

Tungsten space, it looks like happy days are here again.

New Tungsten players are as rare as hen's teeth. The brutal price drop after the surge during the so-called Supercycle chopped off most Tungsten wannabes at the knees and left less than a handful of viable players while bankrupting some of the better-known producers. It didn't help that the Chinese sabotaged the market with uncommercial moves.

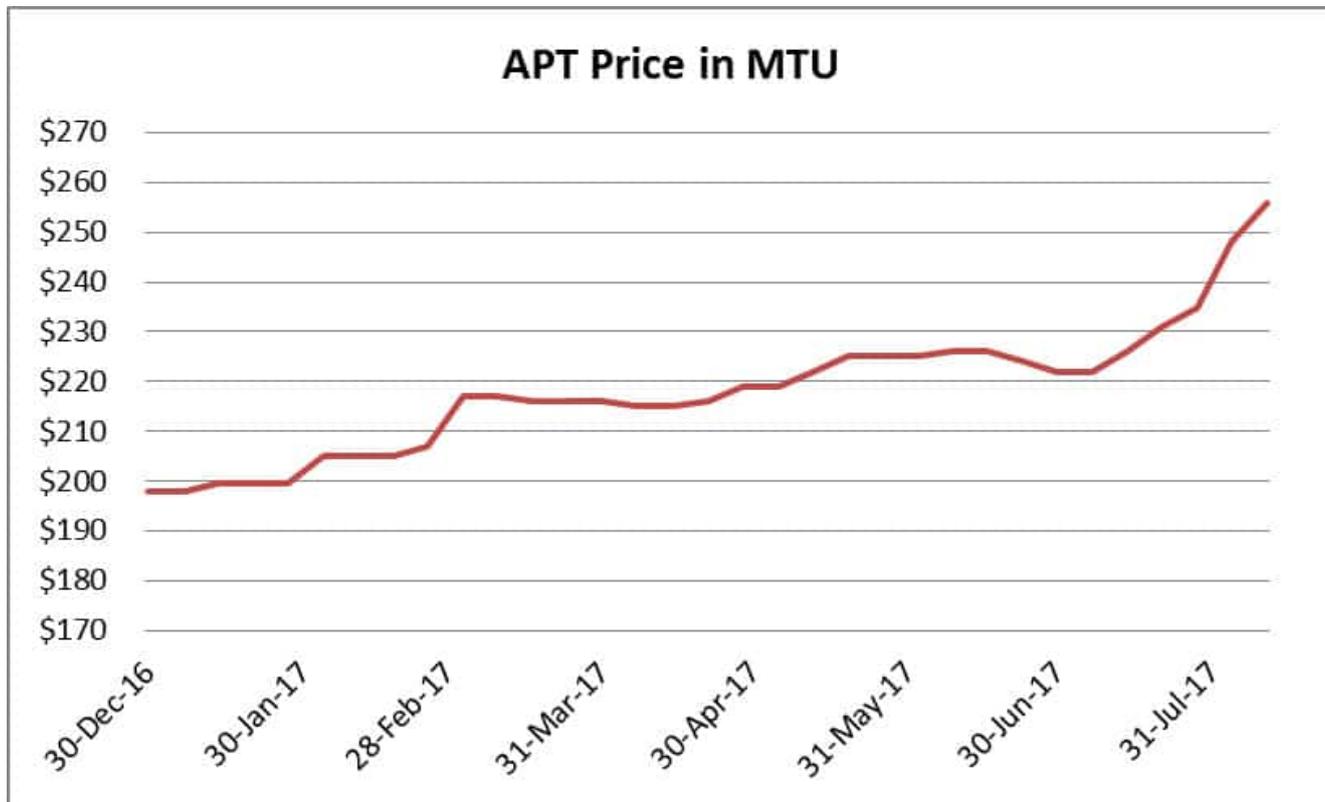
So we were intrigued when a new kid, Happy Creek Minerals Ltd. (TSXV: HPY), appeared on the block. Its principal focus is the Fox property, which is a 100%-owned, new tungsten discovery containing indicated resources grading 0.817% WO_3 and inferred resources grading 1.568% WO_3 . A portion of the resources are within an open pit and overall, are among the highest grade in the western world. The deposits are open to further expansion and the 10 km by 3 km mineral system hosts seven known zones at surface.

We thought it might be useful to review what they have discovered.

Tungsten

As we recently wrote, this hardening alloy metal was looking like the wallflower at the specialty metals dance. Most other things had recovered slightly during 2016 but Tungsten was stranded. The supply of the metal has been dominated by China for some while and as with other metals under Chinese domination commercial considerations has little to do with production decision-making. The stagnation was also somewhat understandable with demand largely coming from the stable machine tool market and the very depressed drill-bit activity in the oil & gas and mining spaces. The former was trending slightly up, the mining sector meanwhile was merely a twinkle

in the eye for prospective recovery in 2016 and the oil & gas sector was suffering the hangover from hell from years of hyperactivity.



Source: Almonty Industries

As the chart above shows the gain thus far this year has been 20% which is respectable in anyone's book but still pales compared to the type of moves that other basic materials like Manganese and Chromite managed during the past 18 months. Tungsten has been one of the few spaces that has seen consolidation with Almonty Industries vacuuming up a number of competing or potentially competing players. Meanwhile North American Tungsten went bankrupt (as did Malaga) and Wolf Minerals walks across hot coals in its search for profitability.

