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FAR EAST CAPITAL
The Mining Investment Experts

Weekly Commentary

31 March 2018 Charts on Thursday's Close Analyst : Warwick Grigor

Vanadium is starting to attract attention as its price skyrockets

We saw a deterioration of sentiment last week, with a number of stocks failing to hold important support lines on the charts, particularly the larger institutional size stocks. Confidence in the market was starting to look shaky. Maybe this had something to do with Easter coming up or maybe it was the lack of a good lead from overseas markets. It might have been the cleaning up of positions ahead of the end of the quarter. Whatever the reason, there is now a risk that the mining sector could be on the back foot for a longer period if nothing comes along in the next week to boost sentiment. Hence the need to pick the right stocks at the moment rather than relying on the trend to make you money.

Investors are usually more reactive than creative

Stock market investors and traders typically respond to price movements in commodities after the event as opposed to positioning themselves ahead of the curve. Thus they are always playing catch up, scrambling to get into situations before the next investor and seldom maximising the opportunity.

Volumes are always thin at the bottom of any cycle, so maybe there is a legitimate excuse for not getting set at that point, but it is infinitely more risky getting involved when volumes pick up after a commodity has already doubled in price. So, as we take a look at vanadium, is the recent response to vanadium price movements one of those high risk propositions? Read on.

Vanadium suddenly popular as its price doubles

Alternative energy and battery input materials have mostly been about lithium, cobalt, but the feedback from the BMO Mining Conference a few weeks back suggested that vanadium is now making a running for the limelight as it was hot on everyones lips. The price chart below gives a reason.

In Australia we have seen stocks like Australian Vanadium (AVL) and King River Copper (KRC) perform strongly in the market, achieving market capitalisations of $70m and $170m respectively (before pulling back to $67m and $146m). AVL shares ran from 1.3¢ last September to a recent high of 5.7¢. KRC's movements have been much more dramatic - from 1.2¢ in December to 19¢ a week ago. A new entrant to the field is Tando Resources (TNO) in South Africa, at market capitalisations of $26m.

Is the performance of vanadium and vanadium stocks just a flash in the pan or the start of something more sustainable?

The size of the vanadium market - supply first

Production is dominated by three countries. China accounts for 57%, Russia 11% and South Africa 10%. Interestingly, the principal consumers of vanadium, being the steelmakers, also impact the supply of vanadium through their demand for magnetite iron ore. Around 73% of the vanadium supply comes as a co-product slag from magnetite iron. This is particularly the case in China where there is increasing pressure from the government and market economics to shift to higher quality magnetite and haematite sources of iron, thereby curtailing the vanadium co-production. Global vanadium supply could fall by 10% as a result.

Geologically, the largest source of vanadium production is titaniferous magnetite, accounting for 85% of supply. Uraniferous sandstone and siltstone are lesser sources, but it is common for uranium mines to have vanadium by-products. Syrah's Balama graphite mine plans to produce a vanadium by-product.

Demand growth is anticipated

Demand for vanadium has been hovering around 80,000 tpa, making it about 20% smaller than the cobalt market. It was at 97,000 t in 2014, but then there was a lull in demand for high-strength steel. Vanadium production declined accordingly, by 14,000 tonnes.

Typically, demand for vanadium is very dependent upon the demand for high quality steel, which accounts for 91% of global demand. Vanadium enhances the durability of steel whilst reducing weight and increasing tensile strength. It also gives better resistance to corrosion from salt water, hydrochloric and sulphuric acids.

Vanadium intensities within steel alloys varies considerably across the globe. The US employs intensity levels of 0.093%, Europe 0.073% and China 0.037%. There has been a push to increase the Chinese level as it moves from 335MPa strength rebar in favour of 600Mpa quality, as more stringent construction safety standards are being enforced.

The commercially traded vanadium products are ferrovanadium and vanadium pentoxide concentrates

V_2O_5 . There are no benchmark exchange-based prices for vandadium but indicative prices are published by a number of commodity market intelligence organisations such as Metal Bulletin.

Structural change in demand due to redox batteries

It appears that we are on the edge of a structural change in the vanadium market due to its use in energy storage, most notably in redox battery solutions. Vanadium Redox Flow Batteries (VRFBs) are non-combustible, modular in design and readily scaleable. They are fast charging and cycle lives exceed 10,000x, but they are expensive to manufacture. The low energy density (only 20% of lithium-ion) precludes them from use in mobile products. Their domain is likely to be restricted to larger scale industrial energy storage solutions, such as where alternative energy installations need energy storage units.

