



**Breakaway  
Research**

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### Company Information

ASX Code	SFX
Share Price	A\$0.69
Ord Shares	101.7m
Un-listed Options	25.1m
ITM option value	A\$6.5m
<b>Market Cap</b>	<b>A\$70.1m</b>
Diluted MCAP	A\$87.4m
Cash (Dec 12)	A\$6.2m
Total Debt	A\$0m
<b>Enterprise Value</b>	<b>A\$63.9m</b>

### Directors

Chairman	Will Burbury
Managing Director	Bruce McQuitty
Technical Director	David Archer

### Substantial Share Holders

Bruce McQuitty	5.11%
Will Burbury	5.11%
David Archer	5.05%

### Company Details

Address	14 Prowse Street West Perth WA 6005
Phone	+618 6424 8440
Web	www.sheffieldresources.com.au

### 1 Year Price Chart



Source: Bloomberg

# Sheffield Resources (SFX)

*Metallurgical studies confirm Thunderbird  
as a world class mineral sands project*

**Recommendation: Speculative BUY**

## Company Update

### Key Points

- **Metallurgical test work underscores Thunderbird as 'world-class'**
- **High quality zircon, rutile, ilmenite and leucoxene products achieved via conventional processing**
- **Infill and extensional drilling campaigns likely to lead to upgrades**
- **PFS expected during Q3/Q4 2013**
- **Drilling to commence imminently at Fraser Range 'Red Bull' nickel copper project**

*Metallurgical test work undertaken at Sheffield's Thunderbird deposit demonstrates high quality zircon, ilmenite, rutile and leucoxene products can be achieved using conventional processing methods. Scoping level studies are well advanced which will lead to pre-feasibility studies expected in 2H2013. An active drill program at Dampier and at the Fraser Range 'Red Bull' nickel-copper project will commence imminently and will likely lead to positive news flow.*

### Investment Thesis

Sheffield Resources (ASX: SFX) flagship Thunderbird deposit currently hosts a JORC Resource of **1.37Bn tonnes @ 6.1% HM** with mineralisation still open in most directions. Within this Resource, Sheffield has identified a 'high grade core' which hosts **517Mt @ 10.1% HM** for a total of 52Mt of Valuable Heavy Minerals (VHM).

Metallurgical studies have recently been completed and indicate the Thunderbird deposit is capable of producing high quality zircon, ilmenite, rutile, and leucoxene products using conventional processing methods. **These results are significant and underscore Thunderbird as a world class mineral sands deposit.**

Scoping level studies are already underway with more detailed pre-feasibility studies scheduled for Q3/Q4 2013. An infill and resource extensional drilling program is planned at Thunderbird in June 2013 which should lead to resource upgrades in both size and JORC category. The nearby Argo deposit will also be drill tested as part of the overall campaign.

At the Red Bull copper-nickel prospect within the Fraser Range, Sheffield has now identified numerous high priority targets. An initial air core drill program is set to commence imminently and will be followed by more extensive RC and diamond drilling campaigns during Q2/Q3 2013.