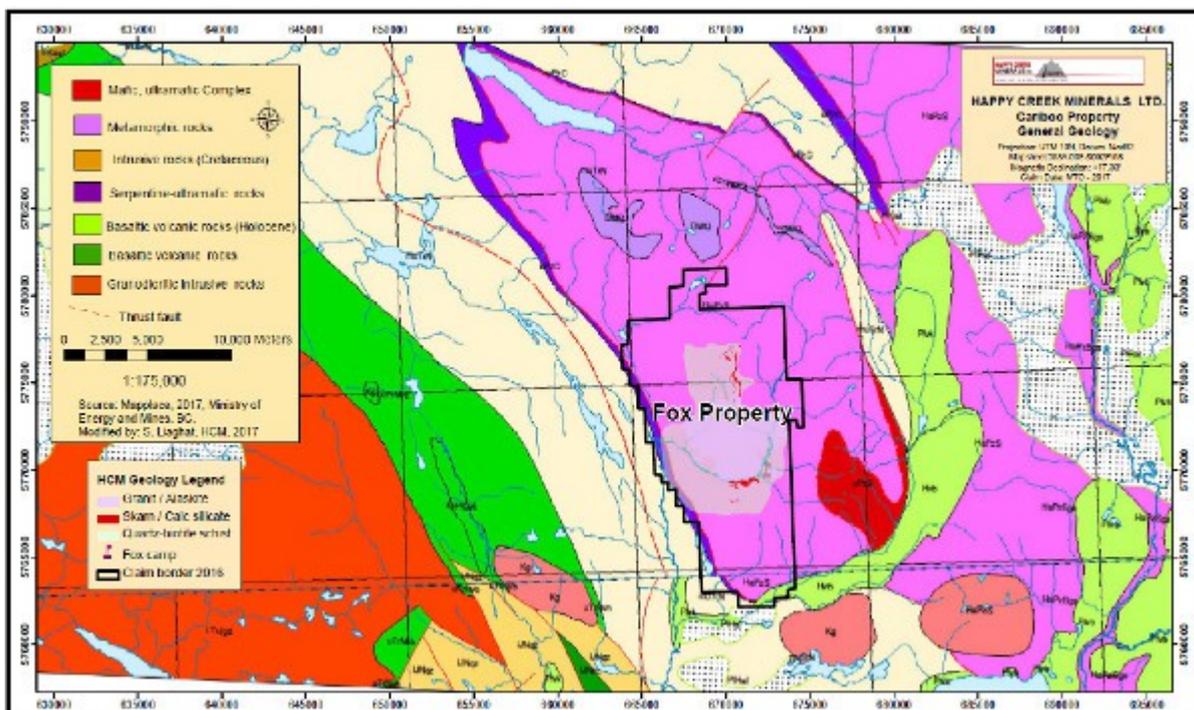
The dilemma for the end users is that new projects that are advanced are rare indeed and those on the drawing boards like Sisson and Mactung are eye-wateringly gigantic. Most other juniors have wilted on the vine during the dry period so it will need prices to continue rising and cross the \$300 per MTU

level (and hold there) before investors have much choice in the space. Thus it is into this rather quiet scene that Happy Creek has ventured.

Fox

The company's target for a Tungsten development is the Fox property approximately 70 km northeast of the town of 100 Mile House in British Columbia. It consists of 31 converted legacy and new cell claims totaling 13,589 hectares. All tenures are 100% owned by Happy Creek and are subject to a 2.5% Net Smelter Royalty (NSR), with Happy Creek having the right to purchase 1% of the NSR. Happily, the property has no known environmental liabilities.

This deposit consists of a tungsten-molybdenum porphyry type system similar in age to the nearby Boss mountain molybdenum mine (situated some 30kms o the west). The southern and central portion of the property are easily accessible by paved and gravel logging roads from 100 Mile House, the largest community in the region.



The Fox property contains eight areas of tungsten mineralization. Tungsten mineralization is hosted mainly in

calc-silicate rocks of the Snowshoe Formation. The consultants classified this as a Tungsten skarn deposit. They noted that known intrusion-related skarn deposits having similar characteristics which occur in the Southern BC and Yukon areas such as Emerald /Dodger, Dimac, MacTung (Yukon, Canada) and Cantung (Northwest Territories), Canada.

Resource

In March 2017, the mining consultants, AGP of Barrie, Ontario produced a NI 43-101 Resource Update for the RC Zone and Maiden Resource Estimate for the BN Zone of the Fox Tungsten Project. The table below shows a summary of the estimate.

ZONE	CLASSIFICATION	Cut-off WO ₃ (%)	Tonnes (t)	WO ₃ (%)	WO ₃ (kg/t)	WO ₃ MTU	Contained WO ₃ (kg)
Ridley Creek	Indicated in-pit	>0.2	329,000	0.729	7.29	250,000	2,500,000
Ridley Creek	Indicated underground	>0.55	157,000	0.940	9.40	147,000	1,470,000
Ridley Creek	Inferred in-pit	>0.2	14,000	0.630	6.30	9,000	90,000
Ridley Creek	Inferred- underground	>0.55	93,000	0.825	8.25	77,000	770,000
BN	Inferred- underground	>0.55	254,00	1.892	18.92	480,000	4,800,000
	Total Indicated		486,000	0.817	8.17	397,000	3,970,000
	Total Inferred		361,000	1.568	15.68	566,000	5,660,000

It is important to note with the Tungsten price moving strongly higher that the resource estimate employed a Tungsten price cutoff of US\$166.52/MTU of WO₃ in concentrate in making the calculation. In order to assess the Mineral Resources an in-situ resource cut-off grade of 0.20% WO₃ was applied for potential open pit resources and 0.55% WO₃ for potential underground material. It would seem evident that the resource would expand quite significantly with a price cut-off closer to the current market price.