Looking at the broad sweet spot for flow batteries, which is for units holding 10kW-100MW of power, some analysts predict that VRFBs could account for 15-25% of the global energy storage market, with demand growing by 33% p.a. (from a market of US$230m in 2018 to US$946m in 2023). However, this is dependent upon the assumption that the capital costs will fall by 66% to US$120/kWh. There is also a caveat that high vanadium prices may suffocate the development of this type of battery as vanadium currently accounts for 30% of the cost of VRFBs. That means they will not reach their market potential if the vanadium price keeps rising aggressively. What is needed to counter this risk is a strong supply response.

History of Australian vanadium plays

Australia has had its share of vanadium plays over the decades, with the two most famous projects being Barrambie, originally owned by Peter Brigg's Ferrovanadium Corporation and Windimurra, owned by Roderick Smith's Precious Metals Australia (PMA) (two infamous mining entrepreneurs of an earlier generation). Neither of these were commercial successes. It seems that South African projects and companies are a much better bet than anything this side of the Indian Ocean, if history is a reliable guide.

The Windimurra vanadium mine was developed by PMA and Xstrata in 1998, at a cost of $180m. It operated from November 1999, to April 2003, when it was placed on care and maintenance. PMA regained control in 2005, and changed its name to Windimurra Vanadium, but the project went belly up again in 2009, after $100m was spent rebuilding the plant to a completion level of only 90%. Atlantic Ltd acquired the project and recommenced production in January 2012, with a plan to produce 6,300 tpa of vanadium based on a Proved and Probably Reserve of 159 Mt at 0.47 V_2O_5. However, the curse of Windimurra continued with administrators being call in again in February 2015.

Barrambie was never developed. It has ended up in the hands of Neometals Ltd (NMT), who now describes it as a titanium project. The Eastern Band deposit contains an Indicated and Inferred Mineral Resource of 47 Mt at 0.63% V_2O_5, 22% TiO_2 and 46% Fe_2O_3. A PFS was completed in 2015, on a 550,000 tpa mine to produce 2,000 tpa V_2O_5, 98,000 tpa TiO_2 and 234,000 tpa Fe_2O_3.

King River has had the Speewah vanadium-titanium project for donkeys years, but it has only recently managed to get the sharemarket interested. KRC started out as NiPlats Ltd, listing on the ASX in 2007. It changed its name to Speewah Metals Ltd in 2010, and then to King River Copper in April 2013.

Located in the Kimberley region of WA, the latest Measured, Indicated and Inferred resource estimate is 4.7 billion tonnes at 0.3% V_2O_5 (vanadium pentoxide). Test work has shown that it can produce a concentrate grade of 2.11% vanadium pentoxide, 16.2% titanium oxide and 66.3% iron oxide. It is a big resource but its location will make any development a challenge, should it advance to that juncture.

TNG Resources (TNG) is advancing the Mount Peak project in the Northern Territory, aiming to produce vanadium products along with titanium oxide and pig iron using its patented TIVAN hydrometallurgical process.

Tando's SPD vanadium project has a declared resource of 513 Mt at 0.78% V_2O_5 (SAMREC Code) on the Eastern Limb of the Bushveld Igneous Complex in South Africa. Tando is buying a 74% interest, with Black Empowerment Groups holding the balance.

How can you make money our of vanadium?

It seems that the fundamental outlook for vanadium is quite positive based on two main arguments. The first and most immediate is the shift of China away from lower grade vanadium-rich magnetite ores. The subsequent and largest impact will come from the commercialisation of vanadium redox flow batteries. This is probably more of an investment proposition that a trading opportunity.

Speculators have already pushed the vanadium price higher, so to some extent the horse may have already bolted. The real question is "how big is the appetite for vanadium stocks from the punters?".

Lithium has had its moment in the sun and now cobalt is increasingly gaining attention. Real money will flow into vanadium stocks at some point, but there is a shortage of vehicles with which to play. Australian projects all have high capex estimates and they all have major hurdles ahead of their development. Companies with projects in South Africa seem to offer lower technical risk, but high geopolitical risk. Maybe the best way to make money in the short term is to jump onto new entrants to the sector early, remembering to take profits before reality catches up.

First Graphene mines working much better now

Last week FGR announced that the high-grade graphite mines in Sri Lanka were now performing to within 10% of the original mining plan. That is good news, especially for those shareholders who originally bought into the company for the highest grade graphite in the world. The Company said that the work program for Q2 2018, involve improvements that are intended to enhance the productivity even further.