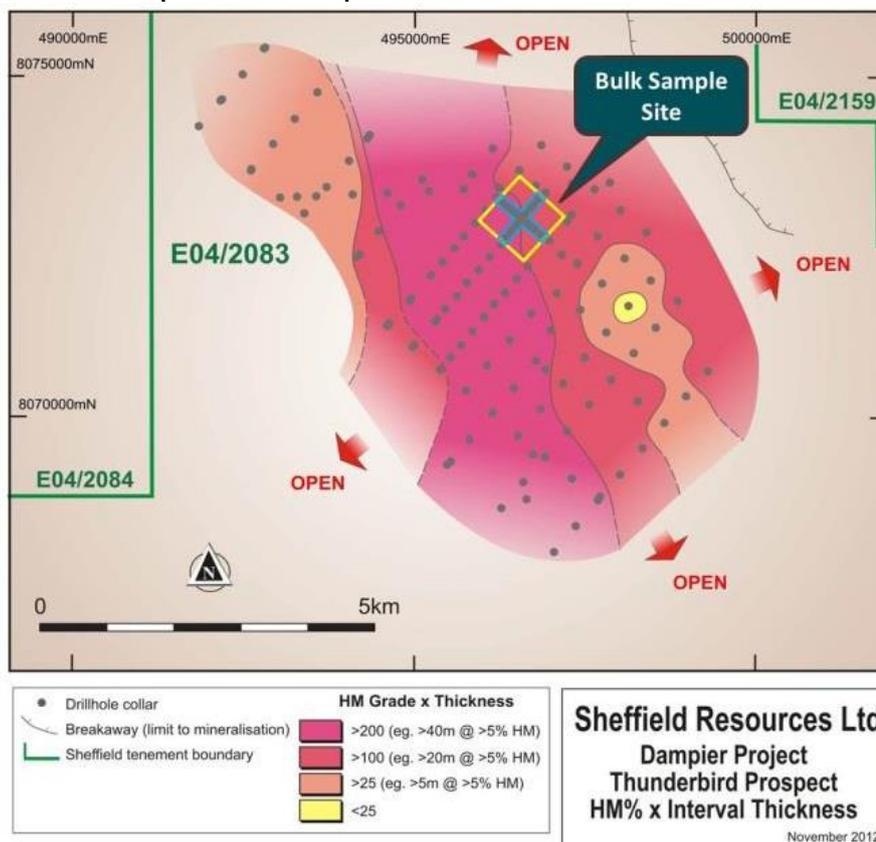
## Company Update

### Thunderbird Metallurgy

Sheffield Resources, in conjunction with Robbins Metallurgical Pty Ltd, recently completed metallurgical test work on a six tonne bulk sample which was collected from 31 aircore holes (drilled at 60m spacing) near the centre of the deposit.

*Metallurgical studies completed from 6t sample*

#### Tunderbird Deposit – Bulk Sample Location



Source: Sheffield Resources

### Summary of Results

The metallurgical test work utilised conventional cyclones and a 6 stage spiral gravity circuit to produce a Heavy Mineral Concentrate (HMC). The concentrate was then upgraded to individual +90% HM concentrates (zircon, rutile and ilmenite components) by utilising wet, high intensity magnetic separation and gravity circuits. Further separation via electrostatic, magnetic and gravity processing delivered high quality final products.

*High quality products achieved with conventional processing*

#### Primary Zircon Specifications

ZrO <sub>2</sub> %	Fe <sub>2</sub> O <sub>3</sub> %	TiO <sub>2</sub> %	Al <sub>2</sub> O <sub>3</sub> %	U ppm	Th ppm
66.2	0.05	0.06	0.1	320	221

#### Primary Ilmenite Specifications

TiO <sub>2</sub> %	FeO%	Fe <sub>2</sub> O <sub>3</sub> %	SiO <sub>2</sub> %	Al <sub>2</sub> O <sub>3</sub> %	Cr <sub>2</sub> O <sub>3</sub> %	ZrO%
57.7	24.2	14.3	0.9	0.4	0.08	0.08

Source: Sheffield Resources



*Zircon product likely to sell for a premium to prevailing prices*

Breakaway is particularly encouraged by the high quality, premium grade, zircon product produced (containing 66.2% ZrO<sub>2</sub>), which should meet the specifications for the premium zircon market and thus sell at a premium to prevailing zircon price. The primary Ilmenite products demonstrated low contaminate levels and are expected to meet the specifications of the sulphate Ilmenite market.

### Resource potential upside

*Significant resource already established*

The Thunderbird deposit currently hosts a Resource of **1.37Bn tonnes @ 6.1% HM for 83Mt of contained Heavy Minerals**. Within this Resource, Sheffield has identified a **'high grade core'** which hosts 517Mt @ 10.1% HM for 52Mt of contained Heavy Minerals.

To put the Thunderbird resource into perspective, the Resource is at least six times larger and triple the grade to that of Sheffield's Eneabba project (located within the North Perth Basin of WA) which currently hosts 226Mt @ 2.3% HM, for a total of 5.3Mt of contained HM.

*'High grade core' of 517Mt @ 10.1% HM*

#### Thunderbird Deposit: JORC Resource

Resource Category	Mineral Resource			In-Situ HM (Mt)	Heavy Mineral Assemblage			
	Cut-off HM%	Million tonnes (Mt)	HM %		Zircon %	Rutile %	Leucoxene %	Ilmenite %
Indicated	2.0	299	7.2	21.5	6.9	1.6	4.3	29
Inferred	2.0	1,075	5.8	61.9	6.9	1.6	4.3	29
<b>Total</b>	<b>2.0</b>	<b>1,374</b>	<b>6.1</b>	<b>83.4</b>	<b>6.9</b>	<b>1.6</b>	<b>4.3</b>	<b>29</b>
Indicated	7.5	137	11.5	15.8	6.9	1.6	4.3	29
Inferred	7.5	379	9.6	36.5	6.9	1.6	4.3	29
<b>Total</b>	<b>7.5</b>	<b>517</b>	<b>10.1</b>	<b>52.3</b>	<b>6.9</b>	<b>1.6</b>	<b>4.3</b>	<b>29</b>

Source: Sheffield Resources

*Bulk sample returned higher grades than expected*

Analysis of the bulk sample resulted in a HM grade of 7.7% containing 8.6% zircon. This represents a 15% higher HM content and 36% higher zircon content than that indicated by corresponding drill hole intervals (6.7% HM, 6.3% zircon).