A Lerchs-Grossman optimized shell was generated by the consultants to constrain the potential open pit material. Parameters used to generate this shell included:

- 50° slopes for the pit shell
- CAD\$8/t mining, CAD\$26/t milling, CAD\$10/t of G&A operating costs
- 8% W₃ recovery to a 68% W₃ concentrate
- CAD\$208.15/MTU W₃ price
- economics applied to Indicated and Inferred materials

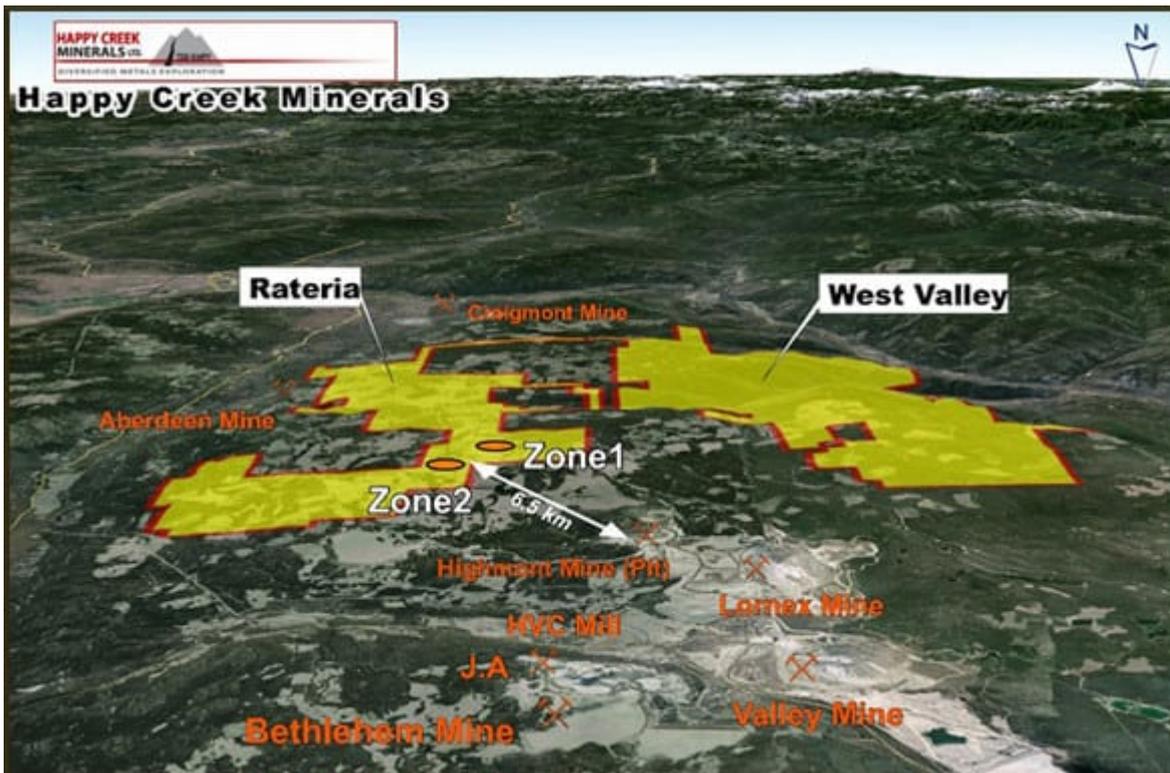
Happy Creek's plan is to continue expanding the resources and advance the Fox project to a Preliminary Economic Assessment and this would obviously use a more current price in the model.

Other Endeavours

In addition, at the 100% owned Rateria property that adjoins to the east and west, respectively, the southern portion of the Highland Valley Copper mine property, and adjoins to the north of the former Craigmont copper mine property, located north of Merritt, British Columbia. Happy Creek has been working on its discovery of two new copper zones that are 6.5 km from a currently producing open pit at the Highland Valley, Canada's largest open pit copper producer (see pic below).



The map below gives an idea of where Happy Creek's properties are vis-à-vis the Highland Valley complex.



Drill results from Zone 1 include 145m of 0.25% copper starting from 9.8m and intervals containing up to 95m of 0.67% copper occur. At Zone 2, drill results include 92.8m of 0.30% copper, 0.15 g/t gold starting at 12.19m, and 146m of 0.46% copper, 0.10 g/t gold starting at 53.0m. Both zone 1 and 2 are open to further expansion and contain predominantly bornite-chalcocite copper mineralogy. Clearly there is a need for much more work, but the focus has switched to the Tungsten property for the short- to medium-term.

Conclusion

With any luck the Tungsten rebound will go under the radar of the promotorial carpetbaggers of the mining sector and mainly be noticed by serious investors and players in the space. That way the likes of Happy Creek and the hardy band of developers who survived the last five years will have the space to themselves without the distractions of squawking wannabes.

With high grades at the Fox property Happy Creek will be the explorer to watch as the Hemmerdon experience has shown that low grades do not cut it when stacking up project economics.

In the Tungsten space, it looks like happy (or at least happier) days are here again.

Stirrings in the Nether Regions of the Metals Space – Vanadium, Tantalum and

Tungsten

In nature there are events where masses of animals or insects suddenly go on the move and as if directed by a higher force organize themselves and surge in a particular direction whether they be birds, or ants or wildebeest. Investors in metals and miners seem to be driven by a higher imperative also.

Last year saw precious metals, many of the bigger base metals and some of the specialty metals (e.g. Lithium, Cobalt, Tin) rise to the occasion after a long somnolence. However there were some notable exceptions. Rare Earths, Uranium and a swathe of less chattered about metals remained mired in the miseries that beset the sector since 2011 (and in some cases 2008). However in recent weeks base metals have gotten a second wind led by copper and zinc and now a group of "other" specialty metals, particularly in the alloy space have started to lift. Here we focus on three of them.

Vanadium

We won't dwell on this metal too strongly as we covered it late last month. In the process we let loose a flurry of fans of different Vanadium wannabes, some on or off the radar until now. We had forgotten to mention in our piece that less obvious companies like Western Uranium Corporation (CSE: WUC | OTCQX: WSTRF) were potential Vanadium players due to the high proportion of Vanadium in their mineralogy. In fact the proportion is so high that it now looks like Vanadium will be the tail that wags the dog at WUC. Time for a name change, methinks..

Meanwhile other names came to attention like the AIM-listed South African player, Bushveld Minerals that bought Evraz's producing Vanadium mine in that country, and Prophecy Development that picked up the Gibellini asset from the

stricken American Vanadium.

Tantalum

Tantalum is usually put in the too hard basket due to it being a conflict mineral when in fact that should be seen as an opportunity rather than a negative.

