



**Breakaway  
Research**

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### Company Information

ASX Code	TGN
Share Price	A\$0.18
Ord Shares	79.1m
Unlisted Options	15m
<b>Market Cap</b>	<b>A\$14.2m</b>
Cash (Mar 13)	A\$2.3m
Total Debt	A\$0m
<b>Enterprise Value</b>	<b>A\$12.0m</b>

### Directors

Non-Executive Chairman	Pat McManus
Managing Director	Paul Berndt
Non-Executive Director	Francis Loh

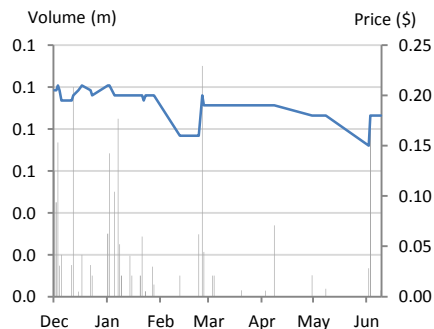
### Substantial Shareholders

Poh Yeo Siak	7.6%
Northern Minerals	5.1%
SM3 Res PL	5.1%
Ocean State Entps Ltd	5.1%
Hilux Res PL	4.4%

### Company Details

Address	Suite 3, 23 Belgravia Street, Belmont, WA 6104
Phone	+618 9477 30311
Web	www.tungstenmining.com

### 1 Year Price Chart



Source: Bloomberg

# Tungsten Mining (TGN)

*Right commodity at the right time*

**Recommendation: Speculative BUY**

## Company Update

### Key Points

- **Maiden JORC Resource of 5Mt @ 0.27% WO<sub>3</sub> for ~14kt of contained tungsten**
- **Positive Scoping Study indicates 7 year LOM (@ 0.75Mtpa) to produce a total of 1.1 million mtu of tungsten concentrate**
- **Simple processing with high recovery rate of ~80%**
- **First production scheduled for end of 2014**
- **Estimated CAPEX of ~A\$56M to be paid back in first 2 years**
- **Robust outlook for tungsten provides valuation upside**
- **Scoping Study NPV<sub>7</sub> A\$36M (A\$0.46 per share)**

*Tungsten Mining is steadily checking off items as it advances towards first production, scheduled for end CY2014. The recently announced maiden JORC Resource and Scoping Study point towards a robust project with significant valuation upside possible with forecasted increases in tungsten pricing.*

### Investment Thesis

Tungsten Mining (ASX: TGN) recently announced a maiden JORC Resource of 5Mt @ 0.27% WO<sub>3</sub> at its flagship Kilba project, located in the Gascoyne region, north-west WA. Encouragingly, this was a 73% increase on the company's target resource for the Kilba project. Following the JORC Resource announcement, Tungsten Mining released the results from a Scoping Study which indicate a viable and economically attractive project.

Tungsten Mining has an ambitious target of first production by September 2014 and appears well on track to meet this objective. The Kilba project is already on a granted Mining Licence and all environmental studies have been completed. Breakaway anticipates the company will soon announce an off-take MOU with a major tungsten end user, completing another vital step on the path towards production.

An infill drilling program is planned for 2H 2013, aimed at upgrading much of the current 5Mt resource and estimating an initial mining reserve. Detailed engineering studies necessary for the feasibility study are also underway and should be completed by the end of 2013.

Fundamentals of the tungsten market continue to point to higher prices brought about by supply/demand imbalances. With first production scheduled for end of 2014, Tungsten Mining is well placed to deliver into buoyant market conditions.



## Project Update

### Maiden JORC Resource

Tungsten Mining recently announced a maiden JORC Resource at its 100% owned Kilba Project. The Resource is made up of two zones of mineralisation at 'Zone 8' and 'Zone 11' which combines to give a total Resource of 5Mt @ 0.27% WO<sub>3</sub> (based on a 0.10% WO<sub>3</sub> cut-off).

