 2, 7] and Prospect[6, 7, 8, 9]

Prospect	Status	Composite			Mineral Assemblage by Particle Classification				Grainsize[8]
		HM	SL	Zircon D_{50}	Zircon	HiTi Leuc & Rutile	Leucoxene	Ilmenite	Zircon D_{50}
		(wt%)	(wt%)	(µm)	(%)	(%)	(%)	(%)	(µm)
Thunderbird[1]	Measured, Indicated and Inferred Resource	12.2	15.0	11.0	8	2.3	2	27	59
Night Train[2]	Inferred Resource	5.9	10.2	2.2	14	5.6	49	18	70
Bohemia[3]	Prospect	2.8	18.7	3.1	15	1.3	22	26	62
Buckfast (upper)[3]	Prospect	6.2	3.5	3.9	10	0.8	19	32	74
Buckfast (lower)[3]	Prospect	8.3	6.6	4.0	11	1.0	9	38	65
Buckfast[3] (all)	Prospect	8.1	6.3	4.0	11	1.0	10	37	66
Cisco (upper)[3]	Prospect	2.0	10.0	4.3	9	1.6	25	26	77
Cisco (lower)[3]	Prospect	3.5	11.9	3.7	8	1.3	12	26	62
Cold Duck (All)[3]	Prospect	4.4	14.7	12.5	7	0.7	2	21	59
Cold Duck (Zone A)[3]	Prospect	2.6	16.8	9.8	10	1.0	2	33	58
Cold Duck (Zone B)[3]	Prospect	6.9	13.6	18.9	3	0.3	1	8	59
Cold Duck (Zone C)[3]	Prospect	2.9	13.4	5.5	7	1.0	2	24	59
Cold Duck (Zone A and Zone C)[3]	Prospect	2.8	15.1	7.6	8	1.0	2	29	59
Concorde[3]	Prospect	1.7	14.1	2.2	19	1.8	16	32	66
Nomad (upper)[5]	Prospect	7.1	11.0	6.0	13	0.8	8	50	77
Nomad (lower)[3]	Prospect	3.0	14.2	1.5	10	3.4	4	29	77
Porphyry Pearl[3]	Prospect	6.6	21.6	3.9	14	1.3	7	28	61
Seagull[4]*	Prospect	4.2	15.4	6.0	13	4.2	9	43	59
South East Night Train[4]	Prospect	2.9	14.7	6.3	12	5.4	10	22	85

[1] Thunderbird Mineral Assemblage sourced from the Mineral Resource Reported above a 7.5% HM cut-off (refer to ASX 05 July 2016).
[2] Night Train Mineral Assemblage sourced from the Mineral Resource reported above a 2.0% HM cut-off (refer to ASX 31 January 2019)
[3] HM from individual samples was combined according to HM grade and weight into (nominal) >20g composite samples for mineral assemblage determination. Screening was carried out at +106µm to remove observed predominantly non VHM fraction. The HM assemblage determination was by the QEMSCAN™ process which uses observed mass and chemistry to classify particles according to their average chemistry, and then report mineral abundance by dominant % mass of individual particles. Particle classification percentage adjusted to account for +106µm screened material added to trash fraction. For the TiO_2 minerals the following breakpoints were used to distinguish between ilmenite 40% to 70% TiO_2, leucoxene 70% to 90% TiO_2, high TiO_2 leucoxene and rutile > 90% TiO_2.
[4] Heavy mineral concentrate was magnetically separated into highly-susceptible (H/S), magnetic 1, magnetic 2 and non-magnetic fractions, with each fraction weighed. The magnetic 1 & 2 fractions were combined and analysed by QEMSCAN™ for mineral determination as Ilmenite: 40-70% TiO_2 >90% Liberation, Leucoxene: 70-90% TiO_2 >90% Liberation , High Titanium Leucoxene (HiTi Leucoxene): >90% TiO_2 >90% Liberation, Zircon: 66.7% ZrO_2+HfO_2 >90% Liberation, the non-magnetic fraction was submitted for XRF analysis and minerals determined as Zircon: ZrO_2+Hf02/0.667, High Titanium Leucoxene (HiTi Leucoxene): TiO_2/0.90. * Inclusion of sample at 6.94% HM originally excluded from 25 February 2015 assemblage release
[5] Combination of techniques with three 2015 composite samples magnetically separated[4] and one 2018 composite sample screened at 106µm prior to assemblage[3] analysed by QEMSCAN™.
[6] For hole details refer to ASX release 25 February 2015, ASX release 17 October 2018, ASX release 13 November 2018
[7] VHM grades have been rounded to reflect uncertainty of the estimation
[8] Grainsize Zircon D^{50} diameter sourced from QEMSCAN™ and is indicative of grainsize. Grainsize weighted average by mass. Thunderbird zircon D_{50} grainsize screened (refer to ASX 24 March 2017)
[9] Weighted average of composites within prospect and zones, refer to Table 3 and Appendix 1

Table 5: Regional average thickness by drilled intersect (HM 1% cut-off) by Resource[1, 2] and prospect[3]

Prospect	Status	Width av. M (HM 1.0 cut-off)	Averaged drilled intersect grade (HM 1% cut-off)		
			HM % (wt. av intersect)	SL % (wt. av intersect)	OS % (wt. av intersect)
Thunderbird[1]	Measured, Indicated and Inferred Resource	47	12.2	15	11
Night Train[2]	Inferred Resource	11	5.9	10	2
Bohemia[3]	Prospect	29	2.6	13	3
Buckfast[3]	Prospect	42	4.7	7	4
Cisco (lower)[3]	Prospect	35	1.9	18	3
Cisco (upper)[3]	Prospect	12	1.5	10	6
Cold Duck[3]	Prospect	23	2.7	15	12
Concorde[3]	Prospect	17	1.4	14	3
Nomad (lower)[3]	Prospect	14	2.1	14	1
Nomad (upper)[3]	Prospect	4	5.1	10	7
Porphyry Pearl[3]	Prospect	13	3.0	18	6
SE Night Train (upper)[3]	Prospect	9	1.5	14	1
Seagull[3]	Prospect	4	3.2	20	7

[1] Thunderbird HM grade reported above a HM 7.5% cut-off (refer to ASX 05 July 2016), quoted thickness calculated from block model at HM 1% cut-off for comparison with other prospects

[2] Night Train HM grade reported above a HM 2.0% cut-off (refer to ASX 31 January 2019), quoted thickness calculated at HM 1% cut-off for comparison with other prospects

[3] Weighted average of drilled grade and thickness of mineralisation applying a HM 1.0% cut-off 3m minimum width, maximum 3m internal waste (release 25 February 2015, ASX release 17 October 2018, ASX release 13 November 2018). Argo and Stingray historic drilling excluded from table.

External References

Muggeridge G. D. (2007) Combined Annual Report (C96/2003 Mt Jowlaenga) for the Period 21 July 2006 to 20 July 2007 E04/1373 Jowlaenga 1, E04/1375 Jowlaenga 3, E04/1376 Jowlaenga 4 and E04/1378 Jowlaenga 6 Western Canning Basin West Australia. Rio Tinto Exploration Pty Ltd statutory annual report to the Department of Mines, Infrastructure and Regulatory Safety (a75902)

Muggeridge G. D. (2008) Combined Annual Report (C96/2003 Mt Jowlaenga) for the Period 21 July 2007 to 20 July 2008 E04/1373 Jowlaenga 1, E04/1375 Jowlaenga 3, E04/1376 Jowlaenga 4 and E04/1378 Jowlaenga 6 Western Canning Basin West Australia. Rio Tinto Exploration Pty Ltd statutory annual report to the Department of Mines, Infrastructure and Regulatory Safety (a79432)

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Yaxley D., Germain M. (2007) Metallurgical Investigation of Zircon Quality in a 420kg Composite Drill Hole Sample Using Conventional Processing Methods. Downer EDI Mining Report MS. 07/81633/1 for Rio Tinto Exploration Pty Ltd; 18 October 2007 (appendix 4, in Muggeridge 2008)

Appendix 1

JORC (2012) Table 1 Report

The table below summaries the assessment and reporting criteria used for the Regional Mineral Assemblage Results and reflects the guidelines in Table 1 of The Australasian Code for the Reporting of Exploration Results, Mineral Resources and Ore Reserves (the JORC Code, 2012).

Section 1 Sampling Techniques and Data

Criteria	JORC Code explanation	Commentary
Sampling techniques	• *Nature and quality of sampling.* • *Include reference to measures taken to ensure sample representivity and the appropriate calibration of any measurement tools or systems used.* • *In cases where 'industry standard' work has been done this would be relatively simple (eg 'reverse circulation drilling was used to obtain 1 m samples from which 3 kg was pulverised to produce a 30 g charge for fire assay'). In other cases more explanation may be required, such as where there is coarse gold that has inherent sampling problems. Unusual commodities or mineralisation types (eg submarine nodules) may warrant disclosure of detailed information.*	• NQ (70 mm) diameter aircore drilling used to collect a at source rotary split 1 to 3kg samples at 1.5m intervals down-hole. • The air core method of drilling by Sheffield used at all prospects within the Dampier Peninsula is an Industry Standard for Mineral sands deposits • See below for Sheffield sample and QAQC procedures and analysis • Aircore drilling was used by Iluka to collect 1.5m intervals down-hole. Split size 1 to 2 kg split, NQ rod diameter with 2 winged tungsten bits, and 3 winged tungsten bit in hard rock. • Aircore drilling was used by Rio Tinto Exploration to collect 1.5m intervals down-hole. Split size 1.5kg to 3kg, NQ rod diameter used with an air core bit.
Drilling techniques	• *Drill type (eg core, reverse circulation, open-hole hammer, rotary air blast, auger, Bangka, sonic, etc) and details (eg core diameter, triple or standard tube, depth of diamond tails, face-sampling bit or other type, whether core is oriented and if so, by what method, etc).*	• Aircore system approximately 70 mm diameter using a blade (face sampling) drill bit, NQ size, was applied. • At Night Train where penetration by blade was not achieved or was slow, a hammer was used for the first 15m. • System used as an industry standard for HMS deposits. • Iluka aircore NQ size using winged bits • Rio Tinto Exploration aircore NQ size, with specific drill bit not stated.
Drill sample recovery	• *Method of recording and assessing core and chip sample recoveries and results assessed.* • *Measures taken to maximise sample recovery and ensure representative nature of the samples.* • *Whether a relationship exists between sample recovery and grade and whether sample bias may have occurred due to preferential loss/gain of fine/coarse material.*	• Rotary splitter beneath the cyclone was used to collect a 1 to 3kg sub-sample from 1.5m intervals. • Sample weight was recorded at the laboratory. • Duplicate samples for Sheffield holes were collected at the drill site (see below) to enable analysis of data precision. • Sample condition of Sheffield holes (wet to dry and good to poor qualitative recovery) was logged at the drill site. Analysis shows no material bias in the differing sample conditions logged. • Bulk samples collected in 3m composite intervals from cyclone, capturing remaining material with mineralised portions retained. • The sample quality is considered appropriate to establish adequate recovery for mineral assemblage heavy mineral analysis by QEMSCAN™. • Iluka sample quality, QAQC and sample weight was not reported in the source report • Rio Tinto Exploration sample quality, QAQC and sample weight was not reported in the source report
Logging	• *Whether core and chip samples have been geologically and geotechnically logged to a level of detail to support appropriate Mineral Resource estimation, mining studies and metallurgical studies.* • *Whether logging is qualitative or*	• Every drill sample was washed and panned, then geologically logged on site in 1.5m intervals. • Sheffield record primary, secondary and oversize lithology, qualitative hardness, grainsize, rounding, sorting, and washability, visual estimates of THM%, SL% and OS%, and depth to water table.