As I am frequently reminding readers, the commissioning period for any mine is usually the highest risk phase, for that is when the promoters get sorted out from the achievers. Underground mines are notoriously difficult in the first two years because of the time it takes to sink a shaft (or decline) and open enough drives and headings to be able to achieve steady state mining rates. It should come as no surprise that it has taken FGR almost this amount of time to ramp up to its planned production level.

FGR has had a number of operating challenges with which to contend. The shortage of skilled labour, and therefore the time it takes to train miners, has been a constant concern. Not everyone makes the grade, so they have to move on and new guys have to be taken on and trained. The other problem that has delayed ore production has been the presence of unmapped historical workings. This led to company having to sink workings deeper and doing more development than was initially anticipated, ahead of sustainable production. Water inflow from historical workings has also been an issue, until such time as the water filled voids have been drained. The historical mining and water ingress issues are expected to diminish as the mine goes deeper.

FGR has kicked a number of important goals in Sri Lanka, with its mines. It is still the only company to be issued with a new "A" class graphite mining licence in Sri Lanka in the last 25 years (others may have renewed long standing licences). It has a 100% ownership of these licences, which is a big advantage when compared with other listed companies that are struggling with local joint venture partnerships. There are plenty of wannabes, but no company has achieved as much as FGR in-country.

The better performance of the mines coincides with the commissioning of the Commercial Graphene Facility in Fremantle. Call it just-in-time delivery, if you will. Another important box has been ticked.

Footnote: FGR was compelled by the ASX to retract the word "target" from its release due to the fact that the mines are operating without JORC resources. For some reason the ASX believes that you can only talk about mining if you have a JORC Resource. The reality is that the JORC Code is not equipped to handle narrow, high grade underground mines, so by binding companies to that Code, the ASX is penalising shareholders of companies with this style of orebody.

In the case of FGR, we are not talking about a speculative company that wants to go into production, we are talking about a company that is already producing. By the company saying that it was within 10% of its target or mine plan, it wasn't flying kites. It was saying "hey, we are within 10% of where we want to be, and we are improving". Will the ASX prevent FGR from ever giving production guidance because of the style of orebody because it is too dumb to see the difference between a speculative target based on resource potential and one based on actual mining being experienced? So much for continuous disclosure rules!

When FGR asked about the lack of consistency in the enforcement of the ASX rules, pointing to when the ASX allowed Lanka Graphite to say that it was "targeting initial production of 20 tonnes per month of ultra- high grade (97% - 99%+ TGC) vein graphite" on 25/9/17 without a JORC resource, Perth said that it was a matter for each office to enforce the rules as they saw fit.

Well, I'm sorry, but this is totally unsatisfactory. All companies should be entitled to have national consistency in regulation and enforcement. There is a reason why it is called Australian Securities Exchange. Anything less is parochial and unprofessional. ASIC should be taking these guys to task, if they are ensuring a level playing field.

Disclosure: The author is a non-executive chairman of First Graphene and in receipt of directors fees and performance based remuneration. Interests associated with the author own shares and options in FGR.