Maiden JORC Resource of 5Mt @ 0.27% WO<sub>3</sub>

### Kilba Project: JORC Resource

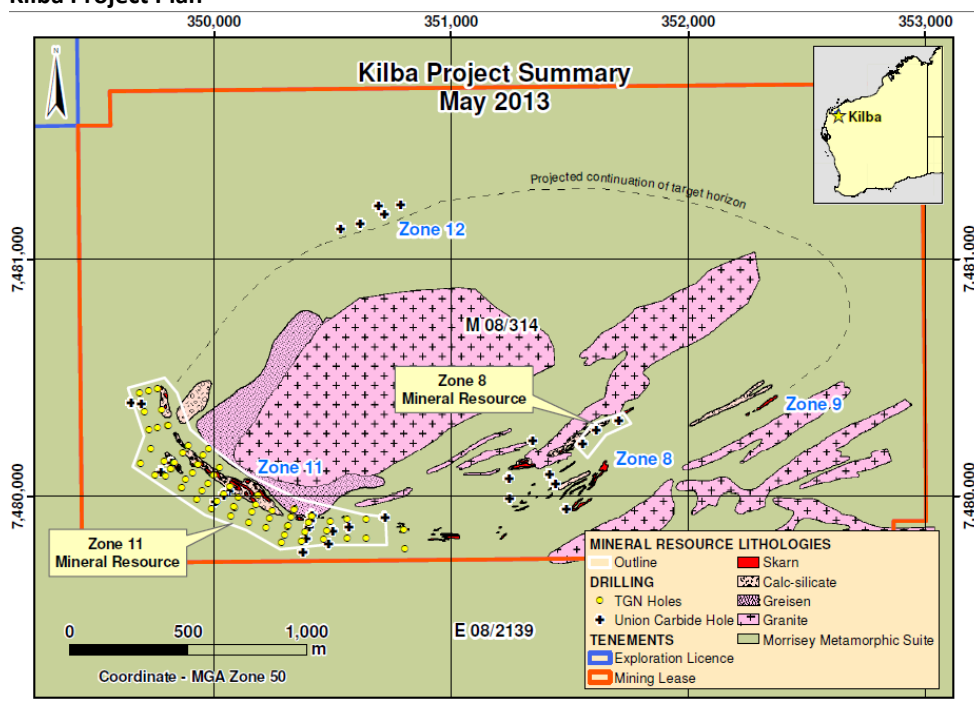
Zone	Category	Tonnes (000's t)	WO <sub>3</sub> %	WO <sub>3</sub> (t)
8	Inferred	230	0.56	1,300
	<b>Total</b>	<b>230</b>	<b>0.56</b>	<b>1,300</b>
11	Indicated	1,300	0.30	4,000
	Inferred	3,500	0.24	8,500
	<b>Total</b>	<b>4,800</b>	<b>0.29</b>	<b>13,000</b>
<b>Total</b>	Indicated	1,300	0.30	4,000
	Inferred	3,730	0.26	9,800
	<b>Total</b>	<b>5,000</b>	<b>0.27</b>	<b>14,000</b>

Source: Tungsten Mining

The 'Zone 11' deposit hosts the majority of the Resource (~95%) and includes a high grade component of 1.3Mt @ 0.57% WO<sub>3</sub>.