Criteria	JORC Code explanation	Commentary
	quantitative in nature. Core (or costean, channel, etc) photography. • *The total length and percentage of the relevant intersections logged.*	• Sheffield heavy mineral sachets were examined under a microscope following heavy medium separation by laboratory and assessed as to whether sand or from rock. • The entire length of the drill hole was logged; minimum (nominal) interval length is 1.5m. • Iluka recorded lithology, colour, grainsize, cement, oversize hardness, washability. • Rio Tinto Exploration logged lithology, lith qualifier, grainsize, sorting, rounding, cementation, cementation type, washability, tone and colour • Logging is suitable such that interpretations of grade and deposit geology
Sub-sampling techniques and sample preparation	• *If non-core, whether riffled, tube sampled, rotary split, etc and whether sampled wet or dry.* • *For all sample types, the nature, quality and appropriateness of the sample preparation technique.* • *Quality control procedures adopted for all sub-sampling stages to maximise representivity of samples.* • *Measures taken to ensure that the sampling is representative of the in situ material collected, including for instance results for field duplicate/second-half sampling.* • *Whether sample sizes are appropriate to the grain size of the material being sampled.*	<u>THM%, SL% OS% Determination</u> Sheffield Drill Site • A 1 to 3kg sample is collected at 1.5m intervals in numbered bags at the drill site via rotary splitter at the cyclone discharge point. • Duplicate samples (field duplicates) collected at drill site for holes 1 in every 40 samples. • Reference blank (builder's sand) material samples inserted 1 each in every 40 samples. • Samples submitted to an external laboratory for heavy liquid separation (HLS) determination of weight per cent heavy mineral (THM%), slimes (SL%) and oversize (OS%) at a screen split of -38µm, +38µm and +1mm. Sheffield external Laboratory • The 1 to 3kg drill sample was sub-sampled via a rotary splitter to approximately 200g for analysis. • The 200g sub-sample was soaked overnight in water then screened and weighed. • THM%, SL% and OS% calculated as percentage of total sample weight (see below) using 2.92 SG. Laboratory repeats were conducted 1 in every 34 samples (1 in 30 samples in 2014, 1 in every 30 samples in 2015, 1 in every 40 samples in 2018). • Laboratory internal standard inserted (nominally) 1 in every 60 samples (1 in 60 samples in 2014, 1 in 50 samples in 2015, 1 in 60 samples in 2018). • 42 umpire samples were analysed at another external laboratory. Four umpire laboratory repeats were carried out. • Laboratory provided a sachet containing the Heavy Mineral Concentrate for each sample – this was used in HM assemblage determination (see below). Iluka drill site • Samples were collected at 1.5m intervals • Aircore drilling was used by Iluka to collect 1.5m intervals down-hole. Split size 1 to 2 kg split, NQ rod diameter with 2 winged tungsten bits, and 3 winged tungsten bit in hard rock. • No QAQC or duplicate information is within the source report • Iluka samples were collected at the field geologist discretion based on observations and therefore not all intervals were sampled Iluka Laboratory • Samples submitted to Iluka Hamilton Laboratory for heavy liquid separation (HLS) determination of weight per cent heavy mineral (HM%), slimes (SL%) and oversize (OS%) at a screen split of -53µm and

Criteria	JORC Code explanation	Commentary
		+1mm. HM determination was screened to -710µm to +53µm by 2.85 SG • Visual estimates of HM%, SL% and OS% were not reported in geological logs. • QAQC data is absent. • The sample is de-slimed and a 100g split is weighted • HM, SL and OS calculated as percentage of total sample weight. Rio Tinto Exploration drill site • Samples were collected at 1.5m intervals • Aircore drilling was used by Rio Tinto Exploration to collect 1.5m intervals down-hole. Split size is 1.5 to 3kg in the report, NQ rod diameter used with an AC bit. • No QAQC or duplicate information is within the source report • Rio Tinto samples were collected at targeted horizons therefore not all intervals were sampled Rio Tinto Exploration Laboratory • Samples submitted to AMDEL laboratories in Adelaide for heavy liquid separation (HLS) determination of weight per cent heavy mineral (HM%), slimes (SL%) and oversize (OS%) at a screen split of -45µm and +0.85mm by 2.86 SG. • Visual estimates of HM%, SL% and OS% were not reported in geological logs. Composite samples were submitted to CSIRO for SEM modal mineralogy by the AutoGeoSEM method in Perth. • QAQC data is absent. • The sample is de-slimed and a 100g split is weighted • HM, SL and OS calculated as percentage of total sample weight. All • Visual estimates of HM%, SL% and OS% logged at the drill site were compared against laboratory results to identify significant errors. • Spacing of duplicate, standard, blank and laboratory repeat samples are designed to identify sample misplacement or misallocation during sample collection and laboratory analysis. • Analysis of field duplicate samples and laboratory repeats are sufficient to show the data has acceptable precision, indicating the sub-sampling and sample preparation techniques are appropriate for the deposit style. <u>HM Assemblage Determination</u> Sheffield • Heavy Mineral Concentrate from individual samples was combined according to HM grade and weight into (nominal) >20g composite samples for HM assemblage determination. • Weighed HM composite was split and homogenised via a micro-riffle to ensure HM%, SL% and OS% of the final composite sample can be correctly calculated. • Weight HM% to composite HM weight grams was 99% for samples • HM assemblage data was collected from same or proximal holes to make >20g composite based on similar physical assessment of composition. • At Cold Duck HM was selected via stratigraphy constraints to assess visual differences in strata

Criteria	JORC Code explanation	Commentary
		bound assemblages. This produced horizon A, B and C. • Screening was applied at -106µm for Bohemia, Buckfast, Cisco, Cold Duck, Concorde, Nomad and Porphyry Pearl to remove coarser more trash dominated material. • Screening prior to analysis was not required due to the clean nature of the HM at the previously announced results at Night Train (refer to ASX 31 January 2019). • HM assemblage determination was by QEMSCAN™ to determine the component mineralogy. This method has rigorous (laboratory) internal quality control measures, and this in comparison with visual observations of HM concentrate is considered sufficient to show the data has acceptable precision, indicating the sub-sampling and sample preparation techniques are appropriate for the deposit style and the Mineral Resource estimation procedure and classification applied. • QEMSCAN™ particle classification rule for DACP001 to DACP006 (2015 previously released results refer to ASX 25 February 2015) TiO_2 sample breakpoints are <40%, => 40% ilmenite, =>70% leucoxene, =>90% rutile and high Ti leucoxene. • QEMSCAN™ particle classification rule for DACP019 to DACP033 and NLCP001 to NLCP012 screened at -106µm with TiO_2 sample breakpoints are <40%, => 40% Ilmenite, => 70% leucoxene, => 90% high Ti leucoxene, =>94% rutile. HiTi Leucoxene and Rutile have been reported combined to equate to 2015 results. • Previous announced DACP008 to DACP018 (refer to ASX 31 January 2019) same technique as DACP019 to DACP033 though not screened due to clean nature of the material. • Fraction +106µm proportionally added into the assemblage assuming all is trash minerals, adjusting particle classification assemblage's pro-rata to reflect inclusion. • For the prospect weighted average particle classification composite sample average applying TiO_2 breakpoints are <40%, => 40% Ilmenite, => 70% leucoxene, => 90% combined rutile and high TiO_2 leucoxene. Rio Tinto Exploration Pty Ltd • Data sourced from Muggeridge G. D. (2008) Combined Annual Report (C96/2003 Mt Jowlaenga) for the Period 21 July 2007 to 20 July 2008 E04/1373 Jowlaenga 1, E04/1375 Jowlaenga 3, E04/1376 Jowlaenga 4 and E04/1378 Jowlaenga 6 Western Canning Basin West Australia. Rio Tinto Exploration Pty Ltd statutory annual report to the Department of Mines, Infrastructure and Regulatory Safety (a79432) • Scanning Electron Microscopy (SEM) carried out on behalf of Rio Tinto by Commonwealth Scientific and Industrial Research Organisation (CSIRO). • Method of HM composite formation not known. • Sheffield calculated intersects by grams of individual samples averaged by weight of average HM for horizons. • Break points for TiO_2 minerals not known • Data manually entered from historic Muggeridge

Criteria	JORC Code explanation	Commentary
		2008 appendix pdf log
Quality of assay data and laboratory tests	• *The nature, quality and appropriateness of the assaying and laboratory procedures used and whether the technique is considered partial or total.* • *Nature of quality control procedures adopted (eg standards, blanks, duplicates, external laboratory checks) and whether acceptable levels of accuracy (ie lack of bias) and precision have been established.*	<u>HM%, SL% OS% Determination</u> • Assay and laboratory procedures are industry standard, although method specifics and heavy liquid composition can vary. • Sheffield drill holes contributed 100% to table of results. Argo and Stingray from historic SEM data and require validation by QEMSCAN™. • SL% was determined using a 38µm screen. • OS% was determined using a +1mm screen. • HM% was determined using heavy liquid TBE (2.96g/ml). • The method produces a total grade as weight per cent of the primary sample. • Method does not determine the relative amounts of valuable (saleable or marketable) and non-valuable heavy mineral species. See below for details of HM assemblage determination. • Reference standard and blank material samples inserted at the drill site 1 each in every 40 samples • The blank material used is commercially available builder's sand. • Reference blanks are examined for performance over time and within laboratory batches. Batches or sub-batches are re-analysed if unacceptable QAQC data are returned. • Analysis of reference blanks and laboratory standards, repeats show the data to be of acceptable accuracy and precision for the Mineral Resource estimation procedure and classification applied. <u>HM Assemblage Determination</u> • HM assemblage is determined from Sheffield drill holes. <u>Assemblage sample DACP001 to DACP006</u> • Historically announced by Sheffield in ASX announcement 25 February 2015. • HM assemblage determination was by a combination of screening, magnetic separation, QEMSCAN™ and XRF assay to determine the component mineralogy of the HM composite. • This method is considered an industry standard, typically optimised according to the HM characteristics of individual deposits. • For this sample a similar method to that developed for the Thunderbird Mineral Sands Deposit was applied. • HM composite was magnetically separated into highly-susceptible (H/S) magnetic 1, magnetic 2 and non-magnetic fractions, with each fraction weighed. The magnetic 1 and 2 fractions were combined and analysed by QEMSCAN™ for mineral determination as follows: Ilmenite: 40 to 70% TiO_2 >90% liberation Leucoxene: 70 to 90% TiO_2 >90% liberation High titanium leucoxene (high Ti leucoxene) and rutile: >90% TiO_2 >90% liberation Zircon: 66.7% ZrO_2+HfO_2 >90% liberation • The non-magnetic fraction was submitted for XRF analysis and minerals determined as follows:

