

HALLGARTEN & COMPANY

Sector Review

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Tungsten

The Cutting Edge in Metals

Company	Ticker	Currency	Price	Mkt Cap mn	Stage	Call
Colt Resources	GTP.v	CAD	0.56	53.00	Exploration	N/A
Galway Resources	GWY.v	CAD	1.27	158.50	Exploration	Avoid
Geodex Minerals	GXM.v	CAD	0.075	10.70	Exploration	N/A
Hazelwood Resources	HAZ.ax	AUD	0.135	31.64	Exploration	N/A
Carbine Tungsten	CNQ.ax	AUD	0.091	19.47	Ex-producer	N/A
King Island Scheelite	KIS.ax	AUD	0.15	13.91	Near-producer	Neutral
Largo Resources	LGO.v	CAD	0.27	116.90	Near-producer	N/A
Malaga	MLG.to	CAD	0.12	28.45	Producer	Long
North American Tungsten	NTC.v	CAD	0.2	52.14	Producer	Long
Ormonde Mining	ORM.L	GBP	0.0825	27.97	Exploration	N/A
Playfair Mining	PLY.v	CAD	0.055	5.75	Exploration	Neutral
Vital Metals	VML.ax	AUD	0.064	14.62	Exploration	N/A
Wolf Minerals	WLF.ax	AUD	0.23	19.31	Ex-producer	N/A
Woulfe Mining	WOF.v	CAD	0.195	51.00	Near-producer	Long

Tungsten

The Cutting Edge in Metals

- + Tungsten is most commonly used in so called “hard steels” and is best known though for providing the filaments in lightbulbs.
- + While the sub-sector has not attracted the interest of broader portfolio investors, heavyweight trading houses have started to circle the few players “of merit”
- + The number of new projects (well, largely reopening of old mines) in the Western World is not that great as to ruin the new higher price scenario
- + China is choking off supply. This may be either due to a desire to stockpile material for its own future use or a sign that heavy over-exploitation in recent decades has left the country in a vulnerable supply situation
- + As in Rare Earths, a substantial number of Tungsten users are concerned about reliability of supply.
- ✗ The Tungsten price has shown itself to be highly volatile in recent years. If they fall below \$250 per MTU, investment dries up and some mines become uneconomic
- ✗ The Chinese as both the largest producer and one of the main users have a vested interest in higher prices but that does not mean that they may not push prices down to achieve other policy or strategic goals

Not the Word on Everyone’s Lips

Tungsten has long been a metal of interest for the cognoscenti but remains largely unknown to the broader public (investing or otherwise). If they have heard of it, then most likely it would be in the context of some power tool’s marketing campaign. However, the metal is indispensable to a lot of applications that are not up close and personal with consumers but vital for the broader economy. To name but a few there are machine tools and all sorts of drilling for both the oil & gas industries and mining. If the recent price surge escaped the attention of the investment community then at least the recent, much-talked about British Geological Survey Risk List has shone a spotlight on the metal ranking it as number four in terms of criticality of supply, ahead of Rare Earths.

Tungsten

Tungsten takes its name from the Swedish words, *tung sten*, or heavy stone. Its symbol in the periodic table though is W which derives from the name of its discoverer, Peter Woulfe, who in 1779 investigated the mineral now known as wolframite and concluded it must contain a new substance. Scheele, in 1781, found that a new acid could be made from tungsten (a name first applied about 1758 to a mineral now known as scheelite). Scheele and Berman suggested the possibility of obtaining a new metal by reducing this acid. The de Elhuyar brothers found acid in wolframite in 1783 that was identical to the acid of

tungsten (tungstic acid) of Scheele, and in that year they succeeded in obtaining the element by reduction of this acid with charcoal. Tungsten occurs in wolframite, scheelite, huebnerite, and ferberite.

Tungsten – where and how

All tungsten deposits are of magmatic or hydrothermal origin. During cooling of the magma, differential crystallization occurs, and scheelite and wolframite are often found in veins where the magma has penetrated cracks in the earth's crust. Most of the tungsten deposits are in younger mountain belts, i.e. the Alps, the Himalayas and the circum-Pacific belt (i.e. the Andes). The concentration of workable ores is usually between 0.3 and 1.0% WO₃.

Applications

Because it retains its strength at high temperatures and has a high melting point, tungsten is used in many high-temperature applications, such as light bulb, cathode-ray tube, and vacuum tube filaments, heating elements, and rocket engine nozzles. Due to its conductive properties, as well as its relative chemical inertia, tungsten is also used in electrodes.

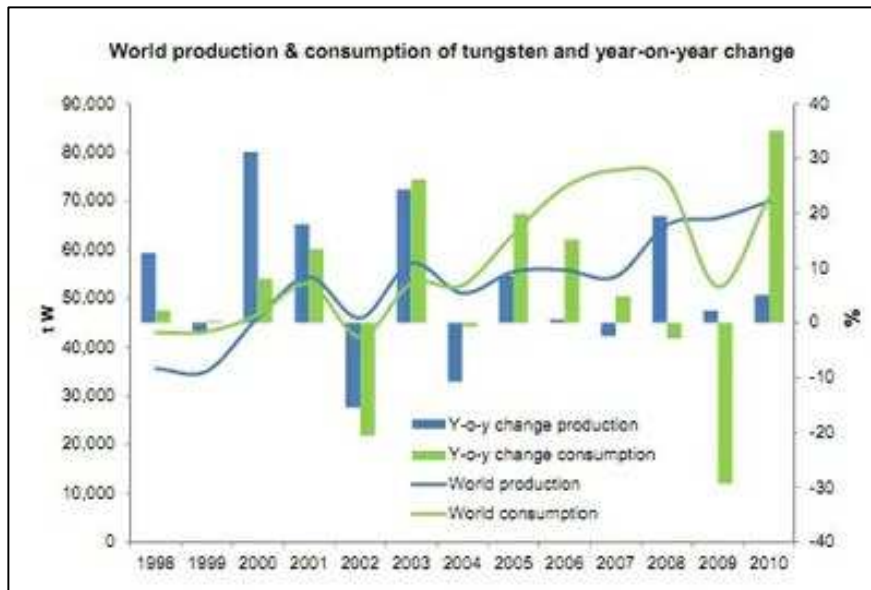
Its high melting point also makes tungsten suitable for aerospace and high-temperature uses such as electrical, heating, and welding applications, notably in the gas tungsten arc welding process (also called tungsten inert gas -TIG- welding).

The hardness and density of tungsten are applied in obtaining heavy metal alloys. High-speed steel, may contain as much as 18% tungsten. Superalloys containing tungsten are used in turbine blades and wear-resistant parts and coatings. In its defense applications, tungsten, usually alloyed with nickel and iron or cobalt to form heavy alloys, is used in kinetic energy penetrators as an alternative to depleted uranium but may also be used in cannon shells, grenades and missiles to create supersonic shrapnel.

Tungsten compounds are used in catalysts, inorganic pigments, and as high-temperature lubricants. Tungsten carbide (WC) is used to make wear-resistant abrasives and cutters and knives for drills, circular saws, milling and turning tools used by the metalworking, woodworking, mining, petroleum and construction industries and accounts for about 60% of current tungsten consumption. Tungsten oxides are used in ceramic glazes and calcium/magnesium tungstates are used widely in fluorescent lighting, while tungsten halogen bulbs are frequently used to light indoor photo shoots, and special negative films exist to take advantage of tungsten's unique disentangling properties. Crystal tungstates are used as scintillation detectors in nuclear physics and nuclear medicine. Other salts that contain tungsten are used in the chemical and tanning industries

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.

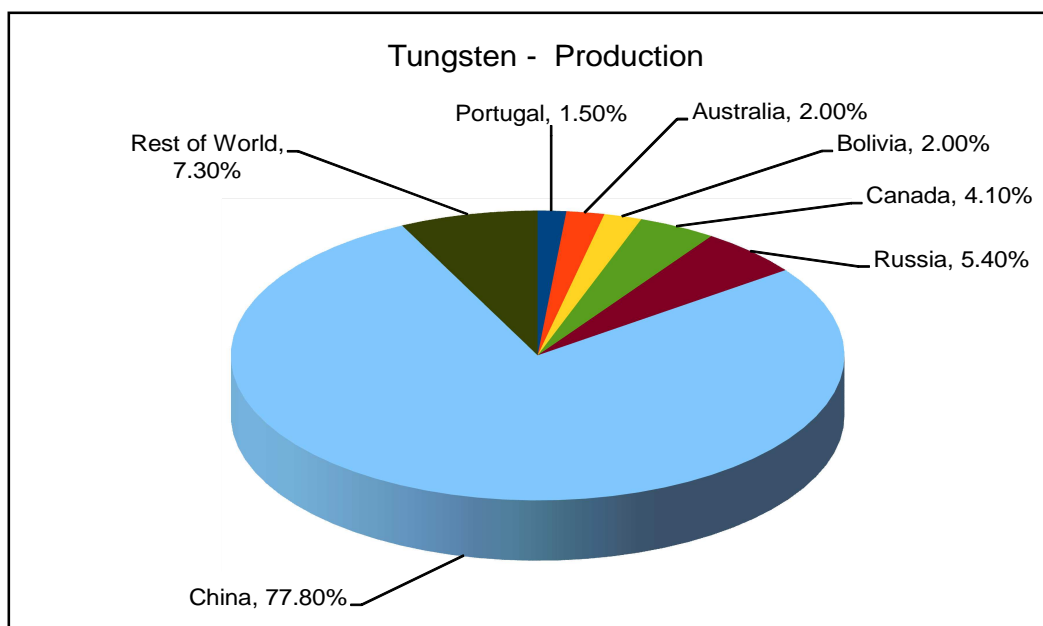


Source: Roskill

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 (to be elaborated upon later) 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).

Who's Got It

The latest assessment of the USGS (from 2008) is that China has 56% of global Tungsten resources, Russia has 9%, the USA has 5% and Canada has 4%. However, it is not which country currently has the resources that matters but the country that gets into production first. Thus Portugal currently has more going on in the Tungsten space than the US does, while South Korea currently has no production but if Woulfe Mining get their operation going there the country will account for 7% of global production and fully 50% of ex-China output. It too doesn't not figure in the ranking of major resource holders (despite its putative mine once being the world's largest).



Source: USGS 2008

This moving feast means that, besides China and Russia, other principal producing countries, when the USGS last computed numbers, were Austria, Bolivia, Peru and Portugal, whilst mines had closed in the last decade in Australia, Brazil, Canada, France, Japan, South Korea, Sweden, Thailand and the USA. Production in the recent past in the US has been in California and Colorado. The pie above gives a snapshot of the USGS's assessment in 2008. However, we would note Canada shuttered most production after 2008 and now has reopened the Cantung mine.

Sources of Production over the last 10 Years	
Primary	55-60,000 tpa
Recycling	20-25,000 tpa

In 2008, Goodall (GBRM), the leading consultants in the tungsten space, predicted that global consumption would rise from 81,000 tpa to around 109,000 tpa by the end of 2012. This projection has probably now a longer time span due to the lost years of global growth in 2008 and 2009.

Not only have the sources of supply altered but so have the tungsten compounds traded, as fluctuating price differentials between concentrate and upgraded products and governmental restrictions played their part in the market. The table below shows the way these shifts have effected product mix over recent decades.

International Trade in Tungsten Compounds		
Year	1986	1996
Concentrates:	84%	29%
Intermediate Products:	16%	71%

Intermediate products include tungstates, tungsten oxides and hydroxides, W and WC powders, and ferrotungsten.

The China Factor

We see in tungsten the same dynamic that other specialty metals have experienced over recent decades. Some Tungsten producers even try to hitch their wagon to the Rare Earths phenomenon. 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 WO₃ 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 (metric ton unit = 10kg).

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 took strong step upwards to its current \$460 range.

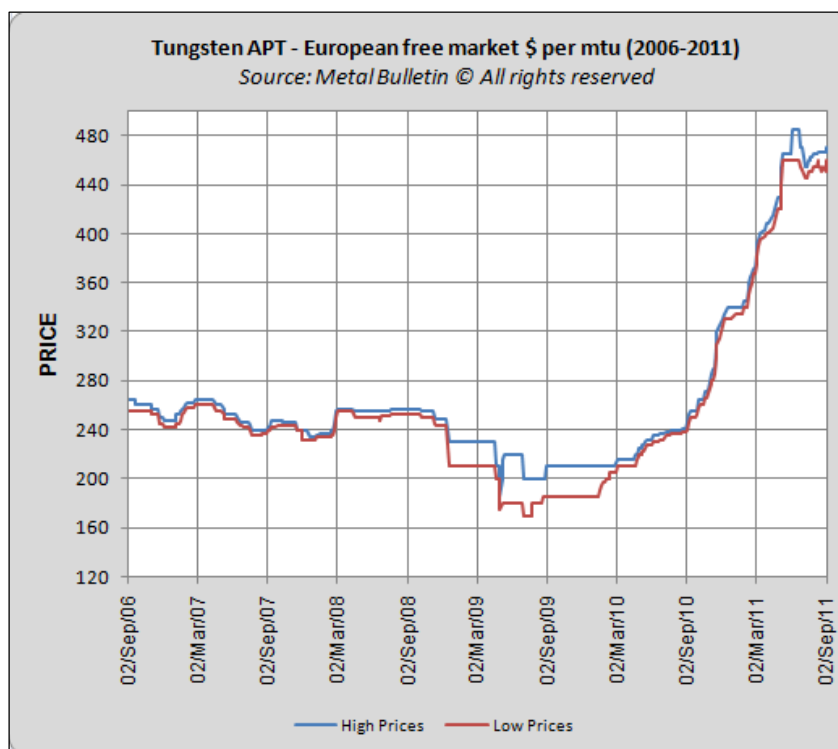
Just as in Rare Earths and other specialty metals the Chinese government is curtailing mining programs and strongly "encouraging" downstream processing of concentrates to higher value added products such semi-finished and finished tungsten products. We might also note that before the 2008 slump China had become a net importer of tungsten concentrates and scrap.