### Kilba Project Plan

Zone 11 hosts 95% of the current Resource



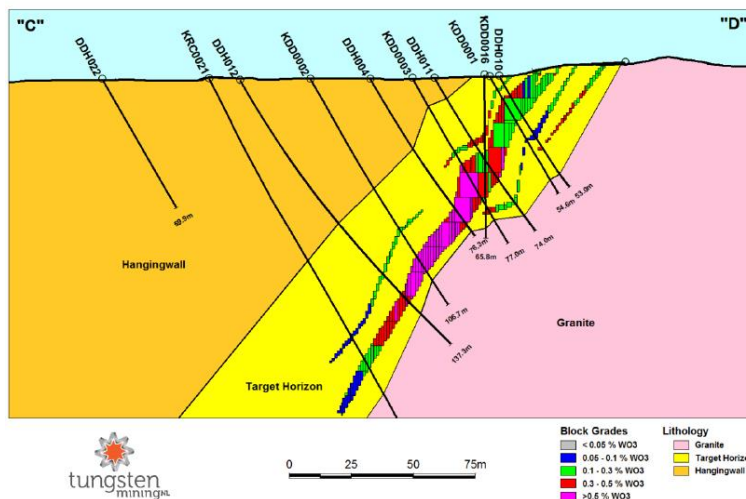
Source: Tungsten Mining

The Zone 11 ore body is interpreted to dip at 30-70 degrees towards the south-west with the mineralisation predominantly associated with skarns and calc-silicate units.



### Zone 11: Block Model and Cross Section

*Steeply dipping ore body with high grade core*



Source: Tungsten Mining

### Mineralogy

*Coarse grained mineralisation provides for easy processing and high recovery rates*

The Kilba project was previously explored by Union Carbide in the 1980's. Historic metallurgical testing estimated a tungsten recovery rate of ~84% from the tungsten bearing ore (scheelite). This exceptionally high recovery was due to the coarse grained nature of the mineralisation making it relatively easy to liberate and simple to process.

Tungsten Mining recently confirmed these high recovery rates (of at least 80% recovery) though work carried out with ALS-Ammtec. Test work indicates that the optimum liberation size (grind size) of the scheelite mineralisation is 1-2mm and at this size, the ore responds well to conventional gravity separation techniques, such as spirals and shaking tables. The simple beneficiation techniques lead to relatively modest CAPEX requirements.

### Scoping Study

Tungsten Mining recently completed a preliminary in-house scoping study designed to assess the viability of the Kilba Tungsten Project. The highlights of this study are summarised in the table below.

*Robust project economics*

#### Scoping Study Outcomes

Anticipated initial mine life	7 years
Total production (LOM), $\text{WO}_3$	1.1M mtu
Average production p.a. $\text{WO}_3$	154,000 mtu
Capital Cost A\$	A\$ 56 million
Average LOM Operating Cost	US\$ 212/mtu
Tungsten recovery overall	80%
Tungsten concentrate grade	>68% $\text{WO}_3$
IRR	34%
<b>NPV at 7% (@ US\$440/mtu APT price)</b>	<b>\$36 million</b>

Source: Tungsten Mining

Breakaway has modelled the Kilba project based on the cost inputs of the Scoping Study. Assuming on a US\$440/mtu APT price (as forecast by Roskill forecast to 2016), our project valuation is in line with the company's estimate of NPV<sub>7</sub> \$36M (46cps).