Criteria	JORC Code explanation	Commentary
		Zircon: $ZrO_2+HfO_2/0.667$ Rutile and high TiO_2 leucoxene: $TiO_2/0.90$. • Reference material was not used, the method design and comparison to visual observation is considered sufficient to establish acceptable accuracy of the data for the reporting of exploration results. • Seagull inclusion of sample at 6.94% HM originally excluded from 25 February 2015 assemblage release <u>Assemblage samples DACP008 to DACP018</u> • Night Train mineral assemblage results announced 31 January 2019. • Heavy Mineral Concentrate from individual samples is combined according to HM grade and weight into (nominal) >20g composite samples for HM assemblage determination. • Weighed HM composite is split via a micro-riffle to ensure HM%, SL% and OS% of the final homogenised composite sample can be correctly calculated. • The HM composite was not screened due to the clean nature of the material • HM assemblage determination was by the QEMSCAN™ process which uses observed mass and chemistry to classify particles according to their average chemistry, and then report mineral particle classification by % mass. • For the TiO_2 minerals specific breakpoints are used to distinguish between rutile (>94% TiO_2), high Ti leucoxene (>90% TiO_2), leucoxene (>70% TiO_2), ilmenite (>40% TiO_2). • Reference material is not used, other measures of accuracy and the method design are considered sufficient to establish acceptable accuracy of the data for the Mineral Resource estimation and classification applied. <u>Assemblage samples DACP019 to DACP033 and NLCP001 to NLCP012</u> • Heavy Mineral Concentrate from individual samples is combined according to HM grade and weight into (nominal) >20g composite samples for HM assemblage determination. • Weight HM% to composite HM weight grams was 99% for samples • Weighed HM composite is split via a micro-riffle to ensure HM%, SL% and OS% of the final homogenised composite sample can be correctly calculated. • The HM composite was screened at -106µm to remove the coarser fraction which contains more trash minerals. • HM assemblage determination was by the QEMSCAN™ process which uses observed mass and chemistry to classify particles according to their average chemistry, and then report mineral particle classification by % mass. • For the TiO_2 minerals specific breakpoints are used to distinguish between rutile (>94% TiO_2), high TiO_2 leucoxene (>90% TiO_2), leucoxene (>70% TiO_2), ilmenite (>40% TiO_2). • Fraction +106µm proportionally added into the assemblage assuming all is trash minerals, adjusting

Criteria	JORC Code explanation	Commentary
		particle classification assemblage's pro-rata to reflect inclusion. • Reference material is not used, other measures of accuracy and the method design are considered sufficient to establish acceptable accuracy of the data for the Mineral Resource estimation and classification applied. <u>Resource mineral assemblage</u> • For Night Train Inferred Resource mineral assemblage by particle classification used at 2.0% HM cut-off (refer to ASX 31 January 2019). • For Thunderbird Measured, Indicated, Inferred mineral assemblage by particle classification used at 7.5% HM cut-off (refer to ASX 5 July 2016). <u>HM Zircon D_{50} grainsize determination</u> • HM D_{50} grainsize determination undertaken QEMSCAN™ assessing cumulative grainsize at 50% of distribution. Measured diameters are indicative of HM zircon diameter and best available data to date for all prospects other than Thunderbird. • Thunderbird D_{50} zircon grainsize announced 24 March 2017 and undertaken by screening of primary zircon product. • No information of D_{50} zircon grainsize for the historic Argo and Stingray prospects sourced from Muggeridge 2008. Grainsize interpretation in diagrams at Argo and Stingray is based on assemblage and VHM similarities on prospects that share similar characteristics. <u>Rio Tinto</u> • Historic data SEM assemblage sourced from Muggeridge G. D. (2008) Combined Annual Report (C96/2003 Mt Jowlaenga) for the Period 21 July 2007 to 20 July 2008 E04/1373 Jowlaenga 1, E04/1375 Jowlaenga 3, E04/1376 Jowlaenga 4 and E04/1378 Jowlaenga 6 Western Canning Basin West Australia. Rio Tinto Exploration Pty Ltd statutory annual report to the Department of Mines, Infrastructure and Regulatory Safety (a79432) • Scanning Electron Microscopy (SEM) carried out on behalf of Rio Tinto by Commonwealth Scientific and Industrial Research Organisation (CSIRO). • Sheffield calculated intersects by grams of individual samples averaged by weight of average HM for horizons. • Break points for TiO_2 minerals not known • Data manually entered from historic Muggeridge 2008 appendix pdf log. • Data is indicative as verification by Sheffield required.
Verification of sampling and assaying	• *The verification of significant intersections by either independent or alternative company personnel.* • *The use of twinned holes.* • *Documentation of primary data, data entry procedures, data verification, data storage (physical and electronic) protocols.* • *Discuss any adjustment to assay data.*	• Sheffield data was logged electronically using "validation at point of entry" systems prior to storage in the Company's drill hole database, which is managed by Company personnel and an external consultancy. • Documentation related to data custody and validation is maintained by the Company. • All drill holes were included in the from the drill database. • The verification and treatment of the data is

Criteria	JORC Code explanation	Commentary
		considered sufficient for mineral assemblage analysis. • The homogenised composite samples were screened at -106µm to remove the coarse fraction. Analysis was carried out by QEMSCAN™ to determine the assemblage of the composite samples by particle classification. The +106µm fraction was then proportionately added to the overall assemblage as trash to factor in the screened portion of the composite sample. • Material at Night Train was not screened.
Location of data points	• *Accuracy and quality of surveys used to locate drill holes (collar and down-hole surveys), trenches, mine workings and other locations used in Mineral Resource estimation.* • *Specification of the grid system used.* • *Quality and adequacy of topographic control.*	• Hole locations have been previously announced. See previously reported information.
Data spacing and distribution	• *Data spacing for reporting of Exploration Results.* • *Whether the data spacing and distribution is sufficient to establish the degree of geological and grade continuity appropriate for the Mineral Resource and Ore Reserve estimation procedure(s) and classifications applied.* • *Whether sample compositing has been applied.*	• Mineral assemblage data four composite samples from four holes separated by 1800m to 2400m apart at Bohemia • Mineral assemblage data for composite samples from four holes separated by 1000m to 1250m apart at Buckfast • Mineral assemblage data from four composite samples from nine holes separated by 420m to 1450m apart at Concorde • Mineral assemblage data three composite samples from five hole separated by 400m to 1100m apart at Cisco (upper zone). One drill hole only intersected the Cisco (lower zone) • Mineral assemblage data is separated in too three zones (A and C which are less trash dominant and zone B iron trash dominant) in eight composite samples from nine holes by 200m to 400m apart at Cold Duck • Mineral assemblage data is from one composite sample from four drill holes separated by 250m to 600m apart at Nomad (upper). One drill hole only intersected the Nomad (lower zone) • Mineral assemblage data is from one composite sample from two drill holes separated by 790m apart at Porphyry Pearl • Regional zircon grainsize (D50), VHM, zircon assemblage and titanium mineral diagrams interpretative between prospects based on available data.
Orientation of data in relation to geological structure	• *Whether the orientation of sampling achieves unbiased sampling of possible structures and the extent to which this is known, considering the deposit type.* • *If the relationship between the drilling orientation and the orientation of key mineralised structures is considered to have introduced a sampling bias, this should be assessed and reported if material.*	• All drilling is vertical making it normal to the horizontal orientation of geology and mineralisation.

Criteria	JORC Code explanation	Commentary
Sample security	• *The measures taken to ensure sample security.*	• Sample security is not considered a significant risk given the location of the deposit and bulk-nature of mineralisation. • Nevertheless, the use of recognised transport providers, sample dispatch procedures directly from the field to the laboratory, and the large number of samples are considered sufficient to ensure appropriate sample security.
Audits or reviews	• *The results of any audits or reviews of sampling techniques and data.*	• All data has been validated by at least two Company geologists

Section 2 Reporting of Exploration Results

Criteria	JORC Code explanation	Commentary
Mineral tenement and land tenure status	• *Type, reference name/number, location and ownership including agreements or material issues with third parties such as joint ventures, partnerships, overriding royalties, native title interests, historical sites, wilderness or national park and environmental settings.* • *The security of the tenure held at the time of reporting along with any known impediments to obtaining a licence to operate in the area.*	• The exploration results reported are from Exploration Licence E04/2081, E04/2083, E04/2084, E04/2171, E04/2349, E04/2350, E04/2400, E04/2456 and E04/2494, located on the Dampier Peninsula about 60km west of Derby, and 20km north of the sealed Great Northern Hwy joining Derby and Broome. • Tenement E04/2081, E04/2083, E04/2084, E04/2171, E04/2349, E04/2350, E04/2400 and E04/2494 are held by Thunderbird Operations Pty Ltd a 100% subsidiary of Sheffield Resources Ltd. • Tenement E04/2456 is held by Sheffield Resources Ltd • E04/2081 was granted on 02/05/2012 and is due to expire on 01/05/2022. E04/2083 was granted on 05/09/2011 and is due to expire on 04/09/2021. E04/2084 was granted on 22/03/2013 and is due to expire on 21/03/2023. E04/2171 was granted on 21/02/2013 and is due to expire on 20/02/2023. E04/2349 was granted on 25/11/2015 and is due to expire on 24/11/2020. E04/2350 was granted on 25/11/2015 and is due to expire on 24/11/2020. E04/2400 was granted on 24/03/2017 and is due to expire on 23/03/2022. E04/2494 was granted on 30/05/2018 and is due to expire on 29/05/2023. E04/2456 was granted on 08/02/2017 and is due to expire on 07/02/2022 • There are no known or experienced impediments to obtaining a licence to operate in the area. • Sheffield has been operating successfully in the region for more than 7.5 years to date.
Exploration done by other parties	• *Acknowledgment and appraisal of exploration by other parties.*	• Bohemia and Buckfast were initially identified by Iluka during a regional air core campaign. Refer to DMIRS report Iluka Resources Limited, Partial Surrender Report - Canning Basin North - Group C170/2012, for the Period 6 July 2011 to 5 July 2017, Nickolas Northcott, 11 August 2017 (#a114453) • Cold Duck was initially identified by Rio Tinto Exploration Pty Ltd (RTE) in 2005 during a regional air core program. Refer to DMIRS report RTE Annual Report for the period ending 20th July 2006 Muggeridge G. D (#a073223) • Porphyry Pearl is a new discovery by Sheffield • Cisco is a new discovery by Sheffield and proximal to the Central Zone identified by RTE Refer to DMIRS report RTE Annual Report for the period ending 20th July 2008 Muggeridge G. D (#a079432) • Night Train is a Sheffield discovery previously

Criteria	JORC Code explanation	Commentary
		announced 25 February 2015 • Nomad is a Sheffield discovery previously announced 25 February 2015 • Runaway initially identified by Iluka during a regional air core campaign. Refer to DMIRS report Iluka Resources Limited, Final Surrender Report - Final Surrender Report for the Roebuck North Reporting Group C170/2102, Tenements E04/2053, E04/2202 and E04/2203, for the Period 6 July 2011 to 20 June 2018, Melissa Taylor and Ngaire Koch, 07 August 2018 (#a117385) • Seagull is a Sheffield discovery previously announced 25 February 2015 • Stingray, Argo and Thunderbird was explored by Rio Tinto ("Rio") between 2003 and 2009. Rio completed four broadly spaced aircore drill traverses, identifying heavy mineral concentrations at Thunderbird averaging 8.07% HM with 8.0% zircon.
Geology	• *Deposit type, geological setting and style of mineralisation.*	• The Dampier Project is located within the Canning Basin in the Kimberley region of Western Australia. The Canning Basin is an intracratonic basin which contains Ordovician to Cretaceous deposits covered by Cainozoic sediments. • HM mineralisation of varying mineral assemblages, grain size and geological setting follow a target stratigraphic horizon defined over a strike length of approximately 160km. • Exploration drilling on the Dampier Project has shown that the region hosts Cretaceous marine coastal systems containing widespread HM mineralisation, including the world class Thunderbird deposit and the recently discovered Night Train deposit. The region is covered by thin but extensive Pindan soil plains which conceal large portions of the target horizon. • Exploration has so far identified fourteen individual prospects containing large, laterally extensive fine-medium grained sheet-like or lobate heavy mineral accumulations deposited in the Late Cretaceous. The variable mineral assemblages identified at these prospects suggest a variety of depositional environments and hinterland sources. • Mineralisation has been discovered at higher stratigraphic levels (i.e. Argo) above the extensively mineralised Thunderbird stratigraphic position. The different mineralised zones are thought to represent potential stacked shoreline facies that accumulated during marine transgressions in the Cretaceous.