In 1Q11, China's Ministry of Land and Resources announced that authorities in the country had identified and ordered the clean-up of more than 280 illegal mines in an effort to regulate the exploration of valuable minerals. The number of exploration licenses for minerals such as Rare Earths, tungsten, tin, and antimony were reduced to 116 from 400 in eleven provinces and regions in the country via spot checks led by teams dispatched by the ministry. This campaign, initiated last June by the ministry, has aimed to end the supposedly illegal excavation of valuable minerals. The ministry earlier ordered that the clean-up of illegal mines should be completed before the end of November 2011. These measures, ostensibly, were in an effort to conserve resources. The Ministry of Land and Resources extended a suspension on approving new-mine applications for tungsten, rare earths and antimony to June 30, 2012 from this month.

Pricing

The average annual price of tungsten since 1950 has fluctuated between a nadir of US\$10 per metric ton unit in 1963 and a peak of US\$175 in 1977. After that point it sagged back to trade in a \$50-75 band for several decades before its revival in the new century.

The chart at the right shows the recent price trends for APT, with a clear recovery being evident since its nadir in mid-2009. More interesting though is that the current price vastly exceeds levels pre-2008, which is a different look to most other industrial metals.



During the last five years, trade in concentrates has diminished and the market has relied more and more upon the APT quotation as a price guide since APT is the product traded in the largest quantity. Prices are mainly based on the quotations published twice a week by London's "Metal Bulletin", although other trade journals also publish quotations or indicative prices.

Our latest projections are shown in the table below.

Tungsten APT Pricing Projections	MTU (US\$)
2010	\$245
2011	\$415
2012e	\$450
2013e	\$485
2014e	\$440
2015e	\$425

Prices may peak in 2013 and then start a light decline mainly because Western world production will pick up. However the projected production is not enough to seriously move the price lower. Frankly not enough is known about the China dynamic to explain the likely actions there. For instance, is China

restricting export quotas a ploy to get prices up or does it reflect some sort of production problem, either short- or long-term within the Tungsten supply chain within China? Pricing even at the near \$400 level for 2015 projected here is enough to give handsome returns to most mine reactivation plans or low capex *de novo* projects.

Reaction in the West

This produced a flurry of activity with companies outside of China realizing that they urgently needed to find and secure long-term supply of tungsten and its products from sources outside China. This led to increased investment in exploration and mine development activities outside of China, particularly in Viet Nam, Australia and the Americas. Three former tungsten mines were reopened: CanTung (owned by North American Tungsten) in Canada in 2005, Panesquira (owned by Primary Metals) in Portugal in 2005 and Pasto Bueno (owned by Malaga Mining) in Peru in 2006.

Factors militating against a ramp up in production included:

- long lead times between exploration and new mine openings are long
- the rapid increase in mine development and operating costs
- the very limited availability of high grade deposits (i.e. greater than 0.6% WO₃)

The result is that the pipeline of new projects is empty and even if potential mines were identified there would be no new significant supply can be expected before 3-4 years. Moreover further price advances for tungsten concentrates and products would be necessary before any new major mining programs could stand a chance of gaining funding. As we have seen APT prices again went off a cliff with the global slump of 2008 and any miners with aspirations to get into production ended up shelving plans for the duration of the slump. This only served to accentuate the China-dependency of the industrial users of Tungsten.

The Process: Mining to concentrating

Tungsten is usually mined underground. Scheelite and/or wolframite is frequently located in rather narrow veins which are slightly inclined and often widen with the depth. Open pit mines exist but are less common.

Most tungsten ores contain less than 1.5% WO₃ and thus ore dressing plants are always in close proximity to the mine. The ore is first crushed and milled to liberate the tungsten mineral crystals. Scheelite ore can be concentrated by gravimetric methods, often combined with froth flotation, whilst wolframite ore can be concentrated by gravity, sometimes in combination with magnetic separation.

Pricing

Most tungsten concentrates are processed chemically to ammonium paratungstate (APT). Secondary raw materials like (oxidized) scrap and residues are another important feed for chemical tungsten processing. However, wolframite concentrates can also be smelted directly with charcoal or coke in an electric arc furnace to produce ferrotungsten (FeW) that is used as alloying material in steel production. Pure scheelite concentrate may also be added directly to molten steel.

Offtake

In sharp contrast to the bemoaners of the REE space, the end users in the Tungsten space are acutely aware of their vulnerability in the supply chain. Not unsurprisingly the major users have moved to try and secure their upstream (as per our mantra in specialty metals “Secure Thy Upstream”). In one case Sandvik, the major toolmaker, acquired a mine in Austria. Back in 2009 it acquired Wolfram Bergbau- und Hütten-GmbH Nfg. KG, an Austrian producer and supplier of tungsten products which operates a refining plant for producing tungsten carbide, including a chemical plant for recycling tungsten material, in St. Martin, Austria. It also operates a mine and ore dressing plant in Mittersill, Austria. WBH is active within the tungsten industry since 1975 and offers tungsten carbide and tungsten metal powders. Sandvik had been part of WBH’s global customer base since many years. Tungsten carbide is the primary raw material of cemented carbide, and therefore the acquisition of WBH is of long-term strategic importance for Sandvik.

This move by Sandvik was interesting as the company was particularly vulnerable to supply disruptions as it is up against China, making a major push into the tool space and thus we might tactfully say that it would be to the benefit of Chinese toolmakers to have foreign competitors experience supply problems from the Chinese tungsten mines. If any investors doubt that that might happen then they would be naive indeed.

Access to the Players

In researching the players one would note that the last 15 years have been a moving feast.

For example, the only US source of Tungsten in recent years has been the Mount Morgan mine at Bishop in California. This is another sad tale of US decline in the mining arena as it was once the largest tungsten producer in the world (at over 2,000 tons per day) however the mine (located on the slopes of Mount Morgan) has been in care and maintenance status since 1992. It was owned for several years by Avocet Tungsten, which acquired it from Union Carbide. Avocet Mining PLC divested this asset in September 2003 and it is now owned by a private company, Bishop Tungsten Development LLC. A treatment plant at the site periodically produces ore from scrap and waste products from the mine, employing only around 16 people now.

Avocet had another Tungsten asset, the Panasqueira mine in Portugal that it sold at the same time it exited the Mount Morgan asset. The buyer was the TSXV-listed Primary Metals. Primary thus owned a 100% interest in the Panasqueira tungsten mine, which produced wolframite concentrates containing some 100,000 MTUs of tungsten trioxide per annum. The Panasqueira mine has a long history of production of high-quality wolframite concentrates and is the dominant producer of high-grade tungsten concentrates outside China.

Primary Metals was taken over in 2007 by Sojitz Corporation, one of Japan's leading trading companies, and thus disappeared from the public eye and access for investors wanting a pure play.

Finding exposure to Tungsten production is not all that difficult. However as in Rare Earths, the most obvious exposure is not necessarily the one that will deliver production and earnings.

There is no shortage of potential investment vehicles as the table below shows. In most of these cases the Tungsten prospect is the main asset of the company concerned (though not at Largo and arguably not at Galway also). Beyond this group there are other companies with Tungsten potential (Quaterra for example) where the asset is insignificant compared to the other metals in the exploration portfolio).

Stock	Ticker	Project Location	Project Name	Tonnes (mn)	Grade WO3	Resource MTU of WO3 (mn)
Colt Resources	GTP.v	Portugal	Tabuaco	2.09	0.57%	1.2
Galway Resources	GWY.v	New Mexico	Victorio	77.2	0.09%	6.95
Geodex Minerals	GXM.v	Canada	Sisson Brook	158.2	0.08%	12.66
Hazelwood Resources	HAZ.ax	Australia	Big Hill	47.43	0.10%	4.74
Carbine Tungsten	III.ax	Australia	Mt Carbide	9.6	0.20%	1.92
King Island Scheelite	KIS.ax	Australia	King Island	13.4	0.64%	8.58
Largo Resources	LGO.v	Canada	Northern	233.4	0.11%	24.97
Malaga	MLG.to	Peru	Pasto Bueno	2.39	0.72%	1.72
North American Tungsten	NTC.v	Canada	Cantung/Mactung	33	0.88%	29.04
Ormonde Mining	ORM.L	Spain	Barruecopardo	10.88	0.45%	4.9
Playfair Mining	PLY.v	Canada	Risby	10.4	1.77%	18.4
Vital Metals	VML.ax	Australia	Watershed	15.1	0.46%	6.95
Wolf Minerals	WLF.ax	UK	Hemerdon	218	1.80%	39
Woulfe Mining	WOF.v	Sth Korea	Sandong	103.2	0.35%	36.12

That leaves the field of listed players (as far as we can work out) as:

- ✧ Malaga: a producing pure-play in Peru
- ✧ North American Tungsten: a producing pure play in the Yukon
- ✧ King Island Scheelite: a former producer reactivating a mine in Tasmania
- ✧ Woulfe Mining: mainly a Tungsten play reopening a past producing mine in South Korea, with a gold mine as a second string asset
- ✧ Carbine Tungsten has a past-producing mine, Mt Carbine, in the Australian state of Queensland. The company is planning to re-treat the low grade stockpile (using X-Ray sorting) over a period of 4-6 years at a production rate of ~100 tonnes WO3 per month, before it recommences hard rock mining.
- ✧ Colt Resources: Mainly a gold play in Portugal with a second string non-NI43-101 Tungsten/Gold asset in Portugal
- ✧ Playfair Mining: pure play, mainly explorer at this stage but with a low-capex potential production project in Newfoundland
- ✧ Largo Resources: mainly a Brazilian Vanadium with a JV Tungsten property in the Yukon and a tailings reprocessing project for Tungsten in Brazil
- ✧ Wolf Mining, a past producer in England, with a very low grade of material (though with tin

credits). Interestingly has Resource Capital and Traxys as shareholders (which is also the case at Malaga and Woulfe)

Largo Resources is worth special mention as it is only a tailings reprocessing plan (though substantial) with its Currais Novos property having Indicated Resources of 3.46 million tonnes grading 0.12% WO₃ and 1.74% F, containing 7.2 million pounds of WO₃. Its Inferred Resource has been estimated to be 810,000 tonnes grading 0.093% WO₃ and 1.44% F containing 1.3 million pounds of WO₃. These tailings were deposited during the processing of ore from the Barra Verde and Boca de Laje tungsten-molybdenum mines. The current project has construction of the plant underway. While this was scheduled to start sending out Tungsten from July 2011, this has not as yet been achieved. Largo is targeting production of 2.3 million lbs of WO₃ and 675,000 lbs of Mo p.a. when operating at full capacity. The company claims a cash cost of less than \$59 per MTU, which is very attractive indeed. It is also estimating cash flow of over \$1mn per month from the project. The main negative here is that the company is part of the Forbes & Manhattan group, otherwise it would have made the cut for inclusion in the list of our favoured projects.

Mt Carbine has a similar game plan (reprocessing tailings) and its capex is less than AUD\$5mn to move forward. This is imminently doable. The company's hard rock mine though is at the lower end of the grade curve.

In this note we shall focus on the four companies with past producing mines that are either in production again or on the way thereto.

Malaga Mining (MLG.to)

Key Metrics			2010	2011e	2012e
Price (CAD)	\$	0.12	Consensus EPS	n/a	n/a
12-Month Target Price (CAD)	\$	0.30	Hallgarten EPS	\$0.02	\$0.02
Upside to Target		150%	Actual EPS	(\$0.01)	
High-low (12 mth)	\$0.11-	\$0.35	P/E	n/a	5.9
Market Cap (CAD mn)	\$	28.4			4.9
Shares Outstanding (millions)		237.1	Dividend	n/a	n/a
			Yield	0.0%	0.0%

- + All the company's output is pre-sold at market prices to Global Tungsten Powders (GTP), a major player in the Tungsten space
- + The company drafted Resource Capital on board in 2010 as a core investor via a significant financing
- + The company has secured its own electricity supply by buildings its own hydroelectric facilities
- + Production is rising, prices are rising and investments are lowering the cash cost per MTU which should imply strong EBITDA growth over the next two years
- ✗ Despite the strong Tungsten price, the company has been turning in earnings that are meagre

The only listed producer of note

Malaga (which some may know under its previous guise as Dynacor) is a tungsten miner operating in the North of Peru. It acquired the Pasto Bueno mine in Peru in 2005 and has made significant investments in refurbishment and production expansion. It re-started production early in 2009 and is now reaching its current capacity of 500 tpd. A 25% expansion of production was achieved in 2010 by tweaking existing equipment and it has medium-term plans for further refurbishment of the on-site plant to reach 1,000+ tpd of throughput, showing that there is significant revenue expansion potential at the project. Demand for product is guaranteed, as MLG signed a three-year off-take agreement with GTP (formerly Osram-Sylvania) that pays a premium to world spot prices for its high quality tungsten.

It also holds a stake in a nearby electricity generator, so power supply problems, which bedevil so many miners, are not a consideration.

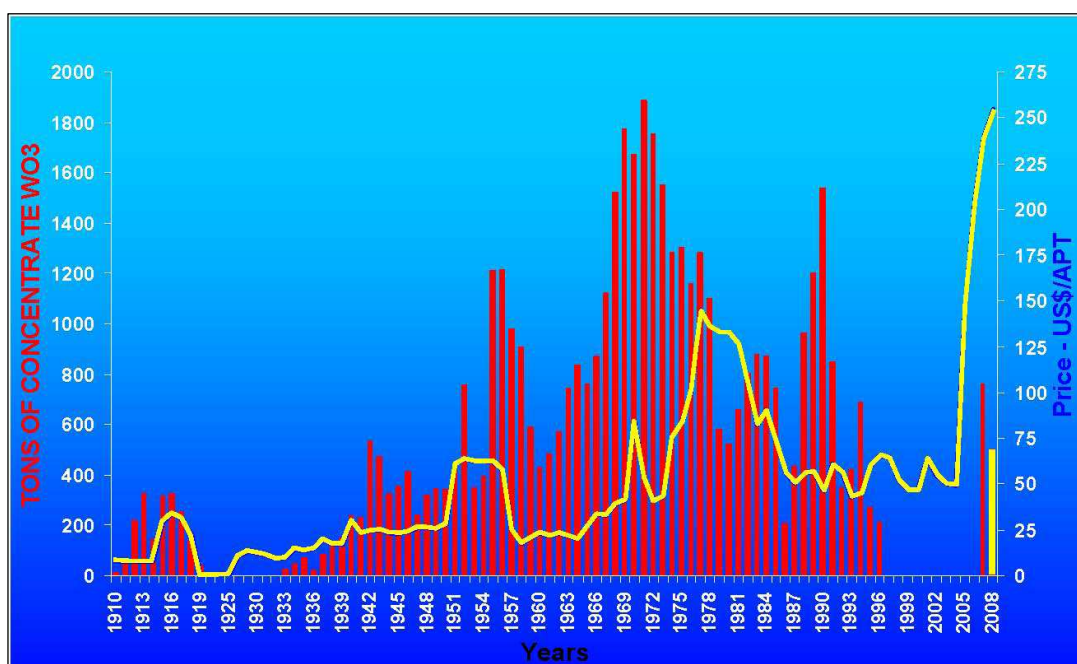
Pasto Bueno – a Long History of Production

The long history of Pasto Bueno can be divided into three different periods of mining operations. Originally called the Consuzo mine it began operations in 1910 and was active through to the early 1990s, under the operatorship by Minera Malaga.