The difference in grades is yet to be fully assessed; however, it does indicate the **potential for the current Resource to be underestimating the HM and zircon grades** which may be achievable through processing.

### Additional Exploration Potential

*Resource still open in most directions*

Significant exploration potential still exists beyond the boundaries of current Thunderbird resource with several km's of strike yet to be tested. At the nearby Argo prospect, a Cultural Heritage Survey is currently being advanced ahead of a 4,500m drill program set to commence mid 2013 (during the dry season). Historical drilling highlights at Argo include 12m @ 3.49% HM from 42m and 7.5m @ 3.44% HM from 27m.



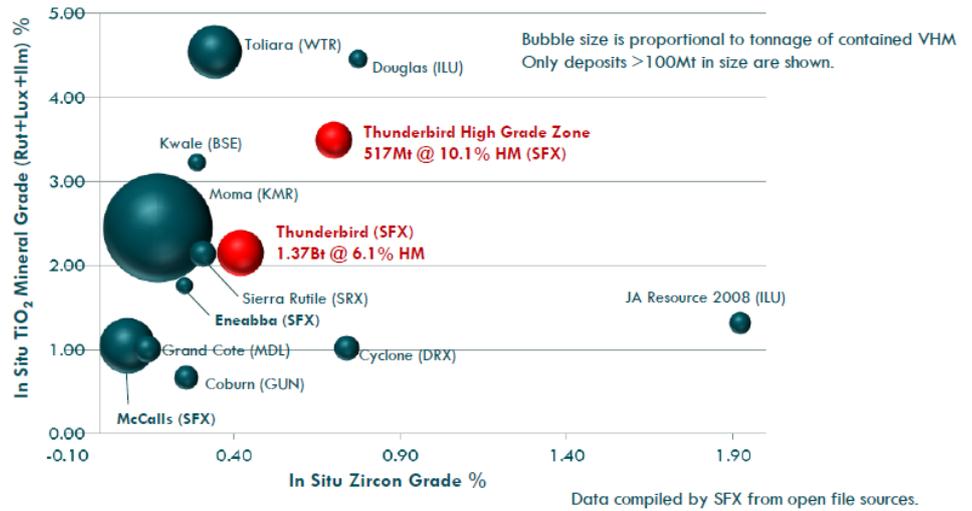
## Breakaway's View

Metallurgy underscores Thunderbird as a world class project

The metallurgical test work recently undertaken is an important step in the company's ambition of becoming a globally recognised producer of mineral sands. Breakaway is highly encouraged by the results achieved as they indicate that the Thunderbird deposit has the potential to generate high quality products (zircon, rutile, ilmenite and leucoxene) using conventional processing technology.

The grade and size of the Thunderbird resource bode well for favourable economics once in production (this will be assessed during the feasibility stage). The chart below illustrates the Thunderbird deposit (the total resource and the 'high grade' core) relative to its peers, and demonstrates the deposit to be amongst the highest in terms of in-situ zircon and TiO<sub>2</sub> grades.

Compares favourably amongst peers

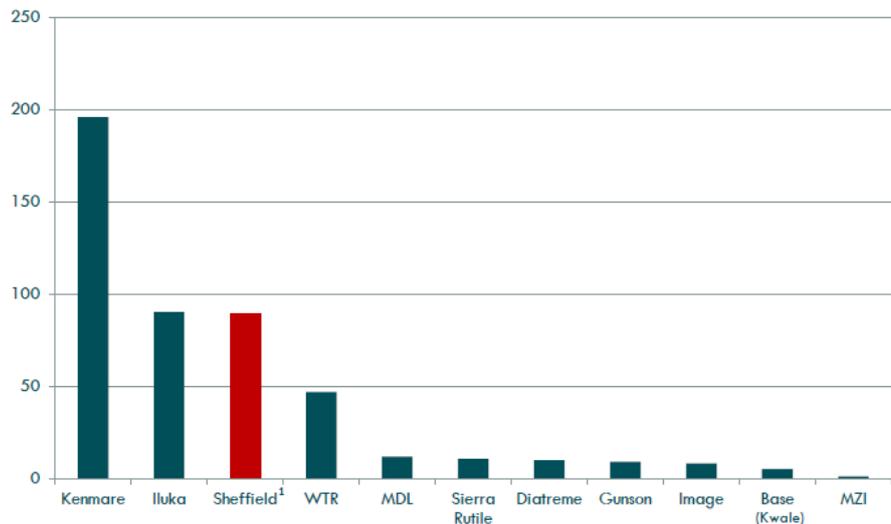


Source: Sheffield Resources

The chart below further emphasises Sheffield's position in becoming a globally significant mineral sand player with its Valuable Heavy Mineral (VHM) now at a total of 90Mt, comparable to that of Iluka.