Drillhole Information	• *A summary of all information material to the understanding of the exploration results including a tabulation of the following information for all Material drillholes:*
	  • easting and northing of the drillhole collar
	  • elevation or RL (elevation above sea level in metres) of the drillhole collar
	  • dip and azimuth of the hole
	  • down hole length and interception depth
	  • hole length.
		• Location of the drill holes used have been previously announced. Refer to ASX release dated 25 February 2015 ' Three New Mineral Sands Discoveries in Canning Basin', ASX release dated 09 October 2018 'Exceptional results confirm Major Discovery at Night Train', ASX release 17 October 2018 'Three New Mineral Sands Discoveries near Thunderbird', ASX release dated 13 November 2018 'New Large High Grade Discovery South of Thunderbird'.
		• Also refer to 05 July 2016 'Sheffield Doubles Measured Mineral Resource at Thunderbird', and ASX release dated 31 January 2019 ''High Grade Maiden Mineral Resource at Night Train'
		• Historic Rio Tinto Exploration Reports Muggeridge G. D. (2007) Combined Annual Report (C96/2003 Mt Jowlaenga) for the Period 21 July 2006 to 20 July 2007 E04/1373 Jowlaenga 1, E04/1375 Jowlaenga 3, E04/1376 Jowlaenga 4 and E04/1378 Jowlaenga 6 Western Canning Basin West Australia. Rio Tinto

Criteria	JORC Code explanation	Commentary
		Exploration Pty Ltd statutory annual report to the Department of Mines, Infrastructure and Regulatory Safety (a75902), and Muggeridge G. D. (2008) Combined Annual Report (C96/2003 Mt Jowlaenga) for the Period 21 July 2007 to 20 July 2008 E04/1373 Jowlaenga 1, E04/1375 Jowlaenga 3, E04/1376 Jowlaenga 4 and E04/1378 Jowlaenga 6 Western Canning Basin West Australia. Rio Tinto Exploration Pty Ltd statutory annual report to the Department of Mines, Infrastructure and Regulatory Safety (a79432) • Historic Iluka Reports Northcott N. (2017) Partial Surrender Report - Canning Basin North - Group C170/2012, for the Period 6 July 2011 to 5 July 2017, 11 August 2017. Iluka Resources Limited statutory partial surrender report to the Department of Mines, Infrastructure and Regulatory Safety (a114453), and Taylor M. and Koch N. (2018) Final Surrender Report - Roebuck North Reporting Group C170/2102, Tenements E04/2053, E04/2202 and E04/2203. Iluka Resources Limited statutory final surrender report to the Department of Mines, Infrastructure and Regulatory Safety (a117385) • Seagull has the inclusion of a 1.5m sample at 6.94% HM originally excluded from 25 February 2015 assemblage release. Oversize content of greater than 20% and less than 25% within sample was reason it was originally excluded. <u>Grade (%) x thickness (m) diagram</u> • All intervals calculated using 1% HM lower cut, 3m minimum width, maximum 3m internal waste, if multiple intersections per hole the maximum interval is used • Contains intersects reported by Rio Tinto Pty Ltd (Annual Reports – Combined Annual Report Mt Jowlaenga - Group C96/2003, for the Period 21 July 2007 to 20 July 2008, G D Muggeridge, September 2007 and Combined Annual Report Mt Jowlaenga - Group C96/2003, for the Period 21 July 2006 to 20 July 2007, G D Muggeridge, September 2008). and Iluka Holes (Iluka Resources Limited, Partial Surrender Report - Canning Basin North - Group C170/2012, for the Period 6 July 2011 to 5 July 2017, Nickolas Northcott, 11 August 2017). Taylor M. and Koch N. (2018) Final Surrender Report - Roebuck North Reporting Group C170/2102, Tenements E04/2053, E04/2202 and E04/2203. Iluka Resources Limited statutory final surrender report to the Department of Mines, Infrastructure and Regulatory Safety (a117385) • Grade (%) x thickness (m) diagram has a 0.5 dilution factor at Thunderbird and Cold Duck to account for iron oxides within the assemblage
Data aggregation methods	• *In reporting Exploration Results, weighting averaging techniques, maximum and/or minimum grade truncations (e.g. cutting of high grades) and cut-off grades are usually Material and should be stated.*	• Reported intersects from drill holes used in the resource estimate have been publicly released in previous Company announcements and reports referring to the Dampier prospects (Refer to Drill hole information section above). • Tabulation of regional average thickness by drilled intersect completed on Sheffield drill holes only. HM, SL and OS presented at HM 1% cut-off as weighted average of drilled intersect (m). Exception Thunderbird used HM Resource block model (05 July 2016) to calculate thickness at 1.0% cut-off and Night Train HM Resource block model to calculated

Criteria	JORC Code explanation	Commentary
		thickness at 1.0% so are comparable to drilled intersects. • Composite heavy mineral produced from individual samples combined according to HM grade and weight into (nominal) >20 g composite samples for mineral assemblage determination. The composite grade is based on weight of available material and selected geology and is not the HM grade of drilled intersect at a set cut-off. • Thunderbird mineral assemblage based on block model at HM 7.5% cut-off (05 July 2016) and Night Train HM 2.0% cut-off (31 January 2019)
Relationship between mineralisation widths and intercept lengths	• *If the geometry of the mineralisation with respect to the drillhole angle is known, its nature should be reported.* • *If it is not known and only the down hole lengths are reported, there should be a clear statement to this effect (e.g. 'down hole length, true width not known').*	• Mineralisation is generally flat-lying to less than 5 degrees dip, vertical drill holes therefore approximate true thickness.
Diagrams	• *Appropriate maps and sections (with scales) and tabulations of intercepts should be included for any significant discovery being reported These should include, but not be limited to a plan view of drill hole collar locations and appropriate sectional views.*	• Refer to body of announcement for plan
Balanced reporting	• *Where comprehensive reporting of all Exploration Results is not practicable, representative reporting of both low and high grades and/or widths should be practiced to avoid misleading reporting of Exploration Results.*	• All information considered material to the reader's understanding of the exploration results have been reported.
Other substantive exploration data	• *Other exploration data, if meaningful and material, should be reported including (but not limited to): geological observations; geophysical survey results; geochemical survey results; bulk samples – size and method of treatment; metallurgical test results; bulk density, groundwater, geotechnical and rock characteristics; potential deleterious or contaminating substances.*	• Argo Metallurgical test work: Yaxley D., Germain M. (2007) Metallurgical Investigation of Zircon Quality in a 420kg Composite Drill Hole Sample Using Conventional Processing Methods. Downer EDI Mining Report MS. 07/81633/1 for Rio Tinto Exploration Pty Ltd; 18 October 2007, in Muggeridge 2008 • Where relevant this information has been included or referred to elsewhere in this Table.
Further work	• *The nature and scale of planned further work (e.g. tests for lateral extensions or depth extensions or large-scale step-out drilling).*	• Refer to the Further Work section in the body of announcement.

Appendix 2

ORE RESERVES AND MINERAL RSOURCES

SHEFFIELD HM ORE RESERVE

1) DAMPIER PROJECT

SHEFFIELD ORE RESERVE FOR DAMPIER PROJECT AT 01 OCTOBER 2018 (in-situ assemblage)

Summary of Ore Reserve[1,2,3,4]				In-situ Assemblage[5]					
Deposit	Ore Reserve Category	Material Tonnes Millions (Mt)	THM (%)	Zircon (%)	HiTi Leuc (%)	Leuco-xene (%)	Ilmenite (%)	Oversize (%)	Slimes (%)
Thunderbird	Proved	235.8	13.3	1.00	0.29	0.26	3.55	13.7	16.5
	Probable	444.8	10.2	0.80	0.26	0.26	2.85	11.0	15.2
	Total	**680.5**	**11.3**	**0.87**	**0.27**	**0.26**	**3.10**	**12.0**	**15.7**

SHEFFIELD ORE RESERVE FOR DAMPIER PROJECT AT 01 OCTOBER 2018 (HM assemblage)

Summary of Ore Reserve[1,2,3,4]				HM Assemblage[6]					
Deposit	Ore Reserve Category	Material Tonnes Millions (Mt)	THM (%)	Zircon (%)	HiTi Leuc (%)	Leuco-xene (%)	Ilmenite (%)	Oversize (%)	Slimes (%)
Thunderbird	Proved	235.8	13.3	7.5	2.2	1.9	26.7	13.7	16.5
	Probable	444.8	10.2	7.8	2.5	2.6	28.0	11.0	15.2
	Total	**680.5**	**11.3**	**7.7**	**2.4**	**2.3**	**27.4**	**12.0**	**15.7**

Notes:

[1]The Ore Reserve estimate was prepared by Entech Pty Ltd and first disclosed under the JORC Code (2012), refer to ASX announcement 16 March 2017 for further details including Table 1. Ore Reserve is reported to a design overburden surface with appropriate consideration of modifying factors, costs, mineral assemblage, process recoveries and product pricing.

[2]Ore Reserve is a sub-set of Mineral Resource

[3]THM is within the 38µm to 1 mm size fraction and reported as a percentage of the total material, slimes is the -38µm fraction and oversize is the +1mm fraction.

[4]Tonnes and grades have been rounded to reflect the relative accuracy and confidence level of the estimate, thus the sum of columns may not equal.

[5]The in-situ assemblage grade is determined by multiplying the percentage of HM by the percentage of each valuable heavy mineral within the heavy mineral assemblage at the resource block model scale.

[6]Mineral Assemblage is reported as a percentage of HM Grade, it is derived by dividing the in-situ grade by the HM grade.

The Ore Reserve estimate was prepared by Entech Pty Ltd, an experienced and prominent mining engineering consultancy with appropriate mineral sands experience in accordance with the JORC Code (2012 Edition) and announced to the ASX on 16 March 2017. The Ore Reserve is estimated using all available geological and relevant drill hole and assay data, including mineralogical sampling and test work on mineral recoveries and final product qualities. The Company is not aware of any new information or data that materially affects the information included in the Ore Reserve estimate and confirms that all material assumptions and technical parameters underpinning the estimate continue to apply and have not materially changed. The Ore Reserve estimate is based on the current, July 2016 Thunderbird Mineral Resource estimate, announced to the ASX on 5 July 2016. Measured and Indicated Mineral Resources were converted to Proved and Probable Ore Reserves respectively, subject to mine design, modifying factors and economic evaluation.