The second operator in the late 1990s was Avocet Resources from about 1995 to 1998. Production peaked in 1980-1981, at a rate of 1000 tons/day. From 1982, production decreased due to low tungsten prices. The property was generally idle from 1998 until 2005 when it was purchased by the current operator, Malaga, Inc (then called Dynacor) in November of 2005. Thus the mine has been active, more or less continuously, for the past nearly 100 years.

The Nature of the Mine

Firstly it should be noted that the company's mine is at very high altitude lying at between 3,200 and 4,200 metres with the concession covering a relative small area of 690 hectares. The ore has a grade of 0.7% WO₃ while the quality of the tungsten concentrate produced at Pasto Bueno, at 75% WO₃, is one of the best in the world since it has very low levels of impurities and does not have trace levels of radioactivity that can be a problem with some other concentrates. Between 1941 and 2002, some six million tons of ore and 42,000 tonnes of concentrate grading at 75% WO₃ were produced from the mine, and this was from only five veins.



The chart above shows the historical production of the mine compared to the prevailing price of APT. The main conclusion that can be drawn from this is that the price very rarely drove the production trend.

The Resource

The company terms the deposit as a Greisen-type of deposit (a type of hydrothermal wall-rock alteration and a frequent typology of tin-tungsten deposits). Hydrothermal wall-rock alteration is the process whereby rocks on the margins of hydrothermal flow channels were changed from an original assemblage of minerals to a different one. This change occurred because of heat and mass exchange

between water and rock. These deposits usually contain, on average around 20 mn tonnes of Tungsten. Many of the tungsten deposits of Yunnan in southeast China, the richest tungsten province in the world, occur in greisenized granite.

Historically, the previous owner had identified 31 veins, mining ore solely from five of these structures. Malaga, having completed surface exploration, has been able to identify to date, 75 veins, 25 of which are major structures. In the company's opinion the Pasto Bueno property still has extensive unknown potential.

The table below shows the current state of the resource at Pasto Bueno taken from the NI43-101 compliant technical report from March 2010.

NATIONAL INSTRUMENT 43-101 COMPLIANT TECHNICAL REPORT (March 2010)				
CATEGORY	METRIC TONS		WO₃ GRADE (%)	MTUs
	2009	2010		
Proven Reserves	28,234	81,696	0.71%	58,004
Probable Reserves	70,214	87,731	0.68%	59,657
Total Reserves	98,448	169,427	0.70%	118,599
Measured Resources	35,646	64,757	0.91%	58,929
Indicated Resources	106,844	334,088	0.73%	243,884
Total M&I Resources	142,490	398,845	0.75%	299,134
Inferred Resources	1,204,000	1,820,641	0.70%	1,274,449

Interestingly the Pasto Bueno mine is akin to a pie that can be served continually without ever diminishing. For example when GTP signed its offtake agreement with Malaga (discussed later) the company signed a five-year agreement although the company at that time (in 2009) only officially had 14-months' worth of reserves at the then production rate. Pasto Bueno gives new meaning to the words "bottomless pit".

Reactivation of the mine

Beginning in about 1995, Avocet Mining invested considerable time and money in trying to restart the operation. They completed the development of the No. 12 level along the Consuelo vein and built the new Huaura mill near the No. 12 level adit. In 2005, Malaga, Inc. purchased the majority of the property (24 concessions) from Minera Malaga. Malaga refurbished the Huaura mill, built by Avocet, and began producing mill feed from several of the veins.

Since 2005, Malaga has invested CAD\$14.2 million for the rehabilitation of the mine and the mill. In September 2006, it began pre-production at a level of 50 tpd. The mine reached the mill's maximum capacity in June 2007, and has been producing at a steady level of 250 tons/day. Malaga has also

substantially increased the WO3 recovery rate from a historical level of 50-60% to more than 80% in current operations. Work is underway on upgrading daily production at the plant, in order to reach a daily capacity of 500 tons/day in 2010.

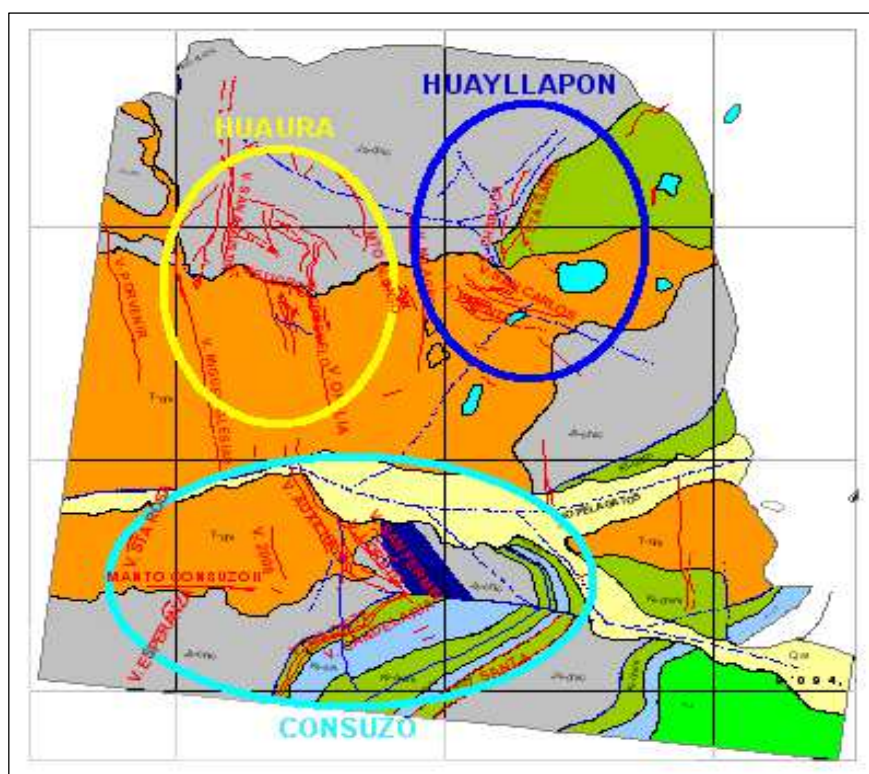


The mine consists of three sectors, Consuzo, Huara and Huayllapon. These are shown on the cross-section above. The only sector in operation until recently was Huara but Huayllapon (marked HDD at the right) has just started to be mined in 2010. The company's goal is to get all three major areas into operation.

The map at the right shows the three zones in relation to each other.

Production Expansion

The company has recently been in the throes of a throughput expansion and efficiency drive. Production per day was 370 tonnes in 2010. The goal has been to



boost milling capacity up to 700tpd sometime in 2011. We might note that 700 tpd is not some chimera as the mine was operating at 1,000tpd in the 1970s.

A new rod mill was installed in 2010 with a further rod mill to follow thereafter. The addition of vibration tables and the mine development will add to installed capacity.

The target is to further reduce its cash cost of sales beyond the current \$178 per MTU, which is substantially higher than the \$103 per MTU achieved in 2010. The company blames part of the cost blowout on labour shortages prompted by Peru's booming mining sector.



Infrastructure

As the Pasto Bueno mine has been in operation, in one form or another, for so long it is almost a given that it has the access and services required to operate a mine in its location. The map above shows that the mine has good access to ports with a choice of two outlets to marine transport.

Water for the process facility is supplied from one of the alpine lakes approximately 2.5 km east of the processing plant as well as from surface water and the underground workings.

Hydro-electric power – self-sufficiency as the goal

The bemoaning by mining companies of their electricity supply situation is so common as to no longer evince a yawn from us. We must confess to have been stunned to come upon a photo of a rather

substantial hydro-electric dam in Malaga's presentation and then realize that the dam was actually funded and built by the company itself to ensure its access to supplies.

In the past, two hydroelectric plants were in operation: an 800 kW unit and a smaller 150 kW unit exploiting the hydrological resources of Pelagatos River in the creation of the Pelagatos reservoir (with a capacity of 12-million cubic metres) guaranteed the continuous operation of these two plants throughout the year independently of the seasonal changes in the flow of water. These hydroelectric plants were originally built by the Malaga Santolalla Corporation were gravitational units, that is to say: the kinetic energy of water undergoing a 170 meter drop is converted by a turbine into mechanical energy which is in turn converted into electrical energy by an alternator. This project was built to run the Consuzo (was later renamed the Pasto Bueno) tungsten mine. Unfortunately these units were regarded as totally obsolete and thus out of use.

A new hydroelectric plant, owned by Hidro Electrica Pelagatos (Hidropesac), was commissioned in December 2008. The hydroelectric plant is currently providing 80% of the mine's power requirements. Hidropesac was formed in January 2006 as a joint venture between Malaga (with 44% ownership), Emerging Power Developers Ltd., (EPD), a Swiss company (having 51% ownership), and ElectroKraft SA, a Peruvian hydropower construction company (the remaining 5% ownership). The hydroelectric plant has a current capacity of 600 kW. The remaining power continues to be provided by the Hidrandina grid.

The hydroelectric plant uses the river flow directly without any additional hydrological infrastructure. The hydroelectric power generated is directly used by the Pasto Bueno mine and its ore processing plant resulting in a significant reduction in energy operating costs. Up until now they have used on-site diesel generated power.

The building of the new hydroelectric plant was financed through the Clean Development Mechanism by the sale of carbon credits under the Kyoto Protocol that is implemented by the United Nations Framework Convention on Climate Change (UNFCCC).

When Malaga purchased the Pasto Bueno property from its previous owners in addition to all the mineral rights, all the hydroelectric rights were also transferred to Malaga. These rights were originally obtained by the Malaga Santolalla Company in the 1950s from the Government of Peru. As a first step in the development of Pasto Bueno, Malaga through its joint venture with EPD, Hidropesac, began building the new hydroelectric plant to replace the previous HEP plant.

Hidropesac has invested more than US\$3mn in this project and has successfully built and commissioned a 600 kW hydroelectric plant at Pasto Bueno. This plant includes two hydroelectric generators – one 150 kW vertical unit and one 450 kW horizontal unit both coupled to Pelton turbines as well as state of the art operational electronic controls. A 22.9 kV/400 V transformer and 15 km power transport line have also been built and installed at Pasto Bueno. EPD, Malaga's partner in Hidropesac, has worked on this project with STUCKY S.A. a Swiss company that has more than 80 years of international experience in the building and commissioning of hydroelectric projects from mega-sized projects to much smaller projects throughout the world.

Since early 2009, following a series of operational and conformity tests that were finished in late 2008, the 600 kW hydroelectric plant was put into commercial production and now provides more than 90% of

Pasto Bueno's energy requirements. Thus, Malaga is now, apart from certain occasional peak power requirements, basically energy independent from the national power grid.

In phase II of the hydroelectric development, Malaga intends to install a second hydroelectric plant that will not only cover all of its future power needs but will also allow Hidropesac to generate additional electricity that will be sold to the national power grid and generate further income for the joint venture.

Offtake

Malaga has a symbiotic relationship with Global Tungsten & Powders Corp (GTP). In February 2009 Malaga signed a five-year agreement for the provision of Tungsten. The main terms of this deal were:

- a \$1.2mn cash advance without interest
- a \$3.8mn loan (first year without interest and afterwards at LIBOR)
- Reimbursement terms over four years with conversion in shares at market price less a discount
- Selling price of Malaga tungsten in line with market price
- Right of first refusal for excess capacity above 700 tpd

This arrangement not only financed Malaga's expansion plans but has given it a guaranteed outlet for product up to the 700 tpd level. It is important to note the market price provision because usually these offtake agreements can end up being onerous with fixed prices or big discounts.

Global Tungsten & Powders Corp (GTP) was created in August 2008. It was the former Materials & Components division of Osram Sylvania, the world's largest lighting firm. The materials group has its roots in the old GTE Sylvania's manufacturing operations that were taken over by the German lighting major, Osram in 1993. GTP is headquartered in Towanda, Pennsylvania and is a leading, producer of tungsten, molybdenum, other refractory materials and phosphors produced in the form of ammonium paratungstate, powders, rod, wire and other fabricated products. Its plants are in Pennsylvania and the Czech Republic. GTP is now part of the Plansee Group, a German private company that is a leading supplier of powder metallurgically manufactured products, with experience in refractory materials dating back to 1921.

The terms for the conversion of shares are that GTP has the right to convert its debt holdings to shares at any time for a maximum of 19.99% of outstanding shares. It would exchange at a 15% discount to the average 10-day price preceding the transaction.

However while GTP has the right to convert but it has made it clear to Malaga that this is not their intention. Malaga had offered to finance with shares but GTP preferred debt as it does not consider itself a miner.

Recent financings

In early May 2010, Malaga undertook a two tranche non-brokered financing from which it received, in the first tranche, gross proceeds of CAD\$2.75mn through the issue of 18,321,667 common shares at \$0.15 and 18,321,667 warrants with an exercise price of \$0.25 that expire two years after the closing date. There is a second tranche (consisting of 21,666,667 Subscription Receipts at a price of \$0.15 each)

that entitle, under the same terms, the holder to redeem for one Unit. The funds raised for the second tranche resulted in gross proceeds of around \$3.25 million.