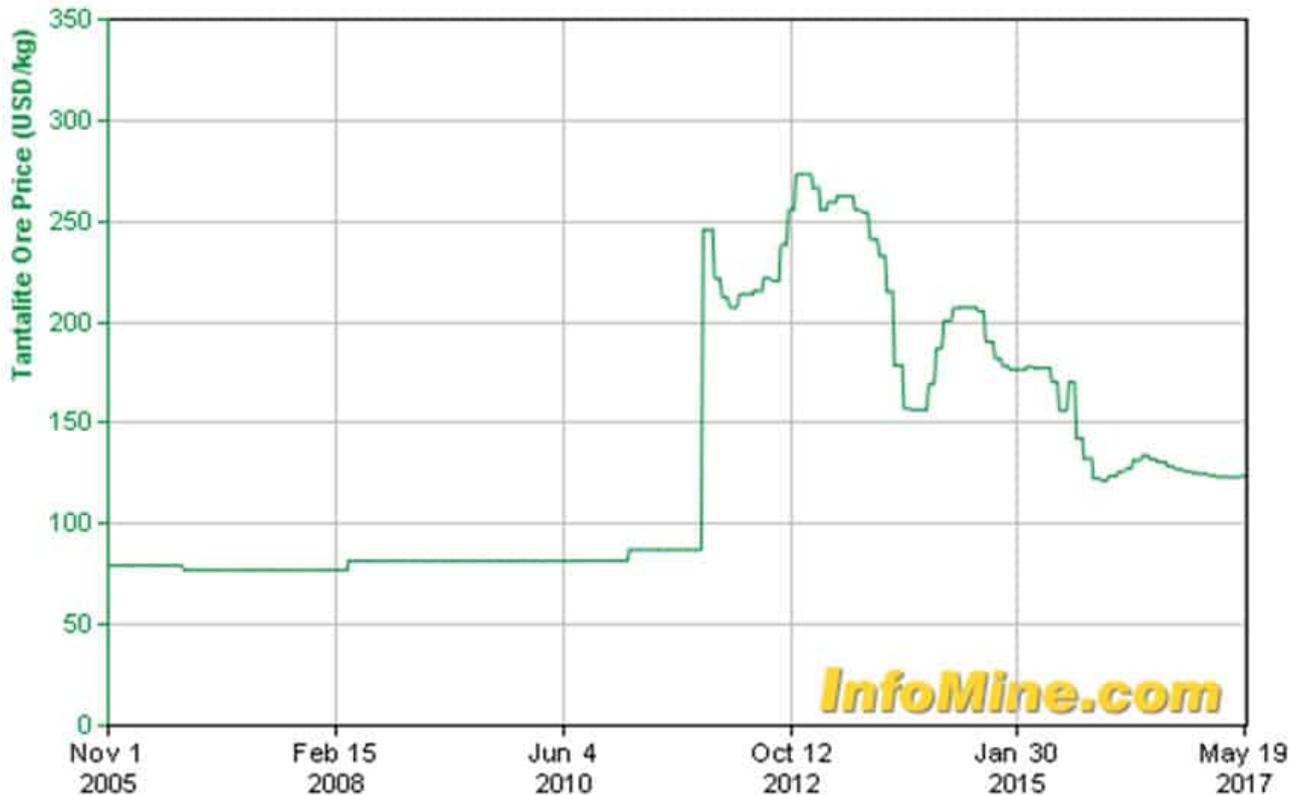
By means of a refresher on this metal, Tantalum is one of the refractory metals, which are widely used as minor components in alloys. The chemical inertness of tantalum makes it a valuable substance for laboratory equipment and a substitute for platinum. Tantalum is also used for medical implants and bone repair. Its main use today is in tantalum capacitors in electronic equipment such as mobile phones, DVD players, video game systems and computers.

As the chart below shows its price was long dormant then shot to prominence well after the Mining Supercycle was past its peak and then slumped again.

Tantalite Ore Price

123.61 USD/kg

31 May '17



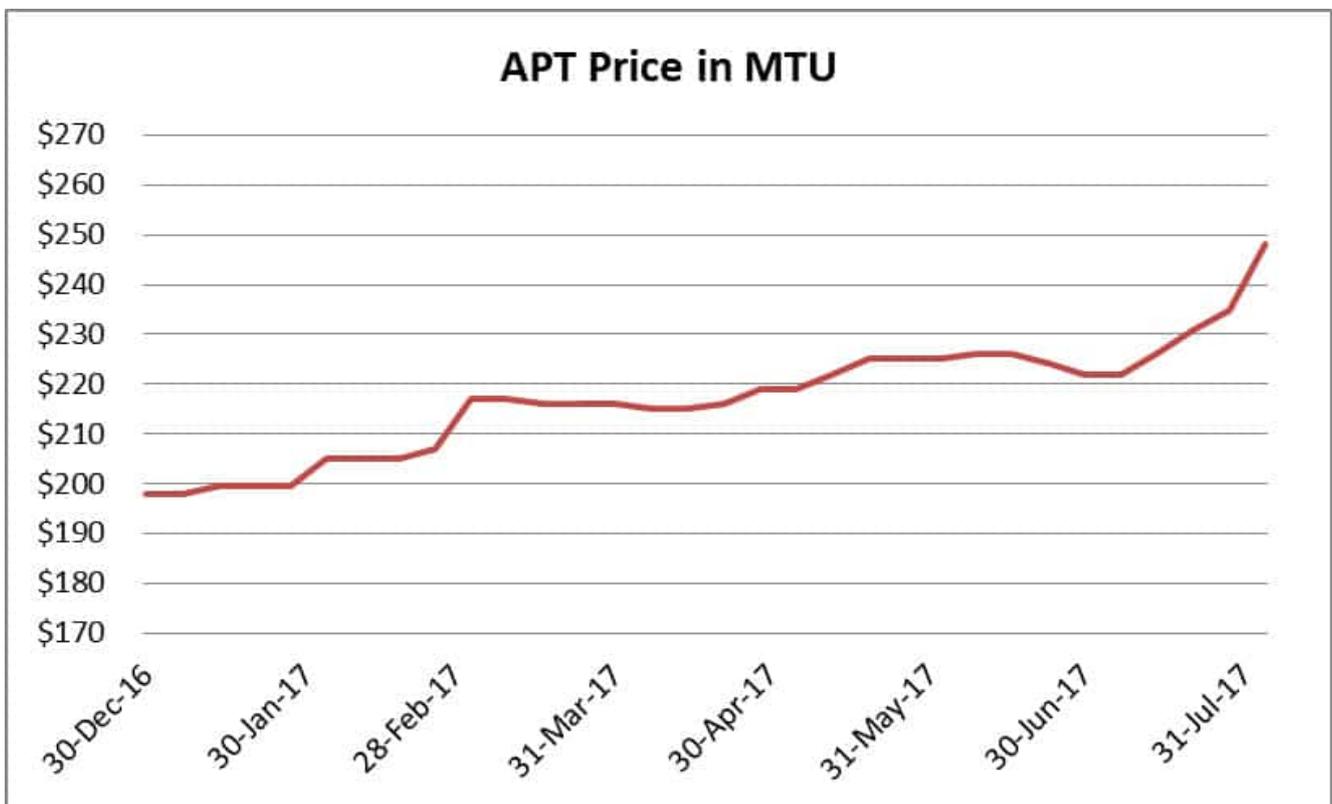
Indeed it could be argued that this was the Dodd-Frank effect at work making metal sourced from non-conflict locations more expensive... until it wasn't. The slump put paid to the ambitions of some of the listed Tantalum wannabes and they headed in other directions. Commerce Resources is a good example of a Tantalum story that digressed into Rare Earths (and interestingly is veering back towards Tantalum again).