SHEFFIELD HM MINERAL RESOURCE

1) DAMPIER PROJECT

SHEFFIELD MINERAL RESOURCE FOR DAMPIER PROJECT AT 01 OCTOBER 2018 (in-situ assemblage)

SHEFFIELD MINERAL RESOURCE FOR DAMPIER PROJECT (in-situ assemblage)

Summary of Mineral Resource[1,2,3]					In-situ Assemblage[5]					
Deposit	Mineral Resource Category	Cut off (THM%)	Material Tonnes Millions (Mt)	THM (%)	Zircon (%)	HiTi Leuc (%)	Leuco-xene (%)	Ilmenite (%)	Oversize (%)	Slimes (%)
Thunderbird low-grade	Measured	3.0	510	8.9	0.71	0.20	0.19	2.4	12	18
	Indicated	3.0	2,120	6.6	0.55	0.18	0.20	1.8	9	16
	Inferred	3.0	600	6.3	0.53	0.17	0.20	1.7	8	15
	Total	3.0	3,230	6.9	0.57	0.18	0.20	1.9	9	16
Night Train low-grade	Inferred	1.2	130	3.3	0.45	0.18	1.5	0.71	2.2	8.7
	Total	1.2	130	3.3	0.45	0.18	1.5	0.71	2.2	8.7
Thunderbird high-grade	Measured	7.5	220	14.5	1.07	0.31	0.27	3.9	15	16
	Indicated	7.5	640	11.8	0.90	0.28	0.25	3.3	11	14
	Inferred	7.5	180	10.8	0.87	0.27	0.26	3.0	9	13
	Total	7.5	1,050	12.2	0.93	0.28	0.26	3.3	11	15
Night Train high-grade	Inferred	2.0	50	5.9	0.82	0.33	2.9	1.06	2.2	10.2
	Total	2.0	50	5.9	0.82	0.33	2.9	1.06	2.2	10.2

Notes:

[1] Night Train: The Mineral Resource estimate was prepared by Optiro Pty Ltd and first disclosed under the JORC Code (2012) refer to ASX announcement 31 January 2019 for further details including Table 1. The Mineral Resource reported above 1.2% HM cut-off is inclusive of (not additional to) the Mineral Resource reported above 2.0% HM cut-off. Thunderbird: The Mineral Resource estimate was prepared by Optiro Pty Ltd and first disclosed under the JORC Code (2012) refer to ASX announcement 5 July 2016 for further details including Table 1. The Dampier Project Mineral Resources are reported inclusive of (not additional to) Ore Reserves. The Mineral Resource reported above 3% HM cut-off is inclusive of (not additional to) the Mineral Resource reported above 7.5% HM cut-off.

[2]THM is within the 38µm to 1mm size fraction and reported as a percentage of the total material, slimes is the -38µm fraction and oversize is the +1mm fraction.

[3]Tonnes and grades have been rounded to reflect the relative accuracy and confidence level of the estimate, thus the sum of columns may not equal.

[4] Night Train: Estimates of Mineral Assemblage are presented as percentages of the Heavy Mineral (HM) component of the deposit, as determined by magnetic separation, QEMSCAN™ and XRF for one of 12 composite samples. Magnetic fractions were analysed by QEMSCAN™ for mineral determination as follows: Ilmenite: 40-70% TiO_2 >90% Liberation; Leucoxene: 70-90% TiO_2 >90% Liberation; High Titanium Leucoxene (HiTi Leucoxene) and Rutile 90% TiO_2 >90% Liberation, and Zircon: 66.7% ZrO_2+HfO_2 >90% Liberation. The non-magnetic fraction was submitted for XRF analysis and minerals determined as follows: Zircon: ZrO2+Hf02/0.667 and High Titanium Leucoxene (HiTi Leucoxene): TiO_2/0.94. HM assemblage determination- was by the QEMSCAN™ process for 11 of 12 composite samples which uses observed mass and chemistry to classify particles according to their average chemistry, and then report mineral abundance by dominant % mass in particle. For the TiO_2 minerals the following breakpoints were used to distinguish between Ilmenite 40% to 70% TiO_2, Leucoxene 70% to 90% TiO_2, High Titanium Leucoxene and Rutile > 90%, Screening of the heavy mineral was not required. Thunderbird: Estimates of Mineral Assemblage are presented as percentages of the Heavy Mineral (HM) component of the deposit, as determined by magnetic separation, QEMSCAN™ and XRF. Magnetic fractions were analysed by QEMSCAN™ for mineral determination as follows: Ilmenite: 40-70% TiO_2 >90% Liberation; Leucoxene: 70-94% TiO_2 >90% Liberation; High Titanium Leucoxene (HiTi Leucoxene): >94% TiO_2 >90% Liberation; and Zircon: 66.7% ZrO_2+HfO_2 >90% Liberation. The non-magnetic fraction was submitted for XRF analysis and minerals determined as follows: Zircon: ZrO_2+HfO_2/0.667 and High Titanium Leucoxene (HiTi Leucoxene): TiO_2/0.94.

[5]in-situ assemblage grade is determined by multiplying the percentage of HM by the percentage of each valuable heavy mineral within the heavy mineral assemblage at the resource block model scale.

SHEFFIELD MINERAL RESOURCES FOR DAMPIER PROJECT AT 01 OCTOBER 2018 (HM assemblage)

Summary of Mineral Resource[1,2,3]					HM Assemblage[4]					
Deposit	Mineral Resource Category	Cut off (THM%)	Material Tonnes Millions (Mt)	THM (%)	Zircon (%)	HiTi Leuc[5] (%)	Leuco-xene (%)	Ilmenite (%)	Oversize (%)	Slimes (%)
Thunderbird low-grade	Measured	3.0	510	8.9	8.0	2.3	2.2	27	12	18
	Indicated	3.0	2,120	6.6	8.4	2.7	3.1	28	9	16
	Inferred	3.0	600	6.3	8.4	2.6	3.2	28	8	15
	Total	3.0	3,230	6.9	8.3	2.6	2.9	28	9	16
Night Train	Inferred	1.2	130	3.3	14	5.4	46	22	2.2	8.7
low-grade	**Total**	1.2	130	3.3	14	5.4	46	22	2.2	8.7
Thunderbird high-grade	Measured	7.5	220	14.5	7.4	2.1	1.9	27	15	16
	Indicated	7.5	640	11.8	7.6	2.4	2.1	28	11	14
	Inferred	7.5	180	10.8	8.0	2.5	2.4	28	9	13
	Total	7.5	1,050	12.2	7.6	2.3	2.1	27	11	15
Night Train	Inferred	2.0	50	5.9	14	5.6	49	18	2.2	10.2
high-grade	**Total**	2.0	50	5.9	14	5.6	49	18	2.2	10.2

Notes:

[1] Night Train: The Mineral Resource estimate was prepared by Optiro Pty Ltd and first disclosed under the JORC Code (2012) refer to ASX announcement 31 January 2019 for further details including Table 1. The Mineral Resource reported above 1.2% HM cut-off is inclusive of (not additional to) the Mineral Resource reported above 2.0% HM cut-off. Thunderbird: The Mineral Resource estimate was prepared by Optiro Pty Ltd and first disclosed under the JORC Code (2012) refer to ASX announcement 5 July 2016 for further details including Table 1. The Dampier Project Mineral Resources are reported inclusive of (not additional to) Ore Reserves. Thunderbird: The Mineral Resource reported above 3% HM cut-off is inclusive of (not additional to) the Mineral Resource reported above 7.5% HM cut-off. Night Train: The Mineral Resource reported above 1.2% HM cut-off is inclusive of (not additional to) the Mineral Resource reported above 2.0% HM cut-off.

[2] THM is within the 38µm to 1mm size fraction and reported as a percentage of the total material, slimes is the -38µm fraction and oversize is the +1mm fraction.

[3] Tonnes and grades have been rounded to reflect the relative accuracy and confidence level of the estimate, thus the sum of columns may not equal.

[4] Night Train: Estimates of Mineral Assemblage are presented as percentages of the Heavy Mineral (HM) component of the deposit, as determined by magnetic separation, QEMSCAN™ and XRF for one of 12 composite samples. Magnetic fractions were analysed by QEMSCAN™ for mineral determination as follows: Ilmenite: 40-70% TiO_2 >90% Liberation; Leucoxene: 70-90% TiO_2 >90% Liberation; High Titanium Leucoxene (HiTi Leucoxene) and Rutile 90% TiO_2 >90% Liberation, and Zircon: 66.7% ZrO_2+HfO_2 >90% Liberation. The non-magnetic fraction was submitted for XRF analysis and minerals determined as follows: Zircon: Zr02+Hf02/0.667 and High Titanium Leucoxene (HiTi Leucoxene): TiO_2/0.94. HM assemblage determination- was by the QEMSCAN™ process for 11 of 12 composite samples which uses observed mass and chemistry to classify particles according to their average chemistry, and then report mineral abundance by dominant % mass in particle. For the TiO_2 minerals the following breakpoints were used to distinguish between Ilmenite 40% to 70% TiO_2, Leucoxene 70% to 90% TiO_2, High Titanium Leucoxene and Rutile > 90%, Screening of the heavy mineral was not required. Thunderbird: Estimates of Mineral Assemblage are presented as percentages of the Heavy Mineral (HM) component of the deposit, as determined by magnetic separation, QEMSCAN™ and XRF. Magnetic fractions were analysed by QEMSCAN™ for mineral determination as follows: Ilmenite: 40-70% TiO_2 >90% Liberation; Leucoxene: 70-94% TiO_2 >90% Liberation; High Titanium Leucoxene (HiTi Leucoxene): >94% TiO_2 >90% Liberation; and Zircon: 66.7% ZrO_2+HfO_2 >90% Liberation. The non-magnetic fraction was submitted for XRF analysis and minerals determined as follows: Zircon: ZrO_2+HfO_2/0.667 and High Titanium Leucoxene (HiTi Leucoxene): TiO_2/0.94.