Investors in the private placement included Resource Capital Fund V LLP, which took 16.66mn units (and the same number of Subscription Receipts) for a total investment of \$5mn. Resource Capital, based in Denver is one of the most prominent PE investors in the mining space in the US and an interesting endorsement of Malaga's strategy. It is also an investor in Woulfe Mining.

By-products

Pasto Bueno is not just a tungsten resource for there is also silver and copper in its output though this has not been a focus until recent times. During 2009, Malaga invested in a small pilot plant to concentrate the mine tailings and succeeded in producing a tailing concentrate enriched in copper and silver.

Obviously this impacts positively the operational cash flow. In March the company announced that it had sold 1,000 tonnes of copper/silver concentrate in the months of January and February of 2010. This concentrate was extracted from the mine tailings, a by-product accumulated from tungsten ore processing. It was expected that an additional 1,000 tonnes will be sold in March, generating an expected US\$1mn during the 1Q10. The company anticipated selling 5,000 tonnes of accumulated material for at least US\$2.5mn in the first half of FY10.

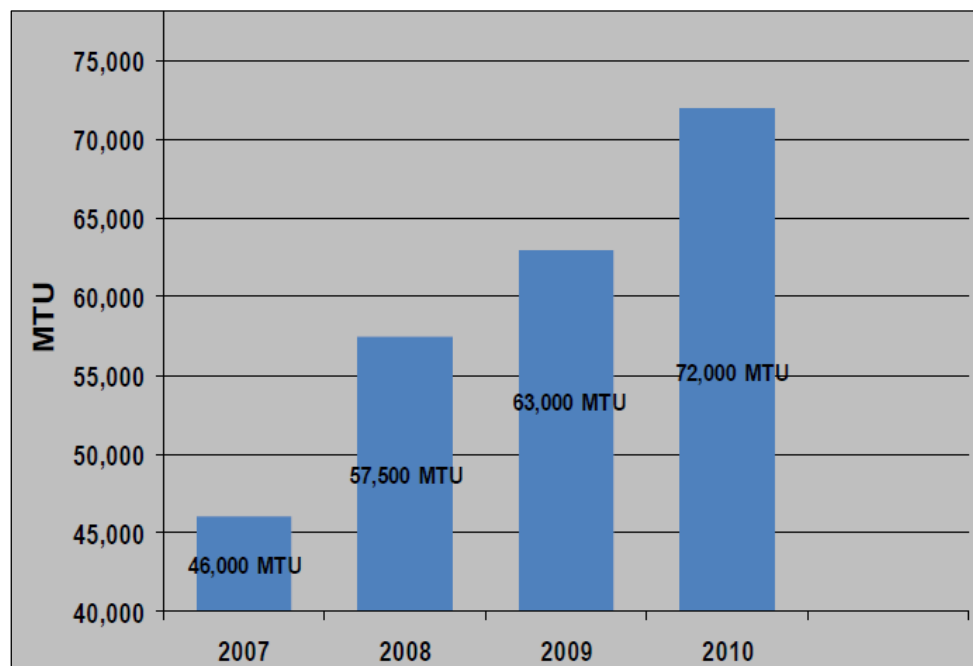
An agreement has been signed with a Peruvian company to process 5,000 tonnes of the enriched tailings and it expects to expand this arrangement further in the future.

Earnings Outlook

In coming up with earnings estimates for Malaga over the next couple of financial years we have used the metrics of output, costs and APT prices that are shown in this table:

	FY12e	FY11e	FY10	FY09
Tons per day	700	700	490	267
Annual Production MTU	126,000	100,110	70,407	63,358
Cash cost/MTU	168	165	103	133
Gross Margin per MTU	83	83	66	21
Av price APT per MTU	450	428	219	197

These do not seem a stretch in light of the current market price and the progress on increasing the milling throughput. The projection of \$168 in cash cost per MTU is achievable we feel in light of some of the process and productivity improvements in recent months.



Thus in working up estimates (shown on the following page) for FY11 and FY12 based upon these parameters we feel that the company has the potential to:

- Sales of \$20.33mn in FY11, nearly double those of the preceding year
- Produce net profits of around \$4.82mn in FY11 or the first annual profit in recent years
- In FY12 sales could be as high as \$27.4mn, thus a YoY increase of around 35%
- This would produce a pre-tax gain of \$5.84mn or around two cents per share

Quite clearly cashflow has taken a major turn for the better in this scenario, but whether this would be sufficient to enable the payback of the GTP loan as well as facilitating improvements to the daily throughput remains unclear. Clearly, in our view, the ideal scenario for shareholders would be for the company to be merged with another Tungsten player (Woulfe?) and become part of a bigger structure with lowered overheads.

The warrants

A feature in recent quarters, as Malaga's stock price has slid, has been the accounting effect for the massive number of warrants that it has on issue. In 2010, as part of the two tranche private placement, Malaga issued 35,863,333 ordinary warrants. Each warrant is exercisable at a price of \$0.25 with 34,988,333 ordinary warrants expiring on May 6, 2012 and 875,000 ordinary warrants expiring on June 23, 2012. With the stock price languishing at 13 cts it is not likely the stock will pass 25 cts in such short order to put these warrants in the money. Thus far in FY11 the warrants have provided the company with an accounting gain of over \$2.5mn as the likelihood of exercise has faded dramatically. In the latest accounts the warrants were assigned a value of \$163,000 which should be extinguished with another small gain at expiration. Ironically, while accounting positive, the expiry of the warrants is a negative for the company as it removes a foreseeable source of finance.

Malaga									
(CAD mn)									
	FY12e	FY11e	3Q11	2Q11	1Q11	FY10	FY09	FY08	FY07
Revenue	27.40	20.33	4.64	5.33	5.26	14.67	11.20	10.62	8.03
Cost of Revenue, Total	14.30	11.46	2.50	2.63	3.53	9.82	9.58	8.54	5.36
Gross Profit	13.10	8.87	2.15	2.70	1.73	4.85	1.63	2.09	2.67
Selling/General/Admin. Expenses	3.40	3.30	0.85	1.28	0.87	3.05	2.76	3.06	3.72
Depreciation/Amortization	3.10	2.68	0.56	0.56	0.95	3.74	4.09	1.9	0.65
Total Operating Expense	20.80	17.44	3.91	4.47	5.35	16.11	16.40	13.75	10.74
Operating Result	6.60	2.89	0.73	0.86	0.85	-1.94	-5.22	-2.87	-1.70
Interest Expense(Income)	0.80	0.60	0.15	0.14	0.15	0.80	0.72	0.338	
Forex loss (gain)	0.12	0.01	-0.11	-0.01	0.27		-0.76		
Unusual Expense (Income)	-0.16	-2.54	-1.291	-1.257	0.013	0.021	-0.03	-0.04	0.07
Income Before Tax	5.84	4.82	1.98	1.99	0.46	-1.44	-5.20	-3.13	-2.75
Dynacor Gold effect							-2.38	0.21	-0.67
Tax (Credit)	0.00	0.00	0.00	0.36	-0.36	-0.55	0.00	0.00	123.06
Net Income	5.84	4.82	1.98	1.63	0.81	-0.89	-7.60	-3.13	-3.42
Weighted Average Shares	241	237.06	183.675	183.582	183.55	168.811	140.77	137.12	122.39
EPS	0.02	0.02	0.01	0.01	0.00	-0.01	-0.054	-0.023	-0.028
Production MTU	126,000	100,110	13,302	29,420	31,388	105,000	63,358	57,500	46,100
Cash cost/MTU	168	165	178	189	129	103	133	144	109
Av price APT per MTU	450	428	454	439	360	219	197	248	237

Conclusion

Malaga is the great survivor in the space, and then only just.... It has come through the valley of darkness into which the specialty metals fell in 2008 but has still not managed to capture the market's interest due to generalized ignorance of tungsten and its supply/demand dynamics. If investors can get into a lather over Rare Earths and Lithium then we feel that Tungsten is just as deserving of attention, maybe even more so.

Grade and longevity of deposit are both factors that are in Malaga's favour in comparison to another stock in the space like North American Tungsten. Cost control must be stringent to survive the fluctuations in the price of APT. Malaga has the added advantage of having long had its own power supply from hydro sources, an advantage it has reinforced in recent times with its new hydro JV.

The high amortization rate hides the earnings potential but hopefully this non-cash item will be modified. At the current pace of expansion of production with prices of APT where they are or slightly higher, the EBITDA at Malaga could be over \$10mn in FY11, representing a P/EBITDA ratio of only three times. Underpinning this is one of the major users (GTP) of Tungsten as a guaranteed off-taker and Resource Capital, a very savvy investor as a key holder. We have had a **Long** position in Malaga in the Model Mining Portfolio for some years now and take this opportunity to reiterate this stance with a 12-month target price of 40 cts.



North American Tungsten (NTC.v)

Key Metrics			2010	2011e	2012e
Price (CAD)	\$	0.22	Consensus EPS	n/a	n/a
12-Month Target Price (CAD)	\$	0.40	Hallgarten EPS	(\$0.06)	\$0.11
Upside to Target		82%	Actual EPS	(\$0.06)	
High-low (12 mth)		\$0.18 - \$0.62	P/E	n/a	1.9
Market Cap (CAD mn)	\$	52.1	Dividend	n/a	\$ 0.02
Shares Outstanding (millions)		237.0	Yield	0.0%	0.0%
Shares O/S Fully Diluted (mns)		255.7			9.1%

- + Surging prices have brought the Cantung mine back into operation with a very healthy margin above break-even
- + Earnings potential is substantially higher than the more pedestrian Malaga
- + Production is rising, prices are rising and investments are lowering the cash cost per MTU signaling strong EBITDA growth over the next two years
- ✗ The life of mine at Cantung is limited to a mere handful of years
- ✗ The company will need to have its second project up and running by 2013 but the capex at over \$400mn is a substantial hurdle
- ✗ Cash costs at \$250 per MTU mean that the mine is one of the first to switch off production if prices tumble

Reactivation of the mine

There is another sometime player in the tungsten space in the Western World. It is North American Tungsten, which owns the CanTung mine in the Northwest Territories of Canada. This mine was put on care and maintenance in June 2009 due to low tungsten prices and came back online over the last year due to the APT price rebound and multiple financings that the company has done in the meantime. The company has a reputed \$250 per tonne production cost at the CanTung mine which operates as a trigger for this mine being switched on or off. The current WO3 price makes it eminently viable and the company has swung into profit in its last reported quarter.

The Mine

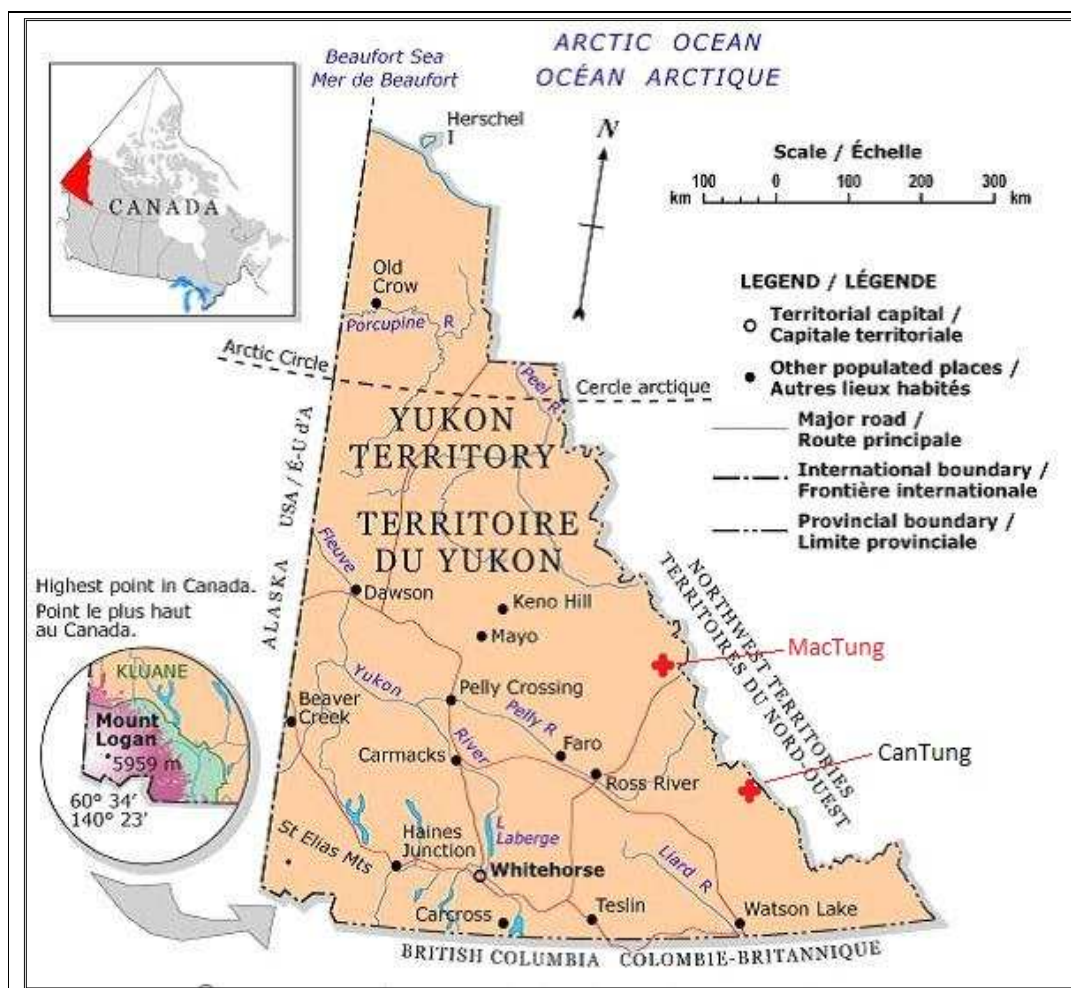
The Cantung Mine is an underground facility that is a primary producer of tungsten concentrates. It is located in the Nahanni area of western Northwest Territories in Canada, some 306 km by road northeast of Watson Lake, Yukon, close to the Yukon border.