Pricing is somewhat opaque but it was jungle drums reporting that producers in Burundi were seeing hefty week-on-week price rises that piqued our interest again. What we have been able to establish is that 30% Tantalum concentrate out of China is up 24.4% on the 360 day basis. This is probably a more significant indicator than the reported move of the same period of only 9.9% in Tantalum metal for US delivery.

Tantalum is one of the rarest metals in the earth's crust it would not surprise us to see this metal start to have its day in the sun again soon.

Tungsten

This metal was looking like the wallflower at the specialty metals dance. Most other things had recovered slightly during 2016 but Tungsten was, to quote the old song, lying like a “dead skunk in the middle of the road, stinking to high heaven”. It was somewhat understandable though with demand largely coming from the stable machine tool market and the very depressed drill-bit activity in the oil & gas and mining spaces. The former was trending slightly up, the mining sector meanwhile was merely a twinkle in the eye for prospective recovery in 2016 and the oil & gas sector was suffering the hangover from hell from years of hyperactivity.



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Conclusion

The tide that swept back into the shallows of the mining market in 2016 lifted most boats but not all. Some of the gains were massive and have been augmented this year but some were left relatively becalmed and some were downright stranded (e.g. Uranium and Tungsten). A belated second tide has arrived and now lifted the three metals here while also taking Zinc above the \$1.30 per lb mark and lifting copper to nearly \$3 per lb. Precious metals mavens are dismayed that the dirty metals are having their day in the sun while their favorites are mired in shallows and in miseries (deservedly so in our view).

This is still early days of the recovery though. All of the three metals here are well off their highs of the Mining Supercycle. All three are also "suffering" from years of underinvestment with development pipelines that are as dry as the street gutters in Timbuktoo. This produces the same scenario of potentially constrained supply. Also the supply is patchy with North American production of all three minerals being small to non-existent.

So hopefully the move in recent weeks is a seachange that will continue and bring the metals to levels at which decent

projects get dusted off and serious personalities enter the space.

Tungsten – When the Tough Get Going

It's a useful moment to revisit the dynamics of some of the metals we write about in specific companies and instead look at the broader picture. Tungsten has featured in our recent thoughts on Almonty and its activities so what about the factors driving the metal itself?

A look at Argus Minor Metals, one of the most important sources of pricing shows that prices have been under renewed pressure. In their edition of the 13th of October they noted that Ammonium Paratungstate (APT – the main Tungsten product) resumed its downward slide after a two week hiatus. Prices fell to \$175-185 per MTU from \$180-190 per MTU (metric ton unit = 10kg). They said “prices had been at their lowest levels since 2009, but with the latest decline have fallen to levels not seen since 2005”. It's interesting to note that most, if not all the current crop of producers were not even around in 2005, so this is a novel experience for them.

So what are the main dynamics at work?

The China Syndrome

Tungsten has shown some of the same dynamics that other specialty metals have experienced over recent decades.