[5] HiTi Leucoxene and Rutile (%) combined for Night Train at a >90% TiO_2 (as one assemblage sample utilised=> 90% rutile and HiTi Leucoxene), HiTi Leucoxene for Thunderbird > 94% TiO_2

SHEFFIELD MINERAL RESOURCE FOR DAMPIER PROJECT AT 01 OCTOBER 2018 (in-situ tonnes)

Summary of Mineral Resource[1,2,3]			In-situ Tonnes[4]					
Deposit	Mineral Resource Category	Cut off (THM%)	THM Tonnes Millions (Mt)	Zircon (kt)	HiTi Leuc[5] (kt)	Leuco-xene (kt)	Ilmenite (kt)	Total VHM (kt)
Thunderbird low-grade	Measured	3.0	45	3,600	1,000	1,000	12,000	17,700
	Indicated	3.0	140	11,800	3,800	4,300	39,100	59,000
	Inferred	3.0	38	3,200	1,000	1,200	10,500	15,900
	Total	3.0	223	18,600	5,900	6,500	61,700	92,600
Night Train low-grade	Inferred	1.2	4.2	560	220	1,900	900	3,590
	Total	1.2	4.2	560	220	1,900	900	3,590
Total low-grade	Measured	3.0	45	3600	1000	1000	12000	17700
	Indicated	3.0	140	11,800	3,800	4,300	39,100	59,000
	Inferred	Various	42	3,760	1,220	3,100	11,400	19,490
	Total	Various	227	19,160	6,120	8,400	62,600	96,190
Thunderbird high-grade	Measured	7.5	32	2,300	700	600	8,400	12,000
	Indicated	7.5	76	5,800	1,800	1,600	21,000	30,200
	Inferred	7.5	20	1,600	500	500	5,600	8,200
	Total	7.5	127	9,700	3,000	2,700	35,000	50,400
Night Train high-grade	Inferred	2.0	3.0	420	170	1,500	540	2,600
	Total	2.0	3.0	420	170	1,500	540	2,600
Total high-grade	Measured	7.5	32	2300	700	600	8400	12000
	Indicated	7.5	76	5,800	1,800	1,600	21,000	30,200
	Inferred	Various	23	2,020	670	2,000	6,140	10,800
	Total	Various	131	10,120	3,170	4,200	35,540	53,000

Notes:

[1] Night Train: The Mineral Resource estimate was prepared by Optiro Pty Ltd and first disclosed under the JORC Code (2012) refer to ASX announcement 31 January 2019 for further details including Table 1. The Mineral Resource reported above 1.2% HM cut-off is inclusive of (not additional to) the Mineral Resource reported above 2.0% HM cut-off. Thunderbird: The Mineral Resource estimate was prepared by Optiro Pty Ltd and first disclosed under the JORC Code (2012) refer to ASX announcement 5 July 2016 for further details including Table 1. The Dampier Project Mineral Resources are reported inclusive of (not additional to) Ore Reserves. Thunderbird: The Mineral Resource reported above 3% HM cut-off is inclusive of (not additional to) the Mineral Resource reported above 7.5% HM cut-off. Night Train: The Mineral Resource reported above 1.2% HM cut-off is inclusive of (not additional to) the Mineral Resource reported above 2.0% HM cut-off.

[2] THM is within the 38µm to 1mm size fraction and reported as a percentage of the total material, slimes is the -38µm fraction and oversize is the +1mm fraction.

[3] Tonnes and grades have been rounded to reflect the relative accuracy and confidence level of the estimate, thus the sum of columns may not equal.

[4] The contained in-situ tonnes for the valuable heavy minerals were derived from information from the Mineral Resource tables

[5] HiTi Leucoxene and Rutile (%) combined for Night Train at a >90% TiO_2 (as one assemblage sample utilised=> 90% rutile and HiTi Leucoxene), HiTi Leucoxene for Thunderbird > 94% TiO_2

2) ENEABBA PROJECT

SHEFFIELD MINERAL RESOURCES FOR THE ENEABBA PROJECT AT 01 OCTOBER 2018 (in-situ assemblage)

Summary of Mineral Resource[1,2]					In-situ Assemblage[11]					
Deposit	Mineral Resource Category	Cut off (THM %)	Material Tonnes Millions (Mt)	THM (%)	Zircon (%)	Rutile (%)	Leuco-xene (%)	Ilmenite (%)	Oversize (%)	Slimes (%)
Yandanooka[4,6,8]	Measured	1.4	2.6	4.3	0.44	0.09	0.10	3.08	11.3	15
	Indicated	1.4	57.7	3.0	0.37	0.11	0.11	2.08	11.4	15
	Inferred	1.4	0.4	1.5	0.16	0.05	0.07	1.01	21.9	20
	Total	1.4	60.8	3.0	0.37	0.11	0.11	2.11	11.5	15
Durack[4,6,7,8]	Indicated	1.4	20.7	2.9	0.40	0.09	0.11	2.07	14.7	14
	Inferred	1.4	5.6	2.6	0.37	0.07	0.19	1.68	18.3	16
	Total	1.4	26.3	2.8	0.39	0.08	0.13	1.99	15.5	14
Drummond Crossing[3,4, 6,8]	Indicated	1.4	35.5	2.4	0.33	0.24	0.08	1.26	7.7	14
	Inferred	1.4	3.3	2.3	0.26	0.21	0.06	1.31	7.2	12
	Total	1.4	38.8	2.4	0.33	0.24	0.08	1.26	7.7	14
Robbs Cross[5,6,8]	Indicated	1.4	14.0	1.9	0.27	0.24	0.09	0.88	6.2	6
	Inferred	1.4	3.8	2.0	0.29	0.22	0.08	1.02	8.1	6
	Total	1.4	17.8	1.9	0.28	0.23	0.09	0.91	6.6	6
Thomson[5,8,]	Inferred	1.4	26	2.0	0.38	0.28	0.11	0.85	6.9	18
	Total	1.4	26	2.0	0.38	0.28	0.11	0.85	6.9	18
West Mine North[3,4,6,9,]	Indicated	2.0	10.2	7.3	0.43	0.48	0.13	3.51	2.3	11
	Inferred	2.0	1.8	2.7	0.25	0.23	0.06	1.31	3.0	17
	Total	2.0	12.0	6.6	0.40	0.44	0.12	3.18	2.4	12
Ellengail[3,4,9,10]	Indicated	2.0	6.5	5.3	0.53	0.43	0.55	3.49	3.2	15
	Inferred	2.0	5.3	4.1	0.41	0.34	0.35	2.55	2.5	15
	Total	2.0	11.8	4.8	0.47	0.39	0.46	3.07	2.9	15
Total	Measured	1.4	2.6	4.3	0.44	0.09	0.10	3.08	11	15
	Indicated	Various	144.6	3.1	0.37	0.19	0.12	1.92	9	14
	Inferred	Various	46.0	2.4	0.36	0.24	0.14	1.21	8	16
	Total	Various	193.3	3.0	0.36	0.20	0.13	1.77	9	14

[1]The Mineral Resource estimates were prepared by Optiro Pty Ltd and first disclosed under the JORC Code (2012) refer to this ASX announcement and December 2017 Quarterly Activities Report for Robbs Cross and Thomson deposits for further details

[2]All tonnages and grades have been rounded to reflect the relative uncertainty of the estimate, thus the sums of columns may not equal.

[3]THM %: Samples from 1989 and 1996 (Drummond Crossing, Ellengail and West Mine North) were analysed using a -75 µm slimes / +2 mm oversize screen. Separation of HM% was by heavy liquid TBE (density 2.84 g/ml) from the -710µm+75µm fraction.

[4]THM %: RGC samples from 1998 and Iluka samples (Drummond Crossing, Durack, Ellengail, West Mine North and Yandanooka) were analysed using a -53 µm slimes / +2 mm oversize screen. Separation of total HM% was by heavy liquid TBE (density 2.90 g/ml) from the -710µm+53µm fraction.

[5]THM %: Samples from Robbs Cross and Thomson analysed by Diamantina Laboratories in Perth using a -45 µm slimes / +1 mm oversize screen (method DIA_HLS_45µm_1mm). Separation of total HM% was by heavy liquid TBE (density 2.96g/ml) from the -45 µm+1mm fraction.

[6]THM %: Samples from Drummond Crossing, Durack, West Mine North and Yandanooka were analysed by Western Geolabs in Perth using a -53 µm slimes / +1 mm oversize screen. Separation of total HM% was by heavy liquid TBE (density 2.96 g/ml) from the +53µm-1mm fraction.

[7]Reported below an upper cut-off grade of 35% slimes.

[8]Estimates of mineral assemblage are presented as percentages of the total heavy mineral (THM) component of the deposit, as determined by QEMSCAN analysis. For the TiO_2 minerals specific breakpoints are used to distinguish between rutile (>95% TiO_2), leucoxene (85-95% TiO_2) and ilmenite (<55-85% TiO_2).

[9]At West Mine North and Ellengail mineral assemblage data determined by Iluka using Method 4 (HMC is separated into magnetics and non-magnetics) was used with the Sheffield QEMSCAN data

[10]At Ellengail mineral assemblage data determined by Iluka using Method 3 (magnetic separation and XRF analysis) was used with the Sheffield QEMSCAN data and Iluka Method 4 data

[11]The in-situ assemblage grade is determined by multiplying the percentage of HM by the percentage of each valuable heavy mineral within the heavy mineral assemblage at the resource block model scale.

SHEFFIELD MINERAL RESOURCE FOR ENEABBA PROJECT AT 01 OCTOBER 2018 (HM assemblage)

Summary of Mineral Resource[1,2]					HM Assemblage[8,9,10]					
Deposit	Mineral Resource Category	Cut off (THM %)	Material Tonnes Millions (Mt)	THM (%)	Zircon (%)	Rutile (%)	Leuco-xene (%)	Ilmenite (%)	Oversize (%)	Slimes (%)
Yandanooka[4,6,8]	Measured	1.4	2.6	4.3	10	2.1	2.3	72	11.3	15
	Indicated	1.4	57.7	3.0	12	3.6	3.7	69	11.4	15
	Inferred	1.4	0.4	1.5	11	3.0	4.4	68	21.9	20
	Total	1.4	60.8	3.0	12	3.5	3.6	70	11.5	15
Durack[4,6,7,8]	Indicated	1.4	20.7	2.9	14	2.9	3.7	71	14.7	14
	Inferred	1.4	5.6	2.6	14	2.6	7.4	64	18.3	16
	Total	1.4	26.3	2.8	14	2.9	4.4	70	15.5	14
Drummond Crossing[3,4, 6,8]	Indicated	1.4	35.5	2.4	14	10.3	3.4	53	7.7	14
	Inferred	1.4	3.3	2.3	11	9.0	2.7	56	7.2	12
	Total	1.4	38.8	2.4	14	10.2	3.4	54	7.7	14
Robbs Cross[5,6,8]	Indicated	1.4	14.0	1.9	15	12.7	5.0	47	6.2	6
	Inferred	1.4	3.8	2.0	14	10.9	4.1	50	8.1	6
	Total	1.4	17.8	1.9	15	12.3	4.8	48	6.6	6
Thomson[5,8,]	Inferred	1.4	26	2.0	19	13.8	5.4	42	6.9	18
	Total	1.4	26	2.0	19	13.8	5.4	42	6.9	18
West Mine North[3,4,6,9,]	Indicated	2.0	10.2	7.3	6	6.5	1.8	48	2.3	11
	Inferred	2.0	1.8	2.7	9	8.6	2.1	50	3.0	17
	Total	2.0	12.0	6.6	6	6.6	1.8	48	2.4	12
Ellengail[3,4,9,10]	Indicated	2.0	6.5	5.3	10	8.0	10.4	66	3.2	15
	Inferred	2.0	5.3	4.1	10	8.2	8.4	62	2.5	15
	Total	2.0	11.8	4.8	10	8.1	9.6	64	2.9	15
Total	Measured	1.4	2.6	4.3	10	2.1	2.3	72	11	15
	Indicated	Various	144.6	3.1	12	6.1	3.9	62	9	14
	Inferred	Various	46.0	2.4	15	10.3	5.8	51	8	16
	Total	Various	193.3	3.0	12	6.8	4.2	60	9	14

[1]The Mineral Resource estimates were prepared by Optiro Pty Ltd and first disclosed under the JORC Code (2012) refer to this ASX announcement and December 2017 Quarterly Activities Report for Robbs Cross and Thomson deposits for further details

[2]All tonnages and grades have been rounded to reflect the relative uncertainty of the estimate, thus the sums of columns may not equal.

[3]THM %: Samples from 1989 and 1996 (Drummond Crossing, Ellengail and West Mine North) were analysed using a -75 µm slimes / +2 mm oversize screen. Separation of HM% was by heavy liquid TBE (density 2.84 g/ml) from the -710µm+75µm fraction.