90Mt of Valuable Heavy Minerals

### Peer comparison of Total Valuable Heavy Mineral (VHM) in Resources (Mt)



Thunderbird discovery has boosted Sheffield's resource inventory to 90Mt VHM<sup>1</sup>

Source: Sheffield Resources



## The Next Steps for Thunderbird (and Argo)

*PFS studies to commence*

Following the initial favourable metallurgical results, Sheffield expects to conduct Pre-Feasibility Studies (PFS) during Q3/Q4 2013 (with scoping level studies already well advanced).

*Drilling program will likely increase the size and category of resource*

A drilling program is planned to commence in June 2013 (during the dry season) which has been designed to infill the Thunderbird deposit and thus increase the 'indicated' component of the resource. The drill program will also test strike extensions of the Thunderbird deposit and provide additional samples for further metallurgical testing, which will be required for flow sheet optimisation and for product marketing.

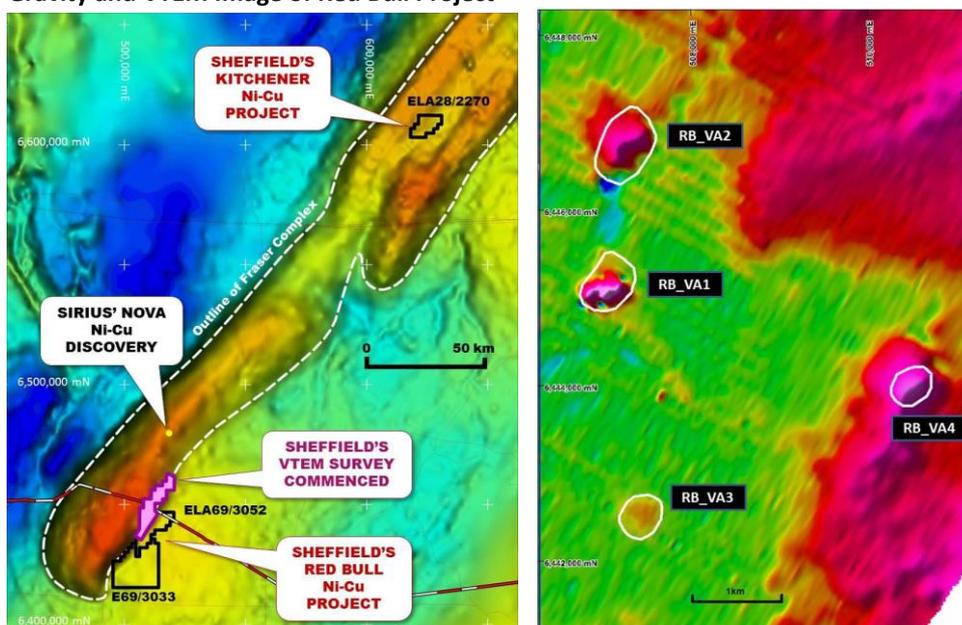
*Argo will also be drill tested*

As part of the exploration program, Sheffield anticipates drilling ~4,500m at the Argo prospect, located 12km west of Thunderbird. Encouraging historical drilling highlights include 12m @ 3.49% HM from 42m and 7.5m @ 3.44% HM from 27m. However, no resource has yet been estimated.

## Exploration at Red Bull – Fraser Range

### Gravity and VTEM Image of Red Bull Project

*Red Bull located in close proximity to Nova deposit*



Source: Sheffield Resources

*High Priority targets identified*

The Red Bull project encompasses two exploration licences for a total of ~525km<sup>2</sup> and is located approximately 20km south of Sirius's Nova deposit. A further exploration licence known as the "Kitchener Project" is currently under application and is located ~160km north east of the Nova deposit, still within the Fraser Range complex.

In November 2012, Sheffield undertook a VTEM survey over an area of 144km<sup>2</sup> within the north western zone of E69/3052 (shaded in pink in the above-left image). Initial interpretation of the survey identified **four high priority targets**, three of which show a correlation with magnetic anomalies, which together are a strong indicator of mineralised systems.

*Drilling set to commence imminently*

### Drilling to commence imminently

An air core drill program is set to commence in April 2013 which will be followed by a more extensive RC/Diamond campaign during Q2/Q3. Given the recent success of Sirius at the Nova deposit, the results of this initial drill program are eagerly awaited.



### **Analyst Verification**

We, Grant Craighead and Andrew McLeod, as the Research Analysts, hereby certify that the views expressed in this research accurately reflect our personal views about the subject securities or issuers and no part of analyst compensation is directly or indirectly related to the inclusion of specific recommendations or views in this research.

### **Disclosure**

Breakaway Investment Group (AFSL 290093) may receive corporate advisory fees, consultancy fees and commissions on sale and purchase of the shares of Sheffield Resources and may hold direct and indirect shares in the company. It has also received a commission on the preparation of this research note.

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