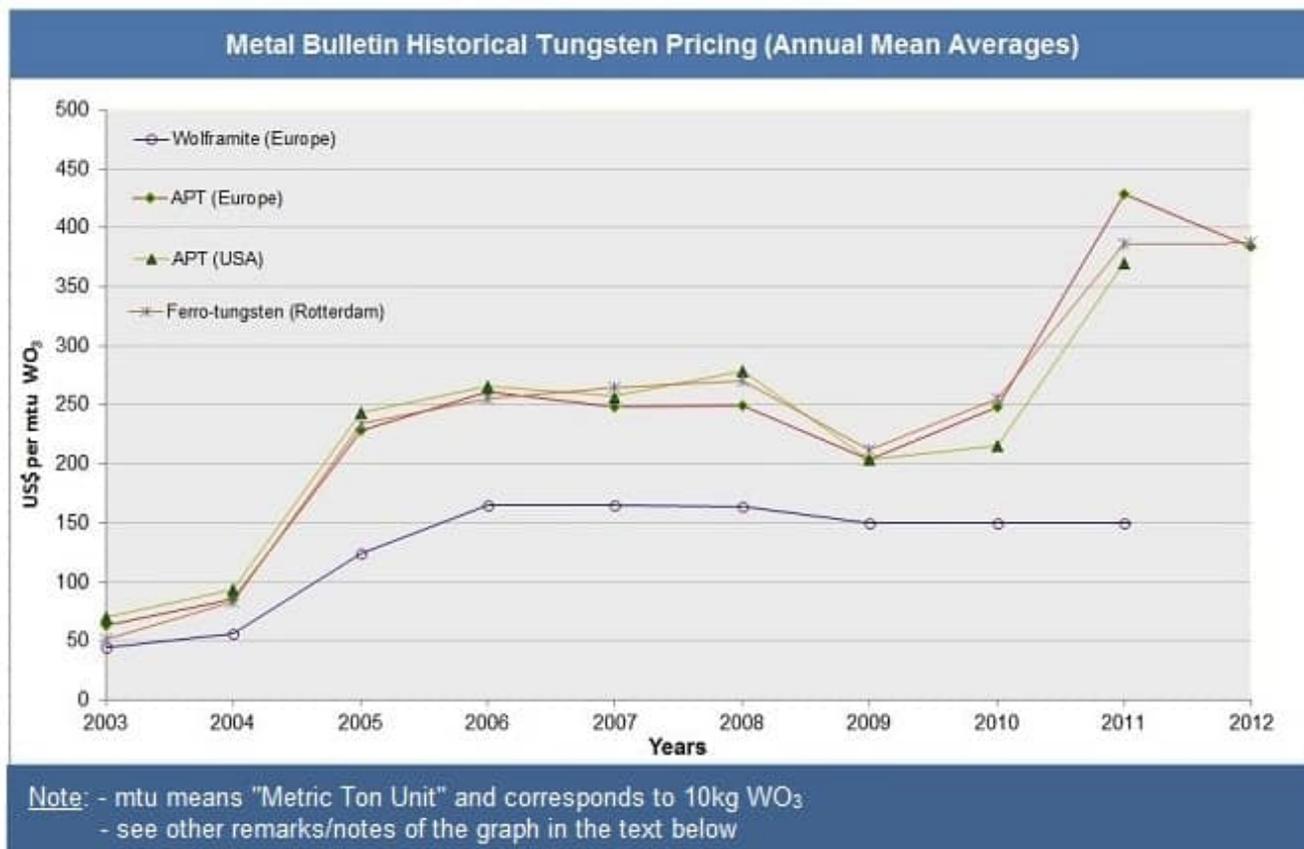
During the 1980s and the 1990s, China, with the world's largest reserves and lowest cost of production, flooded the

world market. This drove down the price of both APT and WO_3 concentrates to below the production cost of most other producers. Amongst the distortions this produced was that APT prices, driven downwards by Chinese processors, were only marginally above the price of concentrates at about USD\$50 per MTU.

The distressed price in the world market quickly drove many tungsten mines and APT producers in the Americas, Asia and Europe out of business and led to their closure. Moreover, outside of China, exploration and mine development programs were quickly abandoned.

However, the distressed market price for tungsten concentrates and its products began to change in 2003 and more markedly in 2004-2005 propelled by the rapid growth and emergence of the Chinese economy in the world marketplace. As in other metals the rapid growth of Chinese demand for tungsten products for its domestic market triggered a tightening of the availability outside of China which was coupled with the Chinese government's policy curtailing mining projects and taxing the export of tungsten concentrates in order to conserve resources for future domestic needs. This led to a price surge in 2005 with the price of APT moving rapidly from below \$80 to nearly \$300 per metric tonne unit (MTU). This in turn sparked a recovery in Tungsten recycling, so the price stayed in the \$250 range for the ensuing five years.

However, with recycling at its max (37% of global supply in 2010 according to the USGS) and demand for Tungsten still high, the APT price went on a tear upwards to the \$460 range.



After that high-water mark the price has been on a slide, briefly rebounding at times on the way down but now down to the level less than half the 2011/2 highs.

Just as in Rare Earths and other specialty metals the Chinese government has indulged in curtailment of mining programs and was strongly "encouraging" downstream processing of concentrates to higher value added products such semi-finished and finished tungsten products.

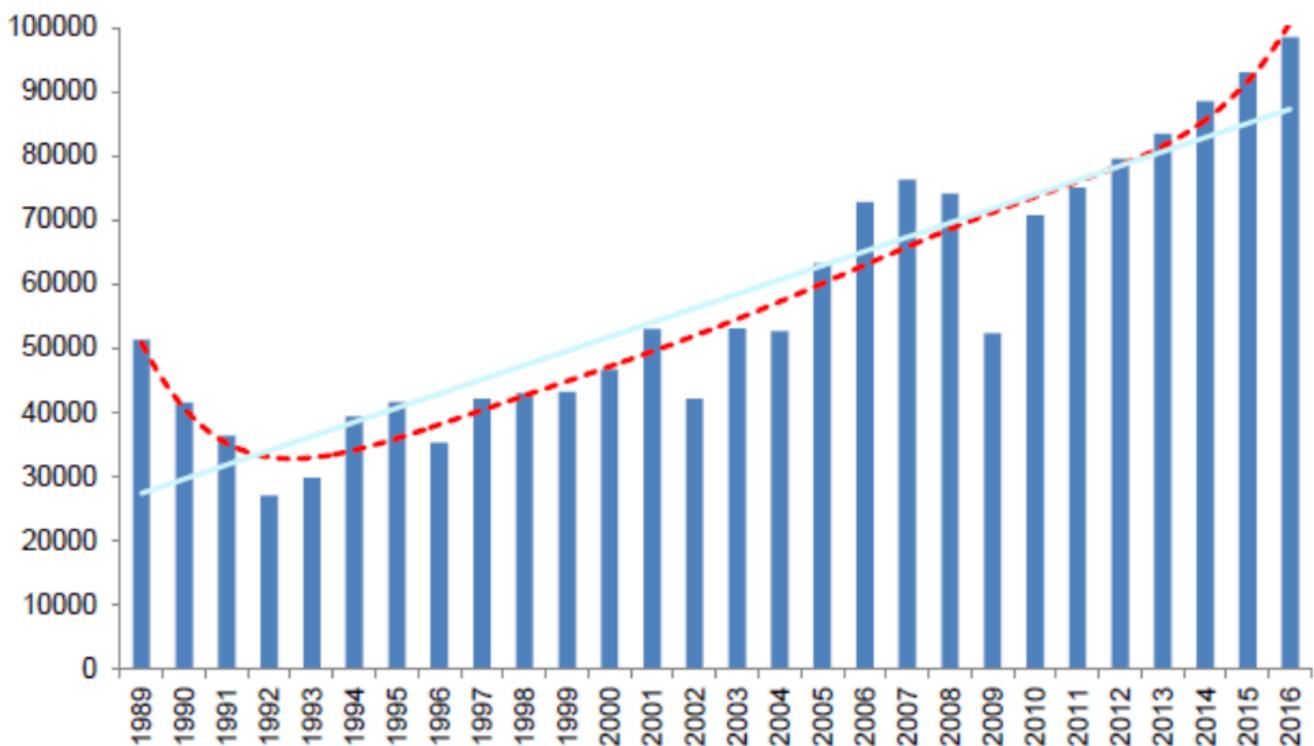
Roskill's latest Tungsten survey commented that they believed primary tungsten supply will continue to be dominated by Chinese mine production in the years to 2018. However, the share of global supply which China provides is forecast to fall from 80% in 2013 to 78% in 2018, caused by an increase in production from mining operations in Vietnam, Australia and Europe.