[4]THM %: RGC samples from 1998 and Iluka samples (Drummond Crossing, Durack, Ellengail, West Mine North and Yandanooka) were analysed using a -53 µm slimes / +2 mm oversize screen. Separation of total HM% was by heavy liquid TBE (density 2.90 g/ml) from the -710µm+53µm fraction.

[5]THM %: Samples from Robbs Cross and Thomson analysed by Diamantina Laboratories in Perth using a -45 µm slimes / +1 mm oversize screen (method DIA_HLS_45µm_1mm). Separation of total HM% was by heavy liquid TBE (density 2.96g/ml) from the -45 µm+1mm fraction.

[6]THM %: Samples from Drummond Crossing, Durack, West Mine North and Yandanooka were analysed by Western Geolabs in Perth using a -53 µm slimes / +1 mm oversize screen. Separation of total HM% was by heavy liquid TBE (density 2.96 g/ml) from the +53µm-1mm fraction.

[7]Reported below an upper cut-off grade of 35% slimes.

[8]Estimates of mineral assemblage are presented as percentages of the total heavy mineral (THM) component of the deposit, as determined by QEMSCAN analysis. For the TiO_2 minerals specific breakpoints are used to distinguish between rutile (>95% TiO_2), leucoxene (85-95% TiO_2) and ilmenite (<55-85% TiO_2).

[9]At West Mine North and Ellengail mineral assemblage data determined by Iluka using Method 4 (HMC is separated into magnetics and non-magnetics) was used with the Sheffield QEMSCAN data

[10]At Ellengail mineral assemblage data determined by Iluka using Method 3 (magnetic separation and XRF analysis) was used with the Sheffield QEMSCAN data and Iluka Method 4 data

[11]The in-situ assemblage grade is determined by multiplying the percentage of HM by the percentage of each valuable heavy mineral within the heavy mineral assemblage at the resource block model scale.

SHEFFIELD MINERAL RESOURCE FOR ENEABBA PROJECT AT 01 OCTOBER 2018 (in-situ tonnes)

Summary of Mineral Resource[1,2,3]			In-situ Tonnes					
Deposit	Mineral Resource Category	Cut off (THM%)	THM Tonnes Millions (kt)	Zircon (kt)	Rutile (kt)	Leuco-xene (kt)	Ilmenite (kt)	Total VHM (kt)
Yandanooka[4, 6,8]	Measured	1.4	112	12	2	3	81	98
	Indicated	1.4	1,726	212	63	63	1,197	1,535
	Inferred	1.4	7	1	0.2	0.3	4	6
	Total	1.4	1,845	224	65	66	1,283	1,639
Durack[4,6,7,8]	Indicated	1.4	600	82	18	22	429	551
	Inferred	1.4	148	21	4	11	95	130
	Total	1.4	748	104	21	33	523	681
Drummond Crossing[3,4, 6,8]	Indicated	1.4	838	118	86	29	447	680
	Inferred	1.4	77	9	7	2	43	61
	Total	1.4	915	127	93	31	490	741
Robbs Cross[5,6,8]	Indicated	1.4	261	38	33	13	123	208
	Inferred	1.4	77	11	8	3	39	61
	Total	1.4	338	50	41	16	162	269
Thomson[5,8,]	Inferred	1.4	516	97	71	28	219	415
	Total	1.4	516	97	71	28	219	415
West Mine North[3,4,6,9,]	Indicated	2.0	748	44	49	13	359	465
	Inferred	2.0	48	5	4	1	24	34
	Total	2.0	796	48	53	14	383	498
Ellengail[3,4,9,10]	Indicated	2.0	346	34	28	36	227	325
	Inferred	2.0	218	22	18	18	136	193
	Total	2.0	565	56	46	54	363	519
Total	Measured	1.4	112	12	2	3	81	98
	Indicated	Various	4,519	529	276	176	2,782	3,764
	Inferred	Various	1,091	165	113	64	559	900
	Total	Various	5,723	705	392	242	3,423	4,762

Notes:

[1]The Mineral Resource estimates were prepared by Optiro Pty Ltd and first disclosed under the JORC Code (2012) refer to this ASX announcement and December 2017 Quarterly Activities Report for Robbs Cross and Thomson deposits for further details

[2]All tonnages and grades have been rounded to reflect the relative uncertainty of the estimate, thus the sums of columns may not equal.

[3]THM %: Samples from 1989 and 1996 (Drummond Crossing, Ellengail and West Mine North) were analysed using a -75 µm slimes / +2 mm oversize screen. Separation of HM% was by heavy liquid TBE (density 2.84 g/ml) from the -710µm+75µm fraction.

[4]THM %: RGC samples from 1998 and Iluka samples (Drummond Crossing, Durack, Ellengail, West Mine North and Yandanooka) were analysed using a -53 µm slimes / +2 mm oversize screen. Separation of total HM% was by heavy liquid TBE (density 2.90 g/ml) from the -710µm+53µm fraction.

[5]THM %: Samples from Robbs Cross and Thomson analysed by Diamantina Laboratories in Perth using a -45 µm slimes / +1 mm oversize screen (method DIA_HLS_45µm_1mm). Separation of total HM% was by heavy liquid TBE (density 2.96g/ml) from the -45 µm+1mm fraction.

[6]THM %: Samples from Drummond Crossing, Durack, West Mine North and Yandanooka were analysed by Western Geolabs in Perth using a -53 µm slimes / +1 mm oversize screen. Separation of total HM% was by heavy liquid TBE (density 2.96 g/ml) from the +53µm-1mm fraction.

[7]Reported below an upper cut-off grade of 35% slimes.

[8]Estimates of mineral assemblage are presented as percentages of the total heavy mineral (THM) component of the deposit, as determined by QEMSCAN analysis. For the TiO_2 minerals specific breakpoints are used to distinguish between rutile (>95% TiO_2), leucoxene (85-95% TiO_2) and ilmenite (<55-85% TiO_2).

[9]At West Mine North and Ellengail mineral assemblage data determined by Iluka using Method 4 (HMC is separated into magnetics and non-magnetics) was used with the Sheffield QEMSCAN data

[10]At Ellengail mineral assemblage data determined by Iluka using Method 3 (magnetic separation and XRF analysis) was used with the Sheffield QEMSCAN data and Iluka Method 4 data

[11]The in-situ assemblage grade is determined by multiplying the percentage of HM by the percentage of each valuable heavy mineral within the heavy mineral assemblage at the resource block model scale.

3) McCALLS PROJECT

SHEFFIELD MINERAL RESOURCES FOR McCALLS PROJECT AT 01 OCTOBER 2018 (in-situ assemblage)

Summary of Mineral Resources[1,2,3,4,7]					In-situ Assemblage[6]					
Deposit	Mineral Resource Category	Cut off (THM%)	Material Tonnes Millions (Mt)	THM (%)	Zircon (%)	Rutile (%)	Leuco-xene (%)	Ilmenite (%)	Oversize (%)	Slimes (%)
McCalls	Indicated	1.1	1,630	1.4	0.07	0.05	0.04	1.10	1.1	21
	Inferred	1.1	1,980	1.2	0.06	0.05	0.04	1.00	1.1	26
	Total	1.1	3,600	1.3	0.07	0.05	0.04	1.05	1.1	24
Mindarra Springs	Inferred	1.1	2,200	1.6	0.07	0.01	0.05	1.32	5.1	20
	Total	1.1	2,200	1.6	0.07	0.01	0.05	1.32	5.1	20
Total	Indicated	1.1	1,630	1.4	0.07	0.05	0.04	1.10	1.1	21
	Inferred	1.1	4,180	1.5	0.07	0.03	0.05	1.17	3.2	23
	Total	1.1	5,800	1.4	0.07	0.03	0.04	1.15	2.6	22

SHEFFIELD MINERAL RESOURCES FOR McCALLS PROJECT AT 01 OCTOBER 2018 (HM assemblage)

Summary of Mineral Resources[1,2,3,4,7]					HM Assemblage[5]					
Deposit	Mineral Resource Category	Cut off (THM%)	Material Tonnes Millions (Mt)	THM (%)	Zircon (%)	Rutile (%)	Leuco-xene (%)	Ilmenite (%)	Oversize (%)	Slimes (%)
McCalls	Indicated	1.1	1,630	1.4	5.2	3.3	2.8	77	1.1	21
	Inferred	1.1	1,980	1.2	5.0	3.8	3.2	81	1.1	26
	Total	1.1	3,600	1.3	5.1	3.6	3.0	79	1.1	24
Mindarra Springs	Inferred	1.1	2,200	1.6	4.2	0.9	3.1	80	5.1	20
	Total	1.1	2,200	1.6	4.2	0.9	3.1	80	5.1	20
Total	Indicated	1.1	1,630	1.4	5.2	3.3	2.8	77	1.1	21
	Inferred	1.1	4,180	1.5	4.5	2.1	3.2	81	3.2	23
	Total	1.1	5,800	1.4	4.7	2.4	3.1	79	2.6	22

[1]The Mineral Resource estimates were prepared by Optiro Pty Ltd and first disclosed under the JORC Code (2012) refer to this ASX announcement

[2]All tonnages and grades have been rounded to reflect the relative uncertainty of the estimate, thus the sums of columns may not equal.

[3]THM is within the 45µm to 1mm size fraction and reported as a percentage of the total material, slimes is the -45µm fraction and oversize is the +1mm fraction.

[4]Reported below an upper cut-off grade of 35% slimes.

[5]Estimates of mineral assemblage (Sheffield) are presented as percentages of the total heavy mineral (THM) component of the deposit, as determined by QEMSCAN analysis. For the TiO_2 minerals specific breakpoints are used to distinguish between rutile (>95% TiO_2), leucoxene (85-95% TiO_2) and ilmenite (<55-85% TiO_2). Estimates of mineral assemblage (BHP) HM assemblage determination was by magnetic separation and observation (grain-counting)

[6]The in-situ assemblage grade is determined by multiplying the percentage of HM by the percentage of each valuable heavy mineral within the heavy mineral assemblage at the resource block model scale.

[7]Excludes Mineral Resources within the Mogumber Nature Reserve

SHEFFIELD MINERAL RESOURCES FOR McCALLS PROJECT AT 01 OCTOBER 2018 (in-situ tonnes)

Summary of Mineral Resources[1,2,3,4,7]			In-situ Tonnes					
Deposit	Mineral Resource Category	Cut off (THM%)	THM Tonnes Millions (Mt)	Zircon (kt)	Rutile (kt)	Leuco-xene (kt)	Ilmenite (kt)	Total VHM (kt)
McCalls	Indicated	1.1	23.3	1,210	770	650	17,940	20,570
	Inferred	1.1	24.4	1,210	930	790	19,790	22,720
	Total	1.1	47.7	2,430	1,700	1,430	37,730	43,290
Mindarra Springs	Inferred	1.1	36.3	1,520	320	1,130	29,080	32,050
	Total	1.1	36.3	1,520	320	1,130	29,080	32,050
Total	Indicated	1.1	23.3	1,210	770	650	17,940	20,570
	Inferred	1.1	60.7	2,740	1,250	1,920	48,860	54,770
	Total	1.1	84.0	3,950	2,020	2,570	66,810	75,340

[1]The Mineral Resource estimates were prepared by Optiro Pty Ltd and first disclosed under the JORC Code (2012) refer to this ASX announcement

[2]All tonnages and grades have been rounded to reflect the relative uncertainty of the estimate, thus the sums of columns may not equal.