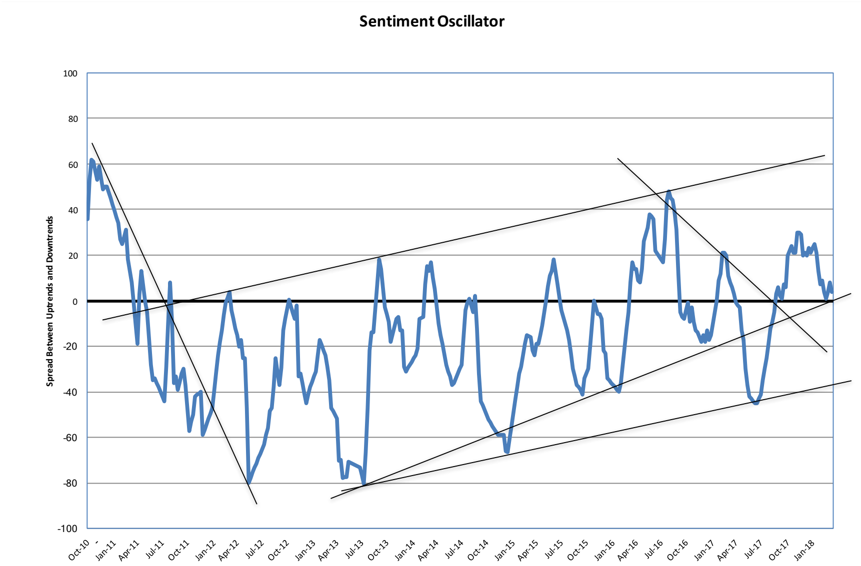
Kicking them while they are down

We have just seen one of the most extreme cases of the tall poppy syndrome we will ever see. The vitriole with which the press has attacked the cricketers for the ball tampering debacle the definitely the most extreme case of kicking a man while he is down that I have seen for quite a while. It even went as far as having a priest writing a half page commentary in the AFR. What the hell would a priest know about cricket, and how could a priest condescend to commenting in the AFR? Why didn't he first comment about how big business has stolen sport from the populous so that it can charge small fortunes for the working class to enjoy what was once their tribal inheritance? (Though, it does help explain why I cancelled my subscription to the AFR a few months back).

There is no doubting that the test cricket "leadership team" was stupid. The whole exercise came across as a bogan high school exercise, but it certainly wasn't of significant importance to derail the entire Australian media for a week (I hear that Trump is sending a crate of beer to the leadership group for shifting the spotlight from his presidency for a week).

Ball tampering is almost as prevalent as sledging. Every team has done it and they are still looking for ways to do it, but without getting caught. That is what kids do. For some reason it is okay to rub a ball on one's trousers (so long as it doesn't get too close the the fly zipper), but why is that any different? It is okay for the captain of the South African team to be caught red-handed, and get away with a slap on the wrist, but the Australian captain has been crucified. Where is the consistency in that? The whole business is hypocritical, pathetic and very childish. It is like a chapter out of *Lord of the Flies*. Please, let us focus on something more consequential than the corruption that inevitably comes with commercialisation of sport. The media should move on and stop being so sanctimonious.

Sentiment Indicator: Sentiment reversed the previous weeks gains as support lines started to give way in a number of situations. 35% (38%) of the charts in uptrend and 31% (30%) in downtrend on Friday's close.



Detailed Chart Comments

NB. Only the bold comments have been updated. Comments in grey type are from previous weeks and will be less relevant.

Indices	Code		Trend Comment	
All Ordinaries	XAO		just fallen a little below the support line	
Metals and Mining	XMM		still falling to major trend line	
Energy	XEJ		testing correction pattern	
Stocks	**Code**		**Trend Comment (updated comments in bold)**	**Main Interest**
ABM Resources	ABU		spiked higher on St Barbara taking $6m	gold
Aeon Metals	AML		rising again	copper + cobalt
Alacer Gold	AQG		holding uptrend	gold – production
Alkane Resources	ALK		down after hitting LT resistance	gold, zirconia
Acacia Resources	AJC		Sideways at the bottom	coal
Aguia Resources	AGR		breached secondary downtrend	phosphate
Alicanto Minerals	AQI		base forming	gold exploration
Allegiance Coal	AHQ		breached support	coal
Alliance Resources	AGS		testing downtrend	gold exploration
Altech Chemicals	ATC		holding on support line	industrial minerals - synthetic sapphire
Anova Metals	AWV		falling again	gold
Antipa Minerals	AZY		new low	gold
Apollo Consolidated	AOP		testing short term correction	gold exploration
Archer Exploration	AXE		breached steepest downtrend	magnesite, graphite
Argent Minerals	ARD		still in downtrend	polymetallic
Aurelia Metals	AMI		testing uptrend	gold + base metals
AusTin	ANW		testing short term correction	tin, cobalt
Australian Bauxite	ABX		testing downtrend	bauxite
Australian Potash	APC		wedge forming	potash
Australian Mines	AUZ		sideways	cobalt/nickel
Australian Vanadium	AVL		correcting	vanadium
Avanco Resources	AVB		take-over at 100% premium	copper
Azure Minerals	AZS		testing downtrend	silver
BHP	BHP		lower	diversified
Base Resources	BSE		sideways through downtrend	mineral sands
Bathurst Resources	BRL		correcting lower	coal