Supply

Over the last few years, sources of supply have shifted

totally. In 1986, the USSR was the world's largest consumer but, by 1992, the reformed CIS was exporting tungsten and by 1996 was the world's second largest supplier. In the late 1990s and at the beginning of the new millennium, China had risen to dominate production with 90% of the world market for tungsten production and supply. This was despite China supposedly having about 75% of the world's tungsten resources.

Forecast Tungsten demand (tonnes W)



*Source: ITIA: Roskill forecast

This shifting dynamic makes it hard to identify where exactly the future production will be coming from. The calculation of global reserves leaves something to be desired in our view. On the Chinese side we, as in so many other things, have no verification of how large reserves are or the pace at which they are being consumed (something that has been an issue also in Rare Earths and Antimony in recent times).

On the Western side we have reserves of Tungsten that are the result of decades of low focus on exploration. The fact that several relative newcomers to the space can come up with substantial new resources rather swiftly after beginning

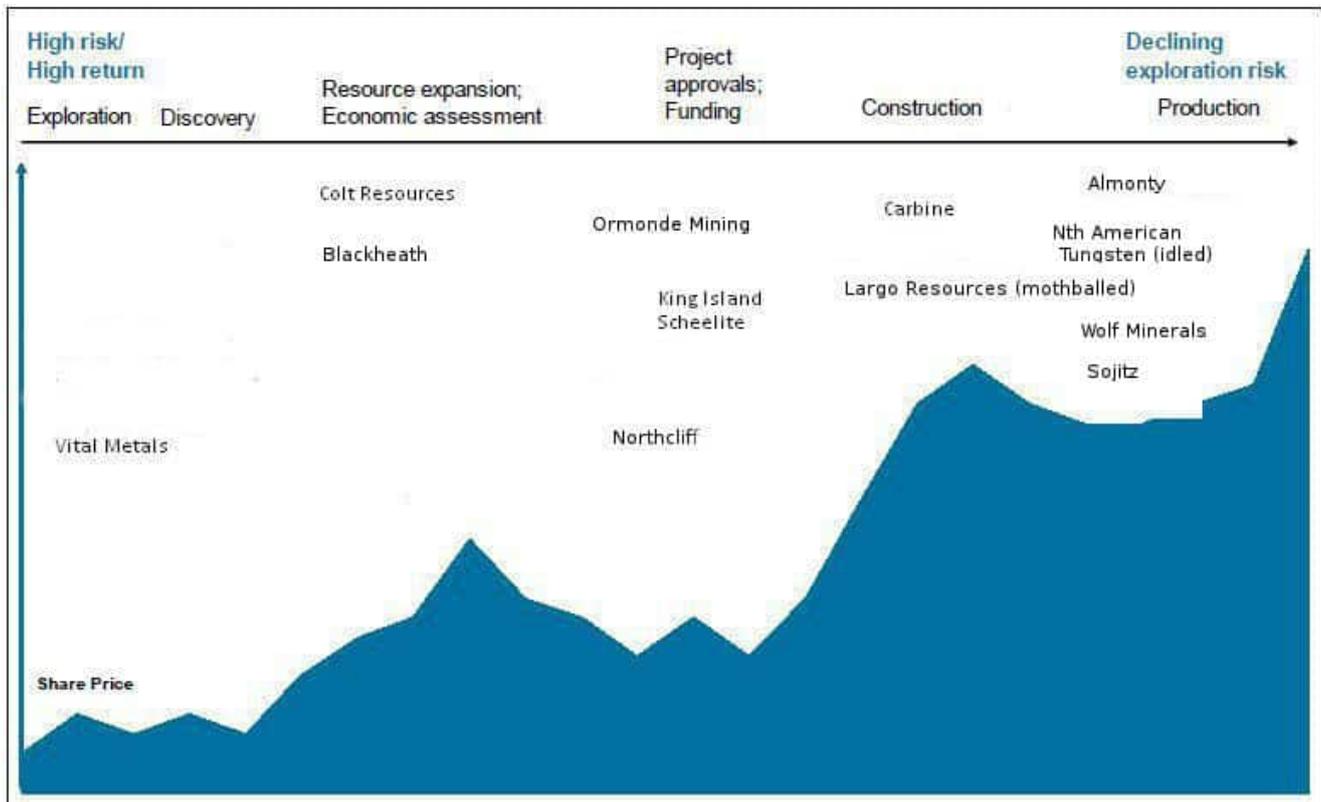
exploration might imply that the West's share of global Tungsten resources is severely underestimated (as it has been in Antimony and Rare Earths).

Secondary production of tungsten, according to Roskill, accounted for 22% of global tungsten supply in 2013, predominantly from recycling facilities in Europe and North American. Greater adoption of tungsten recycling technologies is expected, particularly in Asia, with tungsten from secondary sources forecast to account for 28% of global supply by 2018. The tungsten price will however have a significant bearing upon the volume of secondary tungsten available, as recycling facilities may stockpile material for periods of high pricing.