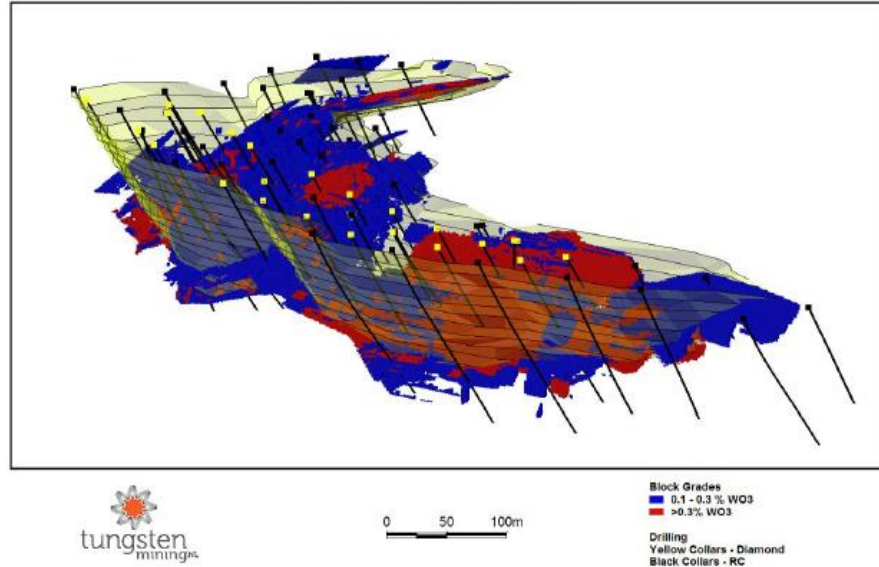


## Open Pit Mining

Tungsten Mining envisages a single open pit (incorporating the Zone 11 ore body) approximately 1.2km long, up to 300m wide and ~120m deep. A small satellite open pit is also envisaged for the Zone 8 ore body.

### Zone 11 – Open Pit Model

Relatively simple open pit mining



Source: Tungsten Mining

## Production Schedule

Entire ore body to be mined in 3 ½ years

The mining schedule has been structured such that 7 years of ore will be mined from the Zone 11 open pit in just 3 years (at 1.7Mt p.a.). Tungsten Mining will then process the higher grade ore (>0.3% WO<sub>3</sub> – shown in red in the above image) over the first 2-3 years while stock piling the lower grade ore for processing in subsequent years.

The early processing of the high grade ore has a positive effect on the project economics, allowing the CAPEX (~A\$ 56M) to be repaid in the first two years of full production.

High grade ore to be processed first

### Preliminary Production Schedule

Year	1	2	3	4	5	6	7
Throughput Mtpa	0.75	0.75	0.75	0.75	0.75	0.75	0.75
mtu produced	264,000	318,000	138,000	96,000	90,000	90,000	84,000
Nom grade % WO <sub>3</sub>	68.0	68.0	68.0	68.0	68.0	68.0	68.0
Concentrate tpa	3,900	4,700	2,000	1,400	1,300	1,300	1,200
Containers p.a.	194	235	100	70	66	66	60

Source: Tungsten Mining

1mtu = 10kg

Mineralisation at Zone 11 starts from surface and as such, pre-striping is not required. Based on a 750,000tpa throughput rate and a recovery of 80%, Tungsten Mining envisages producing an industry standard 68% grade concentrate with production peaking in year 2 at 318,000mtu (3,180t of WO<sub>3</sub>).

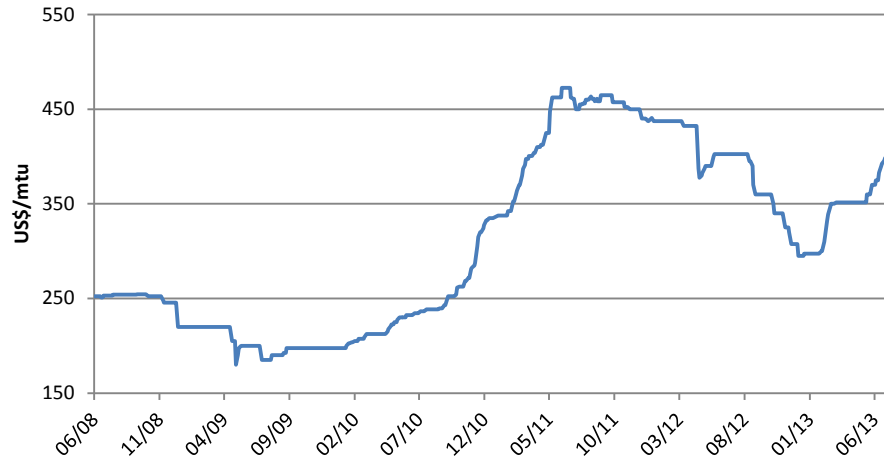


## Tungsten Pricing and Potential Revenue

The chart below shows the five year historical APT (Ammonium Paratungstate) price which can be used as a proxy for the trends in a 68% WO<sub>3</sub> concentrate as will be produced by Tungsten Mining.