Battery Minerals	BAT	correcting lower	graphite
BBX Minerals	BBX	down	gold
Beach Energy	BPT	new high	oil and gas
Beadell Resources	BDR	another new low	gold
Berkeley Energia	BKY	uptrend breached	uranium
Berkut Minerals	BMT	spiked to new high, then heavy fall	cobalt
Blackham Resources	BLK	new low	gold
Blackstone Minerals	BSX	continuing with uptrend	gold, cobalt
Broken Hill Prospect.	BPL	surged higher	minerals sands, cobalt
Buru Energy	BRU	correcting lower	oil
Cardinal Resources	CDV	testing short term downtrend	gold exploration
Cassini Resources	CZI	sideways	nickel/Cu expl.
Celsius Resources	CLA	testing downtrend	copper/cobalt
Chalice Gold	CHN	heading lower	gold
Cobalt Blue	COB	new high	cobalt
Comet Resources	CRL	down	graphite/graphene
Consolidated Zinc	CZL	continuing weakness	zinc
Crusader Resources	CAS	new low	gold/iron ore
Dacian Gold	DCN	back to highs	gold exploration
Danakali	DNK	sideways under resistance line	potash
Doray Minerals	DRM	testing new uptrend	gold
Draig Resources	DRG	testing uptrend	gold
Eden Innovations	EDE	down	carbon nanotubes in concrete
Egan Street Resources	EGA	sideways	gold
Emerald Resource	EMR	gently down	gold
Evolution Mining	EVN	new high	gold
Excelsior Gold	EXG	slump, testing uptrend	gold
Finders Resources	FND	slumped to support line	copper
FAR	FAR	sideways	oil/gas
First Cobalt	FCC	breached steepest downtrend	cobalt
First Graphene	FGR	strong rise	graphite
Frontier Diamonds	FDX	down after IPO	diamonds
Fortescue Metals	FMG	downtrend	iron ore
Galaxy Resources	GXY	continuing down	lithium
Galilee Energy	GLL	new high	oil and gas, CBM
Gascoyne Resources	GCY	testing steeper downtrend	gold
Global Geoscience	GSC	new high	lithium
Gold Road	GOR	new high	gold exploration
Golden Rim	GMR	down	gold exploration
Graphex Mining	GPX	breaching downtrend	graphite
Heron Resources	HRR	testing downtrend	zinc
Highfield Resources	HFR	long term downtrend	potash
Highlands Pacific	HIG	breached uptrend	copper, nickel
Hillgrove Resources	HGO	sideways	copper
Iluka Resources	ILU	new high	mineral sands
Image Resources	IMA	down	mineral sands
Independence Group	IGO	sideways	gold, nickel
Jervois Mining	JVR	downtrend	nickel/cobalt
Karoon Gas	KAR	testing new uptrend	gas
Kasbah Resources	KAS	still in LT downtrend	tin
Kibaran Resources	KNL	gently lower	graphite
Kin Mining	KIN	down heavily	gold
Legend Mining	LEG	falling to support line	exploration
Lepidico	LPD	back to near highs	lithium

Lithium Australia	LIT	breached uptrend	lithium
Lucapa Diamond	LOM	forming a base	diamonds
Macphersons Res.	MRP	down	silver
Marmota	MEU	down	gold exploration
MetalsX	MLX	breached long term support line	tin, nickel
Metro Mining	MMI	at highs	bauxite
Mincor Resources	MCR	breached uptrend	nickel
Mineral Deposits	MDL	uptrend steepening	mineral sands
Myanmar Minerals	MYL	downtrend	zinc
MZI Resources	MZI	testing downtrend	mineral sands
Neometals	NMT	down	lithium
Northern Cobalt	N27	down again	cobalt
Northern Minerals	NTU	down again	REE
Northern Star Res.	NST	off its high	gold
NTM Gold	NTM	down	gold
Oceana Gold	OGC	testing downtrend	gold
Oklo Resources	OKU	in a rising wedge	gold expl.
Orecorp	ORR	breached recent uptrend	gold development
Orinoco Gold	OGX	breached steep uptrend	gold development
Orocobre	ORE	downtrend confirmed	lithium
Oz Minerals	OZL	continuing in uptrend	copper
Pacific American Coal	PAK	heavy correction	coal, graphene
Pantoro	PNR	new high	gold
Panoramic Res	PAN	on support line	nickel
Peel Mining	PEX	surge to new high, then pullback	copper
Peninsula Energy	PEN	back in downtrend	uranium
Perseus Mining	PRU	breached downtrend	gold
Pilbara Minerals	PLS	breached uptrend	lithium/tantalum
PNX Metals	PNX	down	gold, silver, zinc
Red River Resources	RVR	fallen to support line	zinc
Regis Resources	RRL	new high	gold
Resolute Mining	RSG	sideways	gold
RIO	RIO	testing support line	diversified
Salt Lake Potash	SO4	breached downtrend	potash
Saracen Minerals	SAR	new high	gold
St Barbara	SBM	strong	gold
Sandfire Resources	SFR	back to support line	copper
Santana Minerals	SMI	new low	silver
Santos	STO	correcting lower	oil/gas
Sheffield Resources	SFX	rising again	mineral sands
Silver Lake Resources	SLR	breached downtrend	gold
Sino Gas & Energy	SEH	confirming uptrend	gas
Southern Gold	SAU	drifting lower	gold
Stanmore Coal	SMR	rising	coal
Sundance Energy	SEA	testing uptrend	oil/gas
Syrah Resources	SYR	back to downtrend	graphite
Talga Resources	TLG	breaching resistance line	graphene
Tanami Gold	TAM	down	gold
Tempo Australia	TPP	testing downtrend	mining services
Tiger Realm	TIG	spiked higher, off lows	coal
Torian Resources	TNR	testing downtrend	gold expl'n
Triton Minerals	TON	uptrend being tested	graphite
Troy Resources	TRY	back in downtrend	gold
Tyranna Resources	TYX	uptrend developing	gold exploration