We also have the fascinating phenomenon that the Iberian Peninsula producers that ruled Western production for decades (and were very strategic in WW2) faded in the 1980s and are now resurging in both Portugal and Spain. Australia is also on the comeback trail and even South Korea's important Sangdong mine looks likely to return to production. That England has also recently joined the ranks of producers shows that the Chinese will not have their own way in this metal.

The Tungsten Lifecycle Chart

Our all-purpose Lifecycle chart serves particularly well, in the case of Tungsten, to show the state of progress of the various players vis-à-vis each other on the exploration-production continuum (not that some players, irrespective of which metal, imagine themselves production-bound).

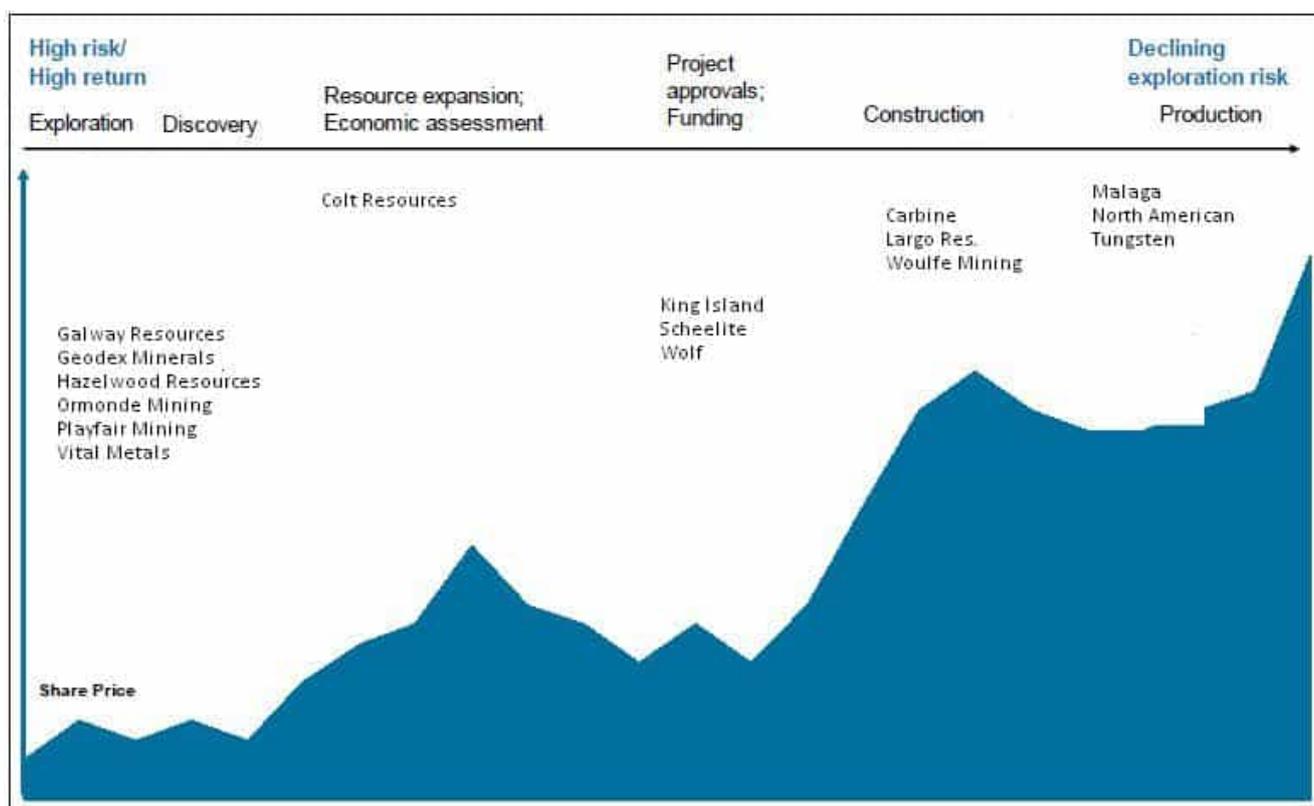


This chart raises the interesting question of how to deal with juniors. During the years of the Supercycle any junior in a given metal could be seen as a potential player. As it wended its way through the Resource/PEA/PFS/BFS continuum there was always an assumption that financing would be forthcoming by hook or by crook for a worthy project. That is now not the case. So do we position a no-hope junior on the Lifecycle Chart at all or just cast them into the outer darkness?

The second issue relates to “naming names” because it is not particularly a company that it somewhere on the timeline but rather individual projects. A good example is Almonty, which has a producing mine in Spain, a near producing mine in Australia and a more distant prospect in South Korea. The stricken North American Tungsten has a producing mine in the Yukon and a project that is way at the other end of the lifecycle and likely to stay there because of its owner’s travails.

Looking back at the Lifecycle Chart (below) we published in 2011, the companies at the very right were Malaga and North

American Tungsten, now both in administration or bankruptcy, and Malaga's property is in the hands of new owners.



Geodex sold its project to Northcliff. Largo mothballed its Brazilian mine almost as soon as it got into operation. Woulfe was bought by Almonty and the "other" Wolf has advanced mightily. King Island Scheelite had a management and project reconfiguration (for the better) but that has put it no further ahead of where it was. Colt has oscillated around trying to decide if it will be a Tungsten project or a gold venture. Almonty did not even figure on our radar screen!

Conclusion

In the grim current environment for metals, even Tungsten cannot escape the generalized price weakness. As we have shown the ranks of potential producers have thinned and several producers have come to grief. The best projects are clearly the reboots of past producers because the capex is a quantum lower than the \$400mn plus price tags on projects like Sisson and MacTung. Prices will have to move higher substantially and for a prolonged period to even move these projects off the

starting blocks.

So while being a producer currently might be somewhat of a thankless occupation, those with production will be the ones to reap the best profits once a price upswing occurs and will have a good run of years before any “new projects” appear as realistic competition with actual output.