The mine complex, opened in 1962, consists of both the open pit and the underground (E Zone) mines. It was opened in 1962. The physical plant site includes an underground mine, a small open pit, process plant, diesel power plant, workshops, warehouses, administration buildings, a town site and single

status accommodation, and an airstrip. There are also waste rock storage facilities and a tailings storage facility.

It has, in the past, produced ore at a rate of 1,160 short tons per day. Mineral Reserves support a mine life of four years, ending in Q4 2014. Primary mining methods include, longhole stoping and pillar-remnant ore recovery using different techniques. Currently, longhole methods are planned for mining the majority of the remaining reserves, both for pillar recovery and for primary mining in areas with favourable geometry.

Processing is carried out by gravity and flotation circuits. Final products include a premium gravity concentrate (G1), containing 65% WO₃ and a flotation concentrate containing 45% WO₃.



Background and History

Prospectors discovered the Cantung Mine tungsten deposit in 1954, while looking for copper. In 1959, the Canada Tungsten Mining Corporation Ltd. was formed to acquire and develop the property. The Cantung Mine commenced production in 1962 from an open pit at the rate of 300 short tons per day

(stpd), with suspensions in 1963 due to low tungsten prices and in 1966 due to the destruction of the mill by fire. The construction of a new 350 stpd mill was completed in 1967 and, in 1969, the capacity was increased to 450 stpd.

In 1971, drilling discovered the underground mine's "E Zone". This zone was accessed through an adit collared at the valley bottom, close to the town site. The mill began to process the underground ore in 1974. In 1975, the mill was further expanded to 500 stpd. A major mill expansion in 1979 increased the mill capacity to 1,000 stpd.

In 1985, Amax consolidated ownership of the Cantung Mine and transferred all tungsten assets, including the Mactung Project (discussed later) at Macmillan Pass, to Canada Tungsten Mining Corporation, retaining majority control. Aur Resources Inc. purchased Amax's controlling interest in 1995 and Canada Tungsten and Aur merged in 1996.

In 1997, North American Tungsten Corporation purchased the Cantung mine, together with the related tungsten assets of the former Canada Tungsten Inc., from Aur (which was taken over by Teck in 2007).

The improvement in tungsten prices after 2000 prompted the reopening of the mine in December 2001 with both underground production and milling resuming at that time. In December 2003, NATCL was placed under the protection of the Companies Creditors Arrangement Act (CCAA), and the mine was closed. In November 2004, NATCL successfully completed a plan of arrangement to deal with creditors, allowing planning for reopening to commence. Preparatory work for the reopening began in July 2005, and production resumed in late September 2005 only for the operations to be suspended again in October 2009 after the price slump. Production activities resumed in October 2010.

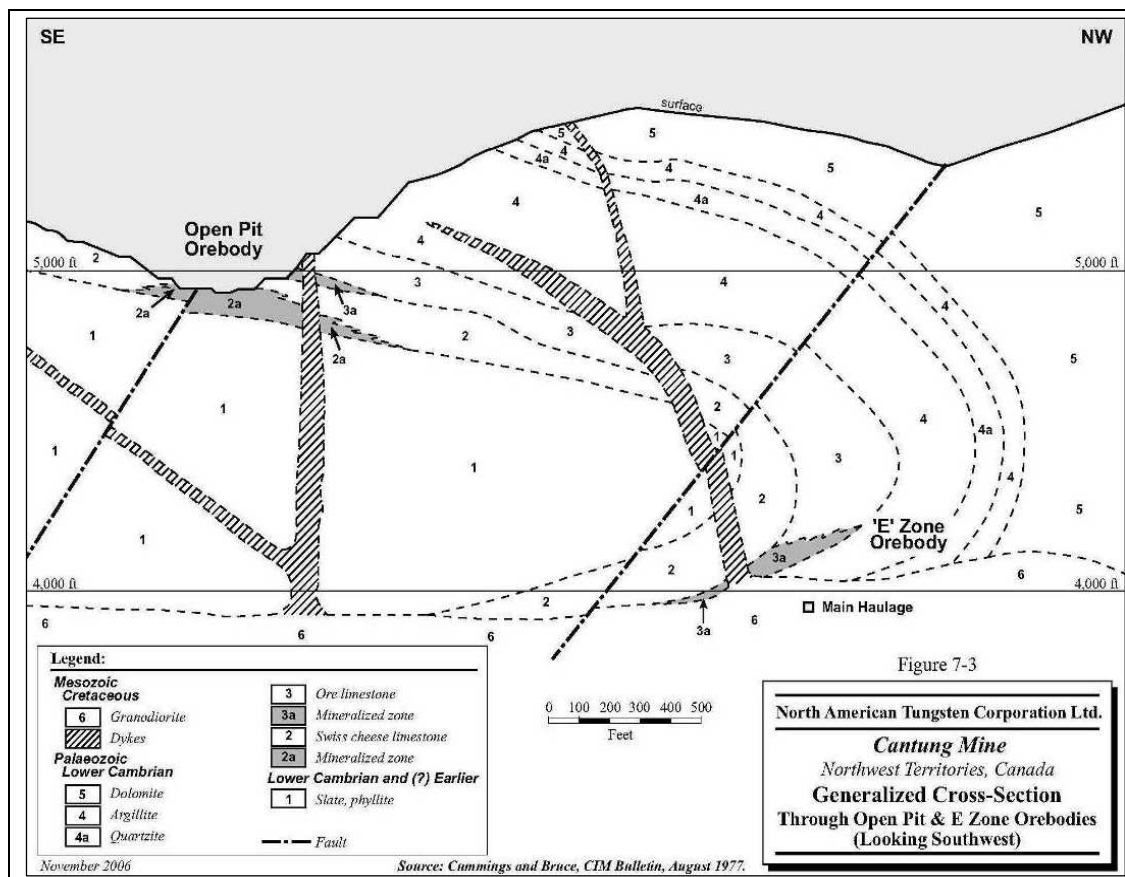
Cantung Mine - M&I (and Inferred)

Zone	Tons	Grade	STU'S
		WO3 %	(Short ton units)
West Extension Below 3700el	344,485	1.49	513,283
West Extension Below 3570el	305,324	1.46	445,773
West Extension	115,601	1.2	138,652
E-Zone	24,183	1.97	47,738
Main Zone Pillars	387,448	1.27	491,461
Central Flats	6,198	1.07	6,646
South Flats	38,990	1.64	64,079
Pit/PUG	1,230,580	0.83	1,021,381
TOTAL Indicated Resources	2,452,809	1.11	2,729,013
West Extension Below 3700el	571	0.92	525
West Extension Below 3700el	15,371	1.15	17,677
Pit/PUG	417,323	0.83	346,378
TOTAL Inferred Resources	433,265	0.84	364,580

The resource statement above, from the NI43-101 dated January 2011, represents the state of the resource at Cantung as at October 2010. Curiously the company measures its resource in Short Ton Units, rather than MTUs. Each STU is 20lbs.

The same report estimated the Probable Mineral Reserve at 1,693,454 tons grading 1.17% WO₃ giving 1,981,337 STUs. This was calculated though upon a price of USD\$262 per MTU, an operating cost of \$149 per ton milled and a cut-off grade of 0.80% WO₃ for the life of mine.

Primary mining methods include, longhole stoping and pillar-remnant ore recovery using different techniques. The Cantung Mine produces ore at a rate of 1,160 short tons per day. The aforementioned Mineral Reserves only support a mine life of four years, ending in Q4 2014. Currently, longhole methods are planned for mining the majority of the remaining reserves, both for pillar recovery and for primary mining in areas with favourable geometry. As can be seen in the cross-section below the deposit is not easy with the open-pit ore body lying at a significant distance above and away from the E Zone with very interesting faulting



The indicated resource would seem to signal potential for a longer mine life and as noted in other Tungsten mines around the world, these deposits tend to surprise to the upside with their longevity as mining progresses. Still the relatively short mine-life weighs on the company in that it will need to either expand its resource at Cantung or get itself a second source of production in the medium term to ensure

life after Cantung.

The Second String - Mactung

As mentioned already, the Cantung project has long had the Mactung project as its undeveloped shadow, and second string. The property is located in the Yukon in the Selwyn Mountain Range and covers the area around Mt. Allan, approximately eight kilometres northwest of MacMillan Pass. The nearest settlement accessible by road, Ross River, is 250 km away to the southwest along the (gravel) Canol Road, a drive that takes about six hours. The aforementioned Cantung Mine is approximately 160 km to the south. This would seem too far away to offer any economies of scale.

The NI43-101 resource on the project consists of:

Classification	Tonnes ('000)	WO3 %	WO3 Tonnes ('000)	MTUs (millions)
Indicated	33,029	0.88	290	29.0
Inferred	11,857	0.78	92	9.2

Wardrop estimated the Underground Probable Mineral Reserve at 8.5 million tonnes grading at 1.082% WO3.

Production

In February 2009 North American Tungsten announced the results of the feasibility study prepared by Wardrop for the MacTung project. Wardrop provided the principal engineering services for the project design and the capital and operating cost estimates while geotechnical and environmental input was provided by EBA Engineering Consultants.

The MacTung Project is forecast to run at 2,000 tonnes per day from an underground operation using conventional long hole plus cut and fill mining methods. The ore will be processed into both a premium gravity concentrate (67% WO3) and a flotation concentrate (55% WO3).

The key parameters that form the basis of the economic evaluation of the MacTung Project are:

Annual Throughput:	730,000 tpa
Recovery first five years:	81.7%
Average annual production first 5 years:	752,000 MTU's
Operating cash cost first 5 years:	CDN\$104/MTU of WO3
Capex including contingency:	CDN\$ 402.1 million
APT pricing:	US\$300/MTU of WO3
Exchange Rate \$US/\$CDN:	0.88 cts

Obviously the APT pricing and exchange rate are now historical artifacts. The enhanced pricing improves project viability while the exchange move militates against it.

The mine life looks very good to us at 11.2 years for the underground mine, with the potential to expand by 17 years with an open pit, exploiting near surface, lower grade indicated and inferred mineral

resources.

The problem this project has is the capex number which is a real eye-opener at CAD\$356.5 million plus a contingency of CAD\$45.6 million.

Based on the aforementioned 11.2 year U/G mine life and the base case parameters, the project's pre-tax net present value was estimated at:

Discount Rate	Pre-Tax Net Present Value
8%	CAD\$276.8 million
6%	CAD\$346.4 million

This gave a pre-tax internal rate of return at 23.5% with the capex payback anticipated to be within 2.9 years after production starts.

On other permitting the Yukon Environmental and Socio-economic Assessment Board (YESAB) deemed the MacTung Proposal adequate in October 2009. Meanwhile, screening of the Proposal has commenced pursuant to the Yukon Environmental and Socio-economic Assessment Act (YESAA).

The Move into Downstream

North American Tungsten's venture into downstream uses for Tungsten dates back to December 2008, ironically that came just as Tungsten's price had wilted. At that time the company concluded a series of strategic agreements to produce and market commercial tungsten products manufactured from its tungsten concentrate at its mining operations. The transactions are a result of three years of the miner's involvement with Tundra Particle Technologies. Tundra Particle Technologies is engaged in the production, sale and licensing of highly filled composites for various industries and applications. TUNDRA™ has granted Tungsten Diversified an exclusive license to manufacture and sell the patented TUNDRA™ tungsten-polymer composite as a lead replacement alternative for ammunition. This license allows TDI to sell TUNDRA™ composite to the military in North America and the European Union, as well as the sporting market in the European Union.

Tundra Particle Technologies, at a pilot plant in Minnesota, has developed and tested patented techniques to produce tungsten powders and intermediates from low grade concentrates. A related company of Tundra had also developed a patented process for manufacturing tungsten composites for sale worldwide.

This move up the value chain was prompted by TPT's patented conversion process that can utilize a much lower grade of tungsten concentrate than today's other tungsten processors require giving North American Tungsten an outlet for lower grade concentrate.

As a result of these agreements, a new company, Tundra Diversified Industries LLC was formed, the shareholders of which were Tundra Particle Technologies, LLC, of White Bear Lake, Minnesota, and North American Tungsten both owning 43.2% interests while Queenwood Capital Partners LLC, of Bloomington, Minnesota owns 13.6%.