**APT price chart 2008- June 2013**

*APT price on an upward trend*



Source: Bloomberg

Breakaway Research estimates TGN would receive ~80% of the prevailing APT price after TC/RC charges. Assuming the current APT price of US\$398/mtu, Breakaway estimates the Kilba project has potential to deliver total LOM revenue of ~US\$ 340M

### Potential Accumulative Revenue

*Significant LOM revenue*

Year	1	2	3	4	5	6	7
mtu produced	264,000	318,000	138,000	96,000	90,000	90,000	84,000
APT Price/mtu	398	398	398	398	398	398	398
Potential Revenue US\$M	84.1	101.3	43.9	30.6	28.7	28.7	26.7
Cumulative US\$M	84.1	185.3	229.2	259.8	288.5	317.1	343.9

Source: Breakaway Research estimates

The above table is a Breakaway estimate only; however it serves to illustrate the significant potential revenue stream achievable at current pricing. Opportunity exists for these numbers to be upgraded should the APT price continue to rise (as per consensus forecasts) or further zones of economic mineralisation be identified.

### Upcoming Drilling

*JORC upgrades likely following infill drilling*

Drilling campaigns already undertaken by Tungsten Mining have demonstrated good continuity of the mineralisation. A further 6,000m RC in-fill drill program is now planned (on 40m x 40m spacing) for 2H 2013 which will likely lead Resource category upgrades.

Potential also exists for size upgrades as other targets within the mining licence are tested. Zone 12 (towards the north of the licence) is reported to host the best surface expressions of tungsten mineralisation and will be tested in due course.



## Breakaway's View

Breakaway has been encouraged by Tungsten Mining's progress since listing in December 2012. Since then, the company has undertaken multiple drilling campaigns, completed a maiden JORC Resource and conducted an in house scoping study, much of which will be utilised in the more detailed feasibility study now underway.

### Project Development Timeline

*Steadily checking off items*

	Q1 13	Q2 13	Q3 13	Q4 13	Q1 14	Q2 14	Q3 14	Q4 14
Phase 1 Drilling	✓							
Phase 2 Drilling	✓							
Phase 3 Drilling	✓	✓						
Resource Definition	✓	✓						
Scoping Study		✓						
Off take MOU								
Infill Drilling								
Mining permits								
Final Feasibility Study								
Off-take agreement								
Financing								
Construction								
Commissioning								

Source: Tungsten Mining and Breakaway Research

*Granted Mining Licence*

The Kilba project is located on already-granted mining lease (ML08/0314), significantly reducing the lead time to production.

*Estimated CAPEX A\$56M*

Based on the outcomes of the scoping study, Tungsten Mining estimate a CAPEX requirement of ~A\$ 56M of which A\$ 44M has been allocated for construction of a 0.75Mtpa plant. This comparatively low CAPEX is a function of the relatively simple processing route required to process the sheelite ore. Average weighted operating costs are estimated at ~US\$212/mtu (against current ATP pricing of US\$398/mtu of which Tungsten Mining would receive ~US\$320/mtu), providing robust project economics.

*Project CAPEX to be paid back in first year*

Tungsten Mining's strategy of processing the high grade ore first is sensible in Breakaway's view as it maximises shareholder values. It also allows the company to rapidly pay back any debt (project pay back expected within first 2 years) and generates strong operational cash flow to continue exploration in the immediate area, as well as advance other projects within the company portfolio.

### Tungsten Outlook

*Robust outlook*

Breakaway continues to have a positive outlook for the tungsten market. China's dominance in the tungsten market and obvious moves to restrict exports and increase imports of tungsten concentrates sends a clear signal to Breakaway of a tightening market with the likely effect of increased APT prices over the longer term.

Tungsten Mining has demonstrated an ability to rapidly 'check off items' as they advance the Kilba project and with the promise of 'near term' production, they are well placed to benefit from increased tungsten prices.



### **Analyst Verification**

We, Grant Craighhead 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 Tungsten Mining 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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