Vango Mining	VAN		back to highs	gold
Vector Resources	VEC		rallying	gold
Vimy Resources	VMY		down	uranium
Volt	VRC		uptrend	graphite
West African Resources	WAF		uptrend	gold
Westwits	WWI		sideways	gold exploration/development
Western Areas	WSA		rallying	nickel
White Rock Minerals	WRM		new low	silver
Whitehaven Coal	WHC		gently higher	coal
WPG Resources	WPG		down again	gold
Wolf Minerals	WLF		new low	tungsten
Totals	35%	50	Uptrend	
	31%	44	Downtrend	
		144	Total	

Guides to Chart Interpretations

- Charts usually go pass from one trend (up or down) into the other via a period of indecision and uncertainty during which the trend can either recover or change. This period is signified by the orange colour. The orange represent both the greatest risk and greatest reward possibilities.
- Once a chart is in confirmed up or downtrends it is not uncommon for 10-20% of that trend to have already transpired.
- There are trends within trends. The focus of this chart review is the immediate trend that affects the sentiment i.e. it can be a downtrend within a long-term uptrend.
- Not every chart warrants a new comment every week. The new comments are in bold type. Grey type comments may be dated.
- Individual charts provide a single view. It is valuable to look at charts of other companies in similar commodities, and the overall sentiment is also very valuable. Not many stocks can swim against the tide.
- We periodically add or delete charts, some times for obscure reasons. If a chart consistent gives poor signals or is very erratic, we may delete it. Sometimes we add a chart because we want to see what all the fuss is about. We do have a preference for charting stocks that we cover in our research as well.
- Errors and omissions may occur from time to time, especially in fast moving markets.

Amber Lights in Tables: Just a reminder if when the amber light is used in the table – it is when the charts are ambiguous or when there is a change of trend taking place. If a chart is breaching a downtrend it can either be a positive sign or a trap. Only once it has done more work can it be confirmed as a new uptrend. Maybe it is a new uptrend (or conversely a new downtrend); the risk takers can decide to jump on board early (or sell). They will maximise their profits (or minimise their losses if indeed it is the start of the new uptrend (downtrend). More risk-averse investors should wait a little longer, being prepared to give up some of the gains in return for greater certainty.

Weightings of Sectors Represented in the Company Charts

Sector	No. of Companies	Weighting	
Gold	**34**	**23.6%**	
Gold Exploration	**15**	**10.4%**	
Copper	**10**	**6.9%**	
Coal	**8**	**5.6%**	
Oil/Gas	**8**	**5.6%**	
Graphite	**9**	**6.3%**	
Mineral Sands	**7**	**4.9%**	
Cobalt	**6**	**4.2%**	
Zinc	**6**	**4.2%**	
Lithium	**7**	**4.9%**	
Silver	**5**	**3.5%**	
Nickel	**5**	**3.5%**	
Potash/Phosphate	**5**	**3.5%**	
Uranium	**3**	**2.1%**	

Weightings of Sectors Represented in the Company Charts			
Bauxite	**2**	**1.4%**	
Tin	**3**	**2.1%**	
Diamonds	**3**	**2.1%**	
Iron Ore	**1**	**0.7%**	
Other	**7**		
Total	**144**		

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