[3]THM is within the 45µm to 1mm size fraction and reported as a percentage of the total material, slimes is the -45µm fraction and oversize is the +1mm fraction.

[4]Reported below an upper cut-off grade of 35% slimes.

[5]Estimates of mineral assemblage (Sheffield) are presented as percentages of the total heavy mineral (THM) component of the deposit, as determined by QEMSCAN analysis. For the TiO_2 minerals specific breakpoints are used to distinguish between rutile (>95% TiO_2), leucoxene (85-95% TiO_2) and ilmenite (<55-85% TiO_2). Estimates of mineral assemblage (BHP) HM assemblage determination was by magnetic separation and observation (grain-counting)

[6]The in-situ assemblage grade is determined by multiplying the percentage of HM by the percentage of each valuable heavy mineral within the heavy mineral assemblage at the resource block model scale.

[7]Excludes Mineral Resources within the Mogumber Nature Reserve

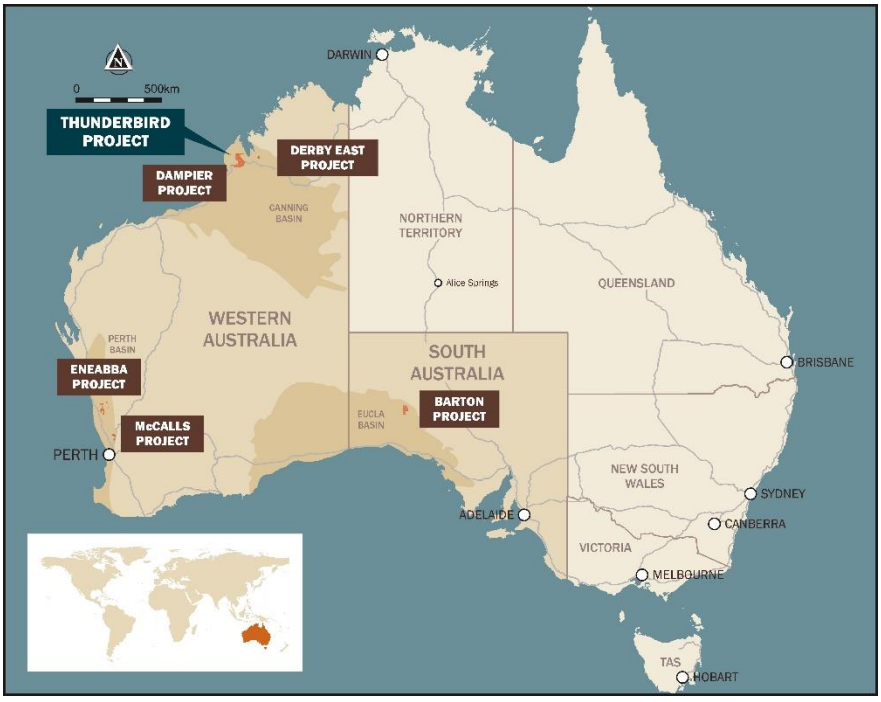

Figure 9: Location of Sheffield's Mineral Sands Projects

GOVERNANCE AND INTERNAL CONTROLS

Mineral Resource and Ore Reserve are compiled by qualified Sheffield personnel and/or independent consultants following industry standard methodology and techniques. The underlying data, methodology, techniques and assumptions on which estimates are prepared are subject to internal peer review by senior Company personnel, as is JORC compliance. Where deemed necessary or appropriate, estimates are reviewed by independent consultants. Competent Persons named by the Company are members of the Australasian Institute of Mining and Metallurgy and/or the Australian Institute of Geoscientists and qualify as Competent Persons as defined in the JORC Code 2012.

COMPETENT PERSONS AND COMPLIANCE STATEMENTS

The information in this report that relates to Exploration Results is based on information compiled by Mr Seb Gray, a Competent Person who is a Member of Australian Institute of Geoscientists (AIG). Mr Gray is a full-time employee of Sheffield Resources Ltd and has sufficient experience that 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 Gray consents to the inclusion in the report of the matters based on his information in the form and context in which it appears.

The Company's Ore Reserves and Mineral Resources Statement is based on information first reported in previous ASX announcements by the Company. These announcements are listed below and are available to view on Sheffield's website www.sheffieldresources.com.au. Mineral Resources and Ore Reserves reported for the Dampier Project and Mineral Resources reported for the Eneabba and McCalls Projects, are prepared and disclosed under the JORC Code 2012. The Company confirms that it is not aware of any new information or data that materially affects the information included in the relevant original market announcements and that all material assumptions and technical parameters underpinning the estimates in the relevant original market announcement continue to apply and have not materially changed.

The information in this report that relates to the estimation of the Ore Reserve is based on information compiled by Mr Per Scrimshaw, a Competent Person who is a Member of the Australasian Institute of Mining and Metallurgy. Mr Scrimshaw is employed by Entech Pty Ltd and has sufficient experience that 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 Scrimshaw 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 the estimation of the Mineral Resources is based on information compiled by Mrs Christine Standing, a Competent Person who is a Member of the Australian Institute of Geoscientists (AIG) and the Australasian Institute of Mining and Metallurgy (AusIMM). Mrs Standing is a full-time employee of Optiro Pty Ltd and has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity which she is undertaking 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'. Mrs Standing consents to the inclusion in this report of the matters based on her information in the form and context in which it appears.

The information in this report that relates to the Thunderbird Mineral Resource is based on information compiled under the guidance of Mr Mark Teakle, a Competent Person who is a Member of the Australian Institute of Geoscientists (AIG) and the Australasian Institute of Mining and Metallurgy (AusIMM). Mr Teakle is a full-time employee of Sheffield Resources Ltd and has sufficient experience that 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 Teakle consents to the inclusion in the report of the matters based on his information in the form and context in which it appears.

The Competent Persons for reporting of Mineral Resources and Ore Reserves in the relevant original market announcements are listed below. The Company confirms that the form and context in which the Competent Persons' findings are presented have not been materially modified from the relevant original market announcement.

Ore Reserves and Mineral Resources prepared and first disclosed under the JORC Code 2012):

Item	Report title	Report Date	Competent Person(s)
Thunderbird Ore Reserve	Thunderbird Ore Reserve Update	16 March 2017	P. Scrimshaw
Thunderbird Mineral Resource	Sheffield Doubles Measured Mineral Resource at Thunderbird	5 July 2016	M. Teakle, C. Standing
Night Train Mineral Resource	High Grade Maiden Mineral Resource at Night Train	31 January 2019	C. Standing
Robbs Cross Mineral Resource	Quarterly Activities Report for The Period Ended 31 December 2017	25 January 2017	C. Standing
Thomson Mineral Resource	Quarterly Activities Report for The Period Ended 31 December 2017	25 January 2017	C. Standing
Yandanooka Mineral Resource	Mineral Resource and Ore Reserve Statement	03 October 2018	C. Standing
Durack Mineral Resource	Mineral Resource and Ore Reserve Statement	03 October 2018	C. Standing
Drummond Crossing Mineral Resource	Mineral Resource and Ore Reserve Statement	03 October 2018	C. Standing
West Mine North Mineral Resource	Mineral Resource and Ore Reserve Statement	03 October 2018	C. Standing
Ellengail Mineral Resource	Mineral Resource and Ore Reserve Statement	03 October 2018	C. Standing
McCalls Mineral Resource	Mineral Resource and Ore Reserve Statement	03 October 2018	C. Standing
Mindarra Springs Mineral Resource	Mineral Resource and Ore Reserve Statement	03 October 2018	C. Standing

Item	Name	Company	Professional Affiliation
Exploration Results	Mr Seb Gray	Sheffield Resources	MAIG
Mineral Resource Reporting	Mr Mark Teakle	Sheffield Resources	MAIG, MAusIMM
Mineral Resource Estimation	Mrs Christine Standing	Optiro	MAIG, MAusIMM
Ore Reserve	Mr Per Scrimshaw	Entech	MAusIMM

SUPPORTING INFORMATION REQUIRED UNDER ASX LISTING RULES, CHAPTER 5

The supporting information below is required, under Chapter 5 of the ASX Listing Rules, to be included in market announcements reporting estimates of Mineral Resources and Ore Reserves.

Section 1, Section 2, of JORC Table 1 can be found in Appendices 1.

PREVIOUSLY REPORTED INFORMATION

This report includes information that relates to Exploration Results, Mineral Resources and Ore Reserves prepared and first disclosed under the JORC Code 2012 and a Bankable Feasibility Study. The information was extracted from the Company's previous ASX announcements as follows:

- Night Train Inferred Resource and Mineral Assemblage results "*HIGH GRADE MAIDEN MINERAL RESOURCE AT NIGHT TRAIN*" 31 January 2019
- Yandanooka, Durack, Drummond Crossing, West Mine North, Ellengail, McCalls and Mindarra Springs Resource Estimates and including Mineral Resource and Ore Statement "*MINERAL RESOURCE AND RESERVE STATEMENT*" 03 October, 2018
- Thomson and Robbs Cross Mineral Resources: "QUARTERLY ACTIVITIES REPORT FOR THE PERIOD ENDED 31 DECEMBER 2017" 30 January, 2018
- Thunderbird Ore Reserve: *"THUNDERBIRD ORE RESERVE UPDATE"* 16 March, 2017
- Thunderbird Bankable Feasibility Study: *"THUNDERBIRD BFS DELIVERS OUTSTANDING RESULTS"* 24 March, 2017
- McCalls Mineral Resource: *"QUARTERLY ACTIVITIES REPORT FOR THE PERIOD ENDED 30 JUNE 2016"* 25 July 2016.
- Thunderbird Mineral Resource: *"SHEFFIELD DOUBLES MEASURED MINERAL RESOURCE AT THUNDERBIRD"* 5 July, 2016

These announcements are available to view on Sheffield's website www.sheffieldresources.com.au.

The Company confirms that it is not aware of any new information or data that materially affects the information included in the relevant market announcements and, in the case of estimates of Mineral Resources, Ore Reserves and the Bankable Feasibility Study, that all material assumptions and technical parameters underpinning the estimates in the relevant market announcement continue to apply and have not materially changed. The Company confirms that the form and context in which the Competent Persons' findings are presented have not been materially modified from the relevant original market announcements.

FORWARD LOOKING AND CAUTIONARY STATEMENTS

The contents of this report reflect various technical and economic conditions at the time of writing. Given the nature of the resources industry, these conditions can change significantly over relatively short periods of time. Consequently, actual results may vary from those contained in this report.

Some statements in this report regarding estimates or future events are forward-looking statements. They include indications of, and guidance on, future earnings, cash flow, costs and financial performance. Forward-looking statements include, but are not limited to, statements preceded by words such as "planned", "expected", "projected", "estimated", "may", "scheduled", "intends", "anticipates", "believes", "potential", "predict", "foresee", "proposed", "aim", "target", "opportunity", "could", "nominal", "conceptual" and similar expressions. Forward-looking statements, opinions and estimates included in this report are based on assumptions and contingencies which are subject to change without notice, as are statements about market and industry trends, which are based on interpretations of current market conditions. Forward-looking statements are provided as a general guide only and should not be relied on as a guarantee of future performance. Forward-looking statements may be affected by a range of variables that could cause actual results to differ from estimated results and may cause the Company's actual performance and financial results in future periods to materially differ from any projections of future performance or results expressed or implied by such forward-looking statements. So there can be no assurance that actual outcomes will not materially differ from these forward-looking statements.