North American Tungsten													
CAD mns (FY ending Sept)													
	FY13e	FY12e	FY11e	4Q11e	3Q11	2Q11	1Q11	FY10	4Q10	3Q10	FY09	FY08	FY07
Revenue	134.05	111.07	62.45	24.34	19.29	11.45	7.37	13.79	0.03	0.39	58.17	56.02	59.16
Other Revenue, Total	0.00	0.00	0.00	0.00	0	0	0	0	0	0	0	0	0.26
Total Revenue	134.05	111.07	62.45	24.34	19.29	11.45	7.37	13.79	0.03	0.39	58.17	56.02	59.42
Cost of Mining	78.17	71.14	60.90	17.32	16.06	17.2	10.32	12.96	0.02	0.54	50.99	59.21	51.6
Gross Profit	55.88	39.94	1.55	7.02	3.23	-5.75	-2.95	0.83	0.01	-0.14	7.18	-3.19	7.55
Selling/General/Admin. Expenses,	0.68	0.68	2.76	0.68	0.6	0.76	0.72	2.5	0.75	0.58	3.06	3.98	3.27
Research & Development	0.10	0.10	0.12	0.10	0	0	0.02	0.07	0	0	0	0	0
Depreciation/Amortization	1.10	1.10	3.12	1.10	1	0.61	0.41	0.52	0.07	0.11	5.02	5.19	4.63
Unusual Expense (Income)	0.02	0.02	0.16	0.02	0.06	0.04	0.04	8.81	4.82	1.46	-1.73	0.31	0.09
Other Operating Expenses, Total	0.02	0.02	0.08	0.02	0.02	0.02	0.02	0	0	0	0.05	0	0
Total Operating Expense	80.09	73.06	67.14	19.24	18.04	19.18	11.9	26.17	6.33	2.81	58.76	68.34	60.62
Operating Income	53.96	38.02	-4.69	5.10	1.25	-7.73	-4.53	-12.38	-6.3	-2.42	-0.6	-12.32	-1.2
Financing costs	0.00	0.00	0.00	0.00	0	0	0	0	0	0	0	0	0
Income Before Tax	53.96	38.02	-4.69	5.10	1.26	-7.73	-4.53	-12.38	-6.14	-2.42	0.4	-12.32	-1.2
Tax (Credit)	15.11	10.64	0.13	0.30	0	-0.06	-0.11	-0.44	-0.19	-0.04	-0.54	-0.63	0
Income After Tax	38.85	27.37	-4.82	4.80	1.26	-7.67	-4.42	-11.94	-5.95	-2.38	0.94	-11.69	-1.2
Diluted Weighted Average Shares	242	240	225.41	238	237.96	213.82	211.84	187	193.02	189.29	134.27	123.18	113.05
Diluted EPS	0.161	0.114	-0.060	0.020	0.01	-0.04	-0.02	-0.06	-0.03	-0.01	0.01	-0.09	-0.01
Production MTUs	323,000	312,000	249,352	78,000	74,652	43,728	52,972						
Sale price per MTU	\$415.00	\$356.00	\$250.43	\$312.00	\$272.30	\$228.17	\$200.51						
Mining costs per MTU	\$242.00	\$228.00	\$244.22	\$222.00	\$217.65	\$367.00	\$255.79						
Copper production (lbs)	702,000	688,000	443,540	172,000	166,397	88,842	16,301						

Earnings & Outlook

The model on the preceding page shows earnings in recent years and our vision of where these might head in coming years in light of our price assumptions for Tungsten.

The current year (note the September Fiscal Year) should register a loss of over \$4mn but this is largely the result of the losses in the first two quarters of FY11 as the mine was returning to production. We expect quite strong earnings in the fourth quarter and going forward. Thus in the future we are projecting:

- Net revenues of \$27.37mn in FY12 or EPS of 11.4 cts
- Net revenues of \$38.85mn in FY13 of EPS of over 16 cts.
- Sales in FY12 should be nearly double the level of FY11
- Sales in FY13 should be around 20% higher than FY12 mainly on better APT price capture

Conclusion

North American Tungsten is in the fortunate position of having had a mine ready to “plug-in” when Tungsten prices rebounded in 2010. It has the less felicitous dilemma of an upcoming project with a capex price tag that is seemingly unreachable out of cashflows. The best scenario is for CanTung to show such astounding returns over the next two years that financing will not be a problem when North American Tungsten goes rattling its cup in the capital markets. We doubt that the \$400mn ticket for the MacTung build would even be footed by an industrial end-user but the possibility exists that a trading house (the new 800-lb gorillas of the non-precious metals space) might foot the bill, all or in part, for an opportunity to control a decent flow of offtake.

We regard NTC as a Long at this point in time due to its extremely low valuation, likely rising earnings over the rest of its LOM and the possibility that its Mactung project may find a partner or off-taker to move it closer to realization. Our twelve-month target price for NTC is 40 cts.

Monday, December 19, 2011



King Island Scheelite (KIS.ax)

Key Metrics			2009	2010e	2011e
Price (AUD)	\$	0.17	Consensus EPS	n/a	n/a
12-Month Target Price (AUD)	\$	0.20	Hallgarten EPS	\$0.00	\$0.00
Upside to Target		18%	Actual EPS	\$0.00	
High-low (12 mth)	\$0.14-	\$0.37	P/E	n/a	n/a
Market Cap (AUD mn)	\$	13.9			
Shares Outstanding (millions)		81.8	Dividend	n/a	n/a
			Yield	0.0%	0.0%

- + A past-producing mine with substantial potential for reactivation
- + A local community eager to see mining recommence in an economically backward area
- + The company had AUD\$5.6mn in cash on hand at the end of June 2011
- + The projected capex of AUD\$112mn compares favorably with greenfield projects but is rather high for a mine reactivation
- + Projected cash costs of less than USD\$120 per MTU make the mine viable in even the most dire price meltdown scenarios
- * Environmental considerations weigh upon the prospects of this project advancing as the scheme involves substantial sea walls and dumping into the neighbouring bay
- * The collapse of the deal with Hunan Non-Ferrous of China was a severe blow to the credibility of the project
- * The tough financing conditions in Australia would signal that a partner is needed to move this forward thus we are rating it as a NEUTRAL until such a collaborator becomes evident

Reactivation of the mine

The prime asset of King Island Scheelite is a collection of Tungsten deposits that have long been mined on King island (shown below), a part of the state of Tasmania that is located in Bass Strait between the mainland of Australia and the island state.



History

The tungsten deposit at Grassy was first discovered in 1911. Operated as an open pit (shown on the following page) between 1917 and 1975, then as an underground mine until 1990. It had gravity and

flotation processes that produced high-grade WO₃ concentrates. However, production ceased in 1990 due to low tungsten prices (US\$50/mtu).

While pre-WW2 production was very small-scale this was transformed in the situation of high demand which developed due to the war against Japan and the isolation of Australia from other sources of supply. The mine had, fortuitously been reopened in 1937 and an enlarged treatment plant capable of processing 500 tonnes of ore per week was erected. In 1942, a new survey of the mine's potential was undertaken which claimed that the reserve actually stood in the vicinity of 3,750,000 tonnes. A new concentrating mill substantially increased production from 30,481 tonnes in 1943 to 129,033 tonnes in 1946.



In 1960, the mine re-opened as a limited experimental production which was quickly expanded to pre-closure levels. By 1969, the mine was controlled by the Peko Wallsend group of companies and further mill expansion saw ore treatment surge to 300,000 tonnes per year and peak at 420,000 tonnes shortly after. Further expansion at the site was initiated by the new owners over subsequent years including the construction of a port facility at Grassy settlement to allow direct shipping of bulk product. In 1972 the traditional open cut quarries were closed and the 'Bold Head' underground mine was established. In 1978 a second underground working named the 'Dolphin' mine was opened. That same year, an artificial scheelite plant commenced production of high purity calcium tungstate and Molybdenum tri-sulphide. In 1984, the Bold Head workings were closed and declining commodity prices saw the overall operation suffer a protracted death. In November 1990, the Dolphin mine was closed also and despite the company's best attempts to sell the mine as a going concern, the entire operation ceased production shortly after.

The site had been fully rehabilitated by 1996. KIS acquired the asset from Rio Tinto in 2005 and a feasibility study conducted by KIS. Then KIS entered into a 50/50 JV with Hunan Nonferrous Metals in 2008. This JV was terminated in December 2010 with KIS regaining 100% of the project. As part of the termination agreement, the Chinese group forgave KIS debt, in exchange for a 2% royalty on future gross revenue, capped at \$3.9m.

Resource

The most recent resource report, shown below, was prepared by Tim Callaghan of Resource and Exploration Geology to JORC complaint standards.

King Island Scheelite JORC Resource						
Classification	Tonnes '000	WO3%	Tonnes WO3	Tonnes '000	WO3%	Tonnes WO3
Resource	0.25% WO3 cut off			0.70% WO3 cut off		
Indicated	8,419	0.95	79,980	4,752	1.29	61,300
Inferred	524	0.5	2,620	7	0.73	50
Total	8,943	0.92	82,600	4,759	1.29	61,350
Reserve				0.70% WO3 cut off		
Probable				1,630	1.3	21,150

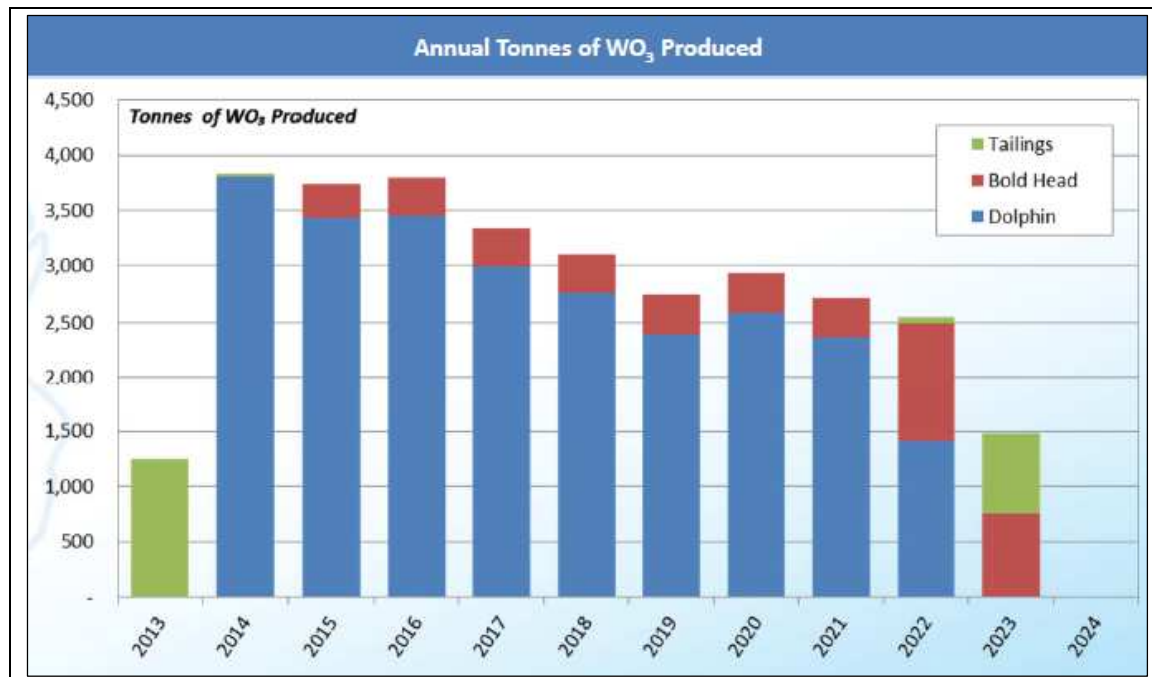
There is also another nearby former underground mine, Bold Head, which is in KIS's asset package. This has a Probable Reserve at 0.70% WO3 cut off of 609,000 tonnes grading 0.76% with contained metal of 464,000 MTU of WO3.

Reshaping the Landscape

Mining has often been a catalyst for major changes in the topography. The Grassy mine is no less an example of this. As the photograph above shows the mine is very near to the sea. However the mine expansion plan is even more dramatic with an expansion towards and under the sea envisaged. To achieve this it is proposed that a massive amount of material be dumped into the sea to reclaim part of the bay to ensure sufficient distance between the pit wall and the water's edge. This reclamation plan is shown on the map that follows.

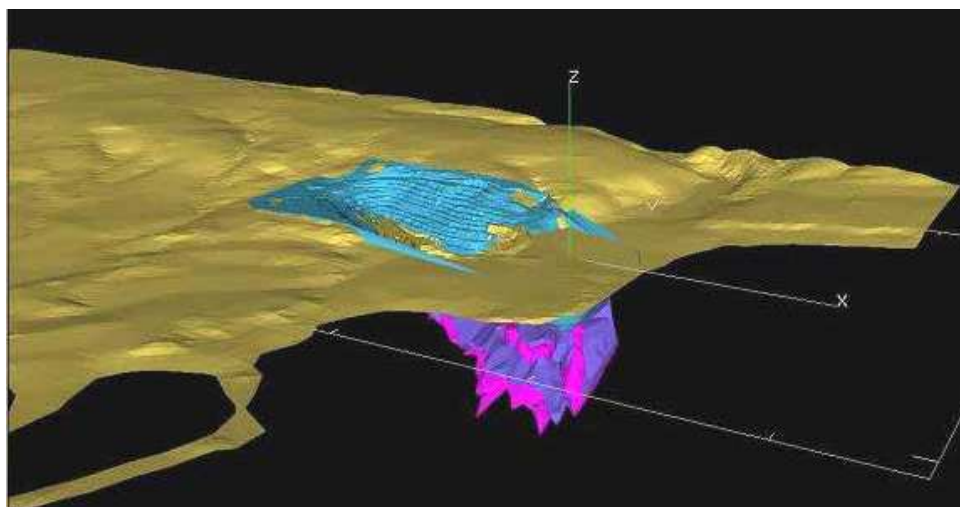
The mine reactivation plan consists of firstly tackling the extensive (2.7mn tonnes at 0.17% W2O) tailings that are on site. Then the plan is to dewater the pit and rehabilitate the existing decline near the base of the old pit. The new mine will use predominantly post-pillar stoping to mine and use classified tailings for hydraulic fill. It is envisaged that an external contractor is to be appointed to undertake these activities. As far as processing is concerned the plan is to build a new mill on the old site based on a feed of 300ktpa and WOF flow sheet. In a report by SGS in 2006, the consultants estimated that a workforce of some 150 people will be required during the mine's construction phase, with an estimated 75-102 employed during the operating phase.

Thus in the first year, some 1.36 mn tonnes of tailings will be treated with pre-flotation concentration using high intensity magnetic separation. After that, in 2014, production from the underground mine will commence at the rate of 350,000 tpa. This should give an 11-year mine life from existing resources and reserves before any exploration success.



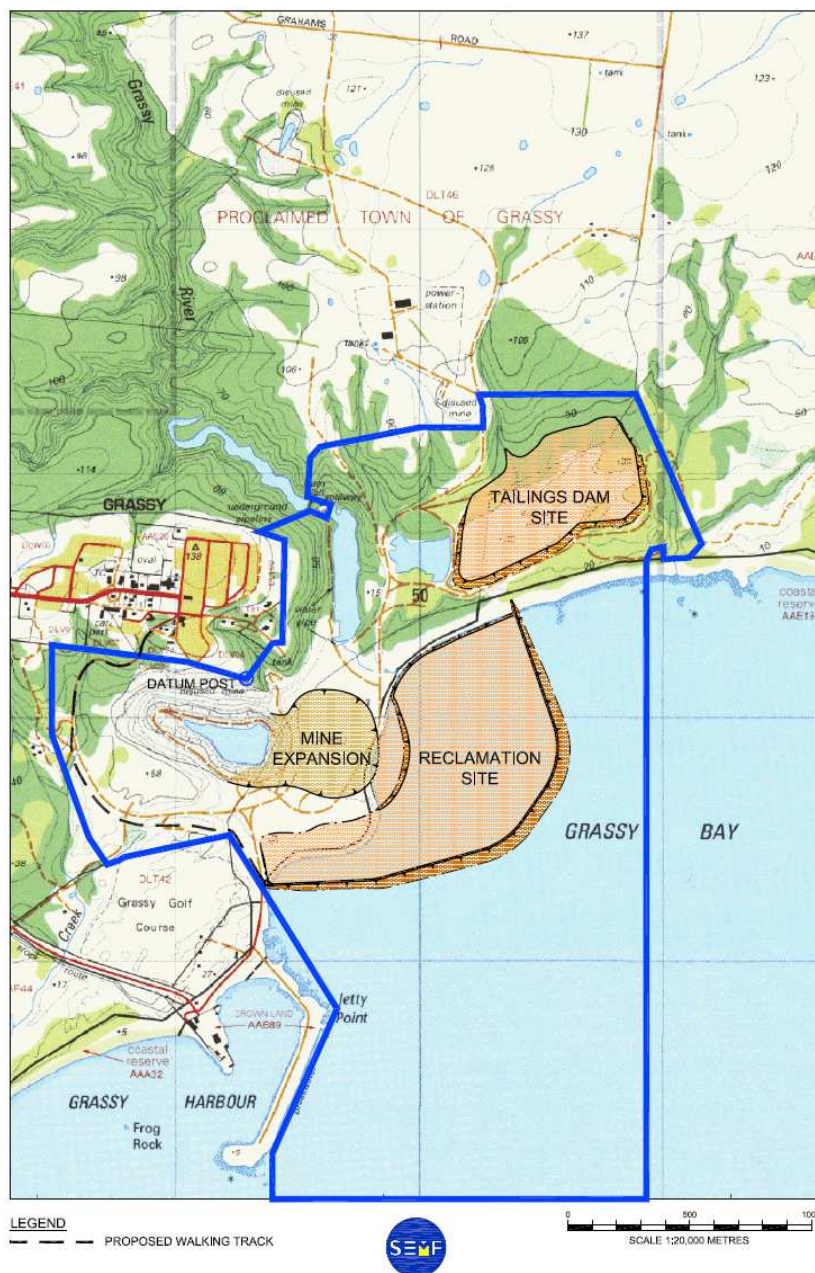
The company is estimating that (at US\$370 per MTU) LOM revenues should be around AUD\$1.18bn. The Capital costs is estimated at US\$112mn and the operating cost underground will be a very attractive \$120 per MTU (or less). A new feasibility study is underway with GR Engineering Services undertaking the work. This will supersede and update the previous FS dated 2006.

The schematic below shows the deposit below ground.



As can be noted the extension of the deposit is towards the sea, necessitating the design measures mentioned previously. This proximity though necessitates construction of the sea wall and infilling of part of Grassy Bay. Undersea mines are not an oddity as coal has been mined under the North Sea from the North of England for over 100 years, and more recently potash has been exploited in the same region at great depth. The difference here is the relative shallowness.

As can also be seen below the local area consists of the town of Grassy which is separated from the port and its facilities by the old pit.



Conclusion

The issues for KIS are two-fold. Can it swing the financing now that the Chinese have departed the scene and can it obtain the environmental approvals required? On the first issue, we suspect that eventually this will be doable by dint of the very healthy Tungsten price and the relative ease and speed with which the mine can be brought back into operation.

On the environmental front there is always the danger of NGOs putting their oar in but they tread on rather dangerous ground when dealing with locals for whom this mine is a known quantity (due to past production) and the knock-on benefits. If one uses the usual multiplier of 1.5 jobs for every one job at the mine then the addition to the local workforce could be 250 positions. To put this in perspective King Island (a backwater amongst backwaters even by Australian standards) has a population of only around 1,600 at the current time (down from 2,700 in 1961). It is not trivial to add that the mine company has offered to expand the port (through a breakwater extension using chunkier pieces of old tailings) so it can take all Bass Strait ferries/trade vessels against the only one vessel that can currently berth at Grassy. On a more trivial level the mine will provide aggregate for Island infrastructure that is currently exceedingly expensive to source and import. The fillip for the local economy from mine reactivation will be massive (proportionately).

Thus we have narrowed KIS's dilemma to one only of funding. Our call on KIS is neutral for the moment until some clearer signs on funding appear. Our target price for the next 12-months is for a modest appreciation to around AUD 20 cts.



Woulfe Mining (WOF.v)

Key Metrics			2010	2011e	2012e
Price (CAD)	\$	0.19	Consensus EPS	n/a	n/a
12-Month Target Price (CAD)	\$	0.40	Hallgarten EPS	\$0.00	\$0.00
Upside to Target		111%	Actual EPS	\$0.00	
High-low (12 mth)		\$0.17 - \$0.37	P/E	n/a	n/a
Market Cap (CAD mn)	\$	50.6			
Shares Outstanding (millions)		266.3	Dividend	n/a	n/a
Shares O/S Fully Diluted (mns)		323.9	Yield	0.0%	0.0%

- + The Sandong mine was the Western World's largest Tungsten mine at the time of its closure. It has substantial resources of W and potential to be a Moly producer in addition
- + The company has Resource Capital as a core investor (as does Malaga)
- + The mine build is ready to commence with equipment already having been delivered and the old underground working still being workable
- + Capex is around \$135mn
- + The company also has a lead/zinc past producing mine in its portfolio
- ✗ The company has a former gold mine that, while attractive, is a distraction and should be spun-off

The Stealth Entrant

Woulfe Mining is unique in several respects. Firstly, it is a South Korean mining story and we have not encountered any of those before. It also has at its fingertips, a mine that was once the world's largest Tungsten producer, which should be able to be reactivated without excessive complication. And finally its structure is novel in having South African management, though based in Australia, and listed in Canada.

The company also has a couple of other assets in South Korea, one of which, the past-producing Muguk gold mine, looks to us as if it might be better-suited to a standalone vehicle.

Sangdong Tungsten-Molybdenum Project

This project is located 187 km south east of Seoul, is Woulfe Mining's flagship property. Before its closure in 1992, the mine was the world's leading producer of tungsten for 40 years. The historical production rate averaged 600,000 tpa mainly from the six-meter thick Main Vein.

Low metal prices, not the exhaustion of resources, led to the mine's premature closure. The most recent scoping study indicates that the property has over 40 years' of mine life remaining.

Substantial underground infrastructure is in place and the Company has opened the mine to a distance of 1.4 km. Above ground infrastructure includes access to roads, water and power.

Drilling conducted by KORES in 1980-1987 discovered a deep molybdenum deposit below the remaining tungsten skarn resources. The molybdenum content in the Sangdong mineralized zones ranges from 0.04% to 0.06% MoS₂ and an additional zone of molybdenum mineralization, as outlined by historical drilling, lies below the Sangdong mineralized zones.

Exploration

In May 2011, Woulfe successfully completed phase one of a drill program which focused on the areas above the valley floor to verify historical data and to upgrade sufficient resources to support the pre-feasibility study. Phase two is targeting the unmined Hangingwall and Footwall mineralized zones on Level 1 and above, as well as the main mineralized zone above the Sangdong Level. That drill program was completed in the last quarter.

In July 2011, Woulfe announced a new resource estimate for the skarn mineralization zones in the Upper Section of the property. The interim resource estimate update from Wardrop showed an Indicated Resource of 5,968,000 tonnes grading 0.42% WO₃ and 0.04% MoS₂, and an Inferred Resource of 18,572,000 grading 0.45% WO₃ and 0.05% MoS₂. See table below.

Wardrop completed an Interim Resource update for the Sangdong mine in July 2011.

Class	Zone	TONNES	Density	WO ₃ (%)	MoS ₂ (%)
'Indicated'	Hangingwall	1,143,000	2.9	0.38	0.07
'Indicated'	Main	2,076,000	2.9	0.47	0.03
'Indicated'	Footwall	2,749,000	2.9	0.41	0.03
'Indicated' Total		5,968,000		0.42	0.04
'Inferred'	Hangingwall	6,073,000	2.9	0.38	0.06
'Inferred'	Main	9,002,000	2.9	0.50	0.04
'Inferred'	Footwall	3,497,000	2.9	0.46	0.04
'Inferred' Total		18,572,000		0.45	0.05

The mineralized zones defined by the current Resource are for the upper quarter of the known dip length of the old mine.

As of Q3 2011, the company is conducting a 19-hole geotechnical drill program which is focused on testing the mineral structures on the site. The site investigation will aid in finalizing the process plant layout and allow civil engineering work to move forward.

Woulfe and Wardrop are engaged in completing the pre-feasibility study with earthworks slated to commence in December of 2011.

The Road to Production

The scoping study on the Sangdong project was completed by Wardrop in March 2010. This signalled an NPV of US\$462 million at an APT price of US\$250 per mtu. The scoping study was to an accuracy of approximately 30% and confirmed the project's economics at that lower tungsten price. Woulfe plans to commence production at the mine in Q4 2012.

Woulfe is moving forward aggressively with project construction plans. The crushing and grinding sections of the process plant are well advanced and all necessary major equipment has been specified. In October 2011, the company took delivery of Metso minerals front end crushing equipment and the Terex feeding equipment which represented the first equipment delivery to the mine site. The equipment was purchased at a significant discount to value. In addition Woulfe will be purchasing new European-made crushing and grinding equipment.

The crusher is designed for 2.4 million tonnes per annum and the initial milling capacity will be 1.2 million tonnes per annum, but can be readily expanded to 2.4 million tonnes. There are real indications that the tungsten markets will remain strong and that molybdenum prices may return to historical highs, which could justify an increase in production.

The flow sheet is conventional, with two-stage crushing followed by rod mill grinding and flotation, and tungsten concentrate further processed to produce APT.

In the latter part of October the company received an explosives license, built an underground storage facility and initiated the first blast since closure in 1993. The F2 foot wall ore body was blasted. This zone will be the initial point of mining and representative of the initial years of operations. The mine has now been reopened from one level in the base of the valley floor to the top of the mountain and across the entire 1.2 km strike of the ore body. During the opening, many new target areas were discovered which were initially prepared by Korea Tungsten prior to the 1993 closure of the mine.

Capital Cost

Plant capital cost estimates are based on the detailed design work carried out by Contromation. The Contromation cost estimate of approximately US\$83 million includes all EPCM (engineering, procurement, construction management) costs plus freight and a 10% contingency. Woulfe considers this estimate to be accurate to within 20%.

Cost estimates prepared by Woulfe, and to be independently developed by Wardrop, include approximately US\$20 million for mine development and equipment, and US\$20 million for the APT refinery. The mining equipment estimate is based on indicative costs provided by reputable suppliers. The refinery cost is based on discussions with a leading process-orientated engineering group with specific experience in the design and construction of APT plants in China. Interestingly a delegation from Woulfe visited China in July to inspect tungsten processing and refining facilities and further discussions will be held with prospective parties with APT experience.

It was planned to construct the APT plant offsite at a port location due to logistical considerations, in particular the processing of imported third party concentrates. However, due to the high cost of land at suitable port sites, the APT plant will be located at Sangdong and in fact will utilise the old APT building if the structural integrity is intact. The tungsten concentrate can therefore be slurried directly into the

refinery without filter pressing with a direct reduction in capital and operating costs.

The total capital cost estimate is around US\$135 million, including indirect costs and owner's costs.

The Flirtation with Korea Zinc

In November 2010, Korea Zinc, the world's biggest producer of refined zinc (ahead of Nyrstar and Hindustan Zinc Ltd. and Xstrata Plc), agreed to buy stakes in Canada's Woulfe Mining Corp. and the miner's Korean units to take advantage of rising demand for minor metals, gold and silver.

The Korean company signed an initial agreement to buy 33.3 million new shares, or a 13.46% stake, in Woulfe for CAD\$10 million. Korea Zinc also intended to purchase new shares in the three units (giving KZ some 51% of Sangdong Mining, 51% of Muguk Gold and 40% of Yeonwha Mining) for a total C\$40 million.

Pursuant to this, in January 2011 the company closed a non-brokered private placement of CAD\$10mn which was 100% subscribed by Korea Zinc (and certain of its nominees) As a result 33,333,333 common shares were issued at a price of \$0.30 per share. The plan was that Woulfe would continue to finance the project up to the second placement of CAD\$38 million by Korea Zinc into Woulfe's Korean subsidiary, Sangdong Mining Corporation. Korea Zinc further agreed to arrange debt funding of up to CAD\$75 million to complete the project.

It is envisaged that Woulfe and Korea Zinc will jointly manage Sangdong all the way through to production. The benefits to Woulfe shareholders from this transaction go far beyond the financing as Korea Zinc is a world leader in metals refining. These benefits include utilization of Korea Zinc's technical and operational team in Korea to assist taking the Sangdong tungsten-molybdenum project into production as quickly as possible.

The plan was that Korea Zinc would assume management control of Sangdong Mining Corporation on commissioning the mine in 2012. This management changeover now seems to have been ruled out.

Pursuant to the terms of the subscription agreement, Korea Zinc was entitled to nominate one person for appointment to Woulfe's board of directors for so long as it holds 5% of the issued and outstanding shares of the company and it has duly done so. Additionally, Korea Zinc, and its nominees in the placement, are entitled to maintain their *pro rata* interest in Woulfe, in the event of further equity financings, for so long as Korea Zinc, together with its nominees, continues to hold at least 5% of the issued and outstanding shares of Woulfe.

Securing Full Control of the Asset

In mid-November 2011, Woulfe announced that it had negotiated the purchase of the 2% NSR that had been retained on the Sangdong project in South Korea from the original vendor, Se Woo Mining Co. Ltd. The amount involved was CAD\$3.5 million, of which \$500,000 was paid on execution of the agreement and the balance of which is payable by December 19, 2011. In addition, Woulfe negotiated an amendment to the acquisition agreement from October so that the final outstanding 30% interest in the mining titles shall vest to Woulfe immediately as part of the completion of the payments noted above.

As a result Woulfe now holds a 100% interest in the Sangdong project.

Muguk – The Second String

The past-producing Muguk gold-silver prospect of the company holds potential value for the company as a spin-off. It is inevitable that it will be undervalued embedded as it is in a soon-to be producing Tungsten entity. According to records, a total of 8.15 tonnes of gold was mined between 1934 and its 1972 closure. The mine was re-opened in 1987, producing at a rate of 200 tonnes per day from the No. 2 Vein until it was again shuttered in 1997. The lengthy period of past production as fairly massive tonnage make this a noteworthy mine by anyone's measure.

In 1994, Korea Resources Corporation (KORES) completed a reserve/resource update on Muguk, resulting in a total reserve/resource estimate of 1,418,980 tonnes grading 13.5g/t gold and 72.8g/t silver, and containing 615,956 ounces of gold and 3,321,599 ounces of silver, based on a 10g/t gold cut-off grade. It should be noted though that a Qualified Person has not done sufficient work to classify the historical estimate as current, thus Woulfe is not treating the historical estimate as current and that the historical estimate should not be relied upon. The mine operated for a further three years after this estimate was undertaken so some of that resource would have been consumed.

The mineralisation at Muguk is hosted within a series of parallel, steeply dipping quartz veins that extend discontinuously for 400-2,000 metres along strike and to a known depth of 800 metres. The average width of the veins is typically less than 1 metre, although the veins pinch and swell and can be up to 2 metres in width in places.

The two most significant veins are the No.2 vein and the Three Brothers Vein, or Samhyungje Vein. The No.2 Vein was exploited between 1944 and 1972, and was developed to a depth of 755 metres along a strike length of 1,800-2,000 metres. The grades reportedly varied from 7g/t gold to 50 g/t gold. Reported production during this period was approximately 260,000 ounces of gold. The Three Brothers Vein was exploited between 1984 and 1997, and was developed to a depth of 600 metres. Reported production during this period was approximately 328,000 ounces. There has been minor exploitation of a number of other veins, including Baksan, Geumyong, and Nos 1 and 7-11 Veins.

In its efforts to revive the mine Woulfe now has the former executive general manager of the mine at time of closure as an advisor to the company. The mine was not profitable at the prevailing sub-US\$300 gold prices in 1997, but the former manager expressed the view that, at that time, he was not in favour of closure given the known residual resources.

In 2010, Woulfe completed a two-hole program at Muguk to comply with its mining rights obligations, which required a total of 750 metres to be drilled. Woulfe opted to target the secondary No.7 Vein to the west of the No.2 and Three Brothers Veins as known mining extended to a depth of a few hundred metres, and shorter holes could be confidently planned to avoid old mining cavities. The first hole intersected 2 metres at 5.6g/t gold and 26g/t silver at 414 metres depth, and the second hole intersected 0.36 metres at 16.6g/t gold and 16g/t silver at 386 metres depth.

The objective of the 2011 drilling program was to confirm the down dip extension of the mineralisation below the historic workings and to substantiate the grades that were reported in the lower levels

Yeonwha Lead-Zinc Property

As unalloyed (to mix a metaphor) fans of the potential of Zinc, we cannot let the underemphasized lead/zinc prospect of Woulfe go unmentioned. The Yeonwha 1 lead-zinc property lies approximately 20 kms to the south east of Sangdong within the historic Taebaeksan mining district. At least 60 tungsten-molybdenum and lead-zinc bearing metallic deposits occur in this district, including numerous known lead-zinc deposits of two million to 12 million tonnes with combined lead-zinc grades averaging approximately 10%.

The Yeonwha 1 Complex consists of three past-producing mines, Taebaek, Bonsan and Dongjeom. These deposits were mined from the early 1960s to the early 1990s and were regarded as the most important mines in the Taebaeksan district. They are connected by underground development and the ore was hauled underground from the Taebaek and Dongjeom mines to the central processing facility located near the Bonsan mine. Production from Bonsan and Dongjeom reportedly ceased in 1991 and production from Taebaek appears to have ceased in 1993.

Yeonwha I lies approximately four kilometers to the south west of the Yeonwha II property which is currently being evaluated by a Korean joint venture group headed by KORES.

One of the largest of the ore bodies, Taebaek 1 within the Taebaek deposit, was mined over a strike extent of around 400 to 500 meters and a vertical extent of approximately 400 meters. The top of the vein is around 400 meters below surface.

In a 1991 report by KORES, prior to the cessation of mining, the historical non-compliant resources were said to include total 'proved reserves' (to prevailing Korean standards) for the three deposits of 3.6 million tonnes grading 3.5% lead and 4.8% zinc, of which 96% was contained in the Taebaek deposit, and total 'inferred resources' of 3.6 million tonnes grading 3.4% lead and 4.8% zinc, of which 73% was contained in the Taebaek deposit.

Woulfe has an option over these properties for which it was required to pay US\$50,000 in cash and an additional US\$50,000 in cash or common shares of the company, at the discretion of the company (at the average closing price of the common shares for the 10 day trading average price prior to the payment date) in order to acquire a 100% interest for both the Yeonwha and Taebaek blocks.

Woulfe Mining also must pay a further US\$1 million in cash and US\$ 1 million in cash or common shares of the company on development of the project, plus a 2% net smelter revenue royalty to the Vendors. Additionally, in order to keep the option in good standing, the company must complete a pre-feasibility study on the property within five years of the transfer of title to the company.

Reshaping for the New World Order

If Tungsten is going to be big then Woulfe would seem to be one of the winners and yet has some structural flaws that might keep it from maximizing the high tide of W. Not that these flaws cannot easily be remedied. For us, the inclusion of a separate gold mine in the structure is extraneous and a distraction. At worst, one or other of the projects will remain undervalued and unappreciated by a market place that will see the company in light of whichever part is most attractive at any given

moment.

Thus in the first instance, creating two separate companies to contain the Tungsten and gold components would make eminent sense. Further on, it would seem to be logical if Woulfe merged with Malaga, combining the two players with Resource Capital as a major shareholder into one global Tungsten player with greater marketing muscle, reach and geographical diversification.

Conclusion

Woulfe is one of the most exciting prospects we have come upon in recent times. It is not often that one can find the holder of the former largest mine in any metal and pick it up for so little outlay, while having a management and largest shareholder that are so serious at the helm. We can find nothing to complain about with this stock except the distracting presence of the side-bet on Muguk and the presence of too many of same family on the board of a non-tightly-held company.

Muguk can be easily solved by being spun-off. We are not averse though to the other base metals aspects staying part of the story (unless Woulfe is rolled up with one or more of the other Tungsten plays to make a global Tungsten vehicle).

That powerful players within the smarter end of the investing community have made a meaningful bet upon Woulfe also gives us comfort.

As Moly fans, we also like that Woulfe shall be able to access a substantial resource of this metal, at its leisure, as the mine plan advances.

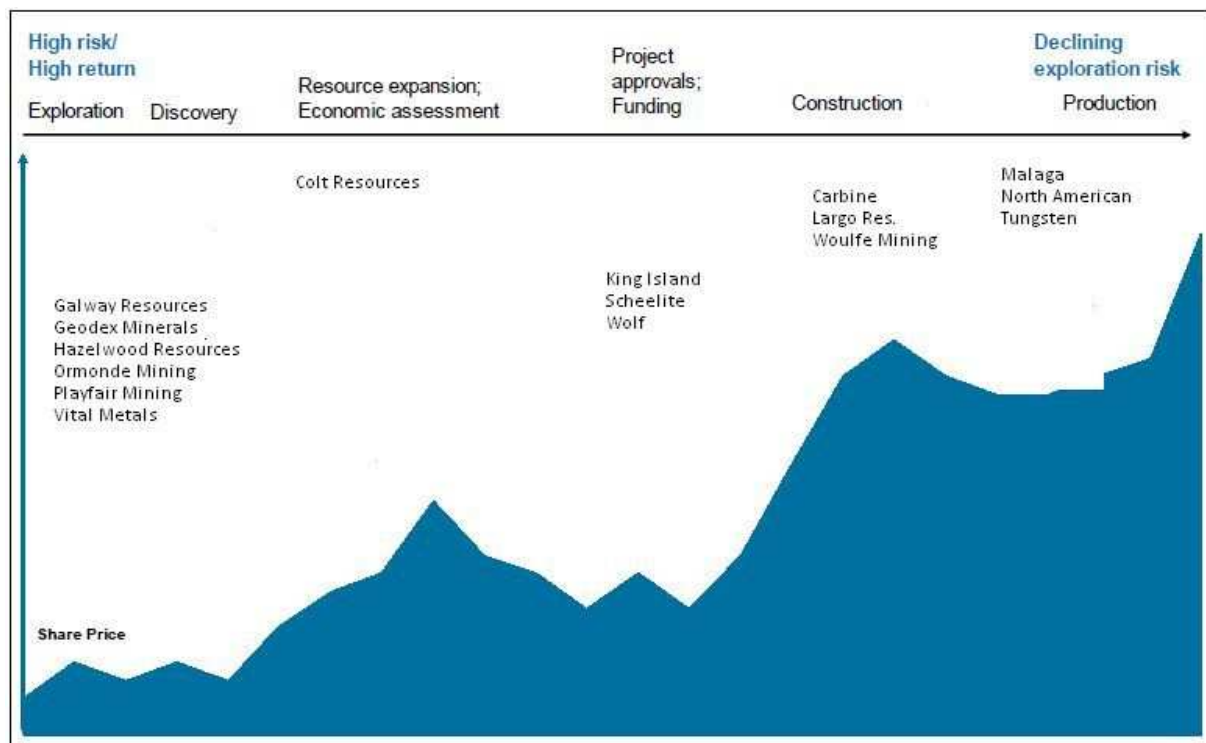
Woulfe should, in theory, be the best story in the Tungsten space. That Malaga and North American Tungsten are ahead of it on the production curve must mitigate against it being our most favoured play. That can be easily remedied though by a hastened pace towards production over the coming 12 months.

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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).



Risks

The risks for specific projects, whether they be environmental or financial are touched upon in discussions of each company covered. However over and above these are the risks for the Tungsten space in general. These are:

- A weakened Tungsten price or a breaking of the current felicitous situation
- Failure of the market to grab onto the Tungsten story
- Weakened global industrial demand (particularly in tools) that would soften prices and volumes
- China skewing the market in some way to again create distortions in prices and trade patterns

Most of these risks are different sides of the same price prism, with the exception of the market's perception/ disinterest in Tungsten. The latter is most evident at the current time when Tungsten stocks are wallowing at valuations one might expect if Tungsten was closer to \$250 per MTU than the current \$450 per MTU. This could be a result of bitter past experience or more likely generalised disinterest/ignorance or wariness of specialist niche metals in the wake of the REE spike and dump over the last two years. This, by inference, makes financings more difficult and more dilutive when they take place. The only way to harvest the attractive prices is to be in production and the only way to do that is

to finance mine-builds/reactivations.

The mélange of risks that threaten the Tungsten price have not become evident in Tungsten pricing, as yet. Maybe, to quote FDR, “we have nothing to fear, but fear itself” when it comes to this issue. The Chinese have clamped down on exports for whatever reason of their own and short of a loosening again of supply from that source the Western world consumers are going to have to tussle over the measly picking from the scant production outside China. Well, may we ask the question as to what Tungsten prices might be if the world’s economies were not as flaccid as they currently are?

Conclusion

Tungsten is one of those metals where the rapidly fluctuating price makes it hard to plan a company's trajectory for more than a couple of years. While there may be a supercycle in the broader metals space some individual metals have not been able to maintain price spikes for more than a transitory period. A chart for the Tungsten price, since 2008, looks remarkably robust and continues to hit highs that it has not reached in decades. It is a metal though that has failed to capture the market’s interest due to generalized ignorance of Tungsten and its supply/demand dynamics. If investors can get into a lather over Rare Earths and Lithium then we feel that Tungsten is just as deserving of attention, maybe even more so.

Tungsten, in theory, should be a bellwether of industrial activity, more than virtually any other metal as it is directly levered into machine-tool manufacturing as the swing factor in its demand (the relatively non-variable part being lighting uses). However, the “spoiler” here is China which distorts the Tungsten market as much as it has distorted so many others, So you have a situation like now where Western Tungsten demand is weakish but Chinese demand is strong (and the Chinese have slashed exports) so up goes the price. We could also have a situation where Western demand recovers and Chinese demand slows (and/or exports rise) and the price crashes. The lesson here being that ostensible demand does not matter in some metals, instead all that matters is China's attitude.

Overall there now exists a window of opportunity for tungsten producers, outside of China, as end users scramble to secure alternative, more reliable sources of supply. Any broader economic recovery (than the current anaemic version) should lead to heated competition for tungsten concentrates in the global market between Chinese and non-Chinese processors and consequently result in an increasing price structure for tungsten and its products in the future. A jump in prices of APT to over \$500 would not be unthinkable.

The issue is how companies can leap through these windows of opportunity without breaking a leg. Of the stocks covered in this review, Malaga and North American Tungsten have a production tap that they can turn on and off at will. Whether such stop/start motion is also profitable has yet to be proven. Woulfe is well advanced in getting to production and has a benefactor in the form of Korea Zinc. This is a mighty enabler to have for any project. King Island had the Chinese backing them and lost them. Now they need to find a financial sponsor, or an off-taker of substance. Two tailings reprocessors (Carbine and Largo) will cast their bread upon the water and in the case of Carbine may lead into reactivation of a hard-rock mine.

Unlike Rare Earths, a beaten down mining sub-space is coming back with a vengeance in Tungsten. In

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relatively short order a number of mines have come on stream or are promising to do so, however none adds so much to the global supply picture that either alone or collectively they will spoil the Tungsten price rebound. Only a prolonged global economic slump might achieve that regrettable outcome.

Important disclosures

I, Christopher Ecclestone, hereby certify that the views expressed in this research report accurately reflect my personal views about the subject securities and issuers. I also certify that no part of my compensation was, is, or will be, directly or indirectly, related to the specific recommendations or view expressed in this research report.

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