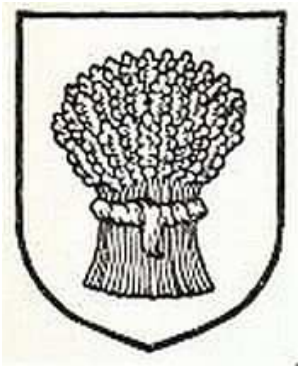
Monday, July 11, 2022



HALLGARTEN & COMPANY

Coverage Update

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Perpetua Resources

(Nasdaq: PPTA / TSX: PPTA)

Strategy: Long

Key Metrics	
Price (CAD)	$3.62
12-Month Target Price (CAD)	$16.10
Upside to Target	345%
12 mth high-low	$3.60-$8.88
Market Cap (USD mn)	$228.02
Shares Outstanding (millions)	62.99
Options (millions)	2.07
Shares Units (millions)	0.73
Warrants (millions)	0.20
Fully Diluted (millions)	65.99

Perpetua Resources

Antimony Drives Economics Higher

- + The Stibnite mine is moving rapidly into the development category and into the final stages of permitting, with the next major catalyst expected in Q3 2022
- + Early action environmental clean-up beginning this summer
- + Very well-cashed up with ~US$40mn in the bank
- + Perpetua has one of the US's best-resourced investment management firms as its largest shareholder and driving force
- + When operational, the mine will be one of the biggest gold mines in the US and the sole Antimony mine in the US
- + Welcome turnover on the share register sees Barrick "overhang" removed and shares pass to institutional hands
- + Antimony, suffering a long-term supply crisis, saw its price surge to over US$14,000 per tonne before a slight pullback to trade at $13,600-$13,900 currently
- + Stibnite mine will be the largest (and only) producer of Antimony in the USA and thus a key playing piece in recreating US resource independence in critical metals
- + Fortunately, China is losing its long-held dominance of the Antimony market
- ✘ Removal from the Russell 2000 was a short-term blow
- ✘ The Chinese still dominate the Antimony processing space
- ✘ Capex, and thus financing requirements, are substantial

Powered by Gold & Antimony

Since coming into the orbit of the New York investment management group, Paulson & Company, the Stibnite project in Idaho has been rethought and reenergized, and now focused. This mine has the potential to be within the top handful of gold producers in the United States. It is also located in Idaho, which has risen swiftly in investors' estimation in recent years, challenging Nevada as the top-ranking "go-to" mining friendly state.

Felicitously the upsurge in the price of Antimony has also given the company a second potentially strong income stream from a metal that now figures in Washington's hit-list of critical metals that need to be wrestled out of Chinese control and dominance.

And now the latest new technology to employ Antimony is molten salt batteries for mass storage. The potential here is for a quantum surge in demand. Perpetua's largest shareholder, Paulson & Company is also a major shareholder in Ambri, the main innovator in this form of battery. The one caveat is that this new application may be its own undoing if the price of the metal goes too high and unravels the

economics. Time will tell.

In this note we shall look at the move towards production and the implications of the resurrection in the Antimony price for the economics of the mine and the US government's goals in resource security.

The Asset

The Stibnite Project is located in central Idaho, USA. The historical Stibnite mine takes its name from the mineral Stibnite (Sb_2S_3), derived from Stibium, the Latin word for Antimony (hence the metals' chemical symbol, Sb).

The project lies approximately 100 miles northeast of Boise, Idaho, 38 miles east of McCall, Idaho, and approximately 10 miles east of Yellow Pine, Idaho. However, because of the terrain the property is located approximately 152 road-miles northeast of Boise, Idaho. The primary access is known as the Johnson Creek Route of which some 113 miles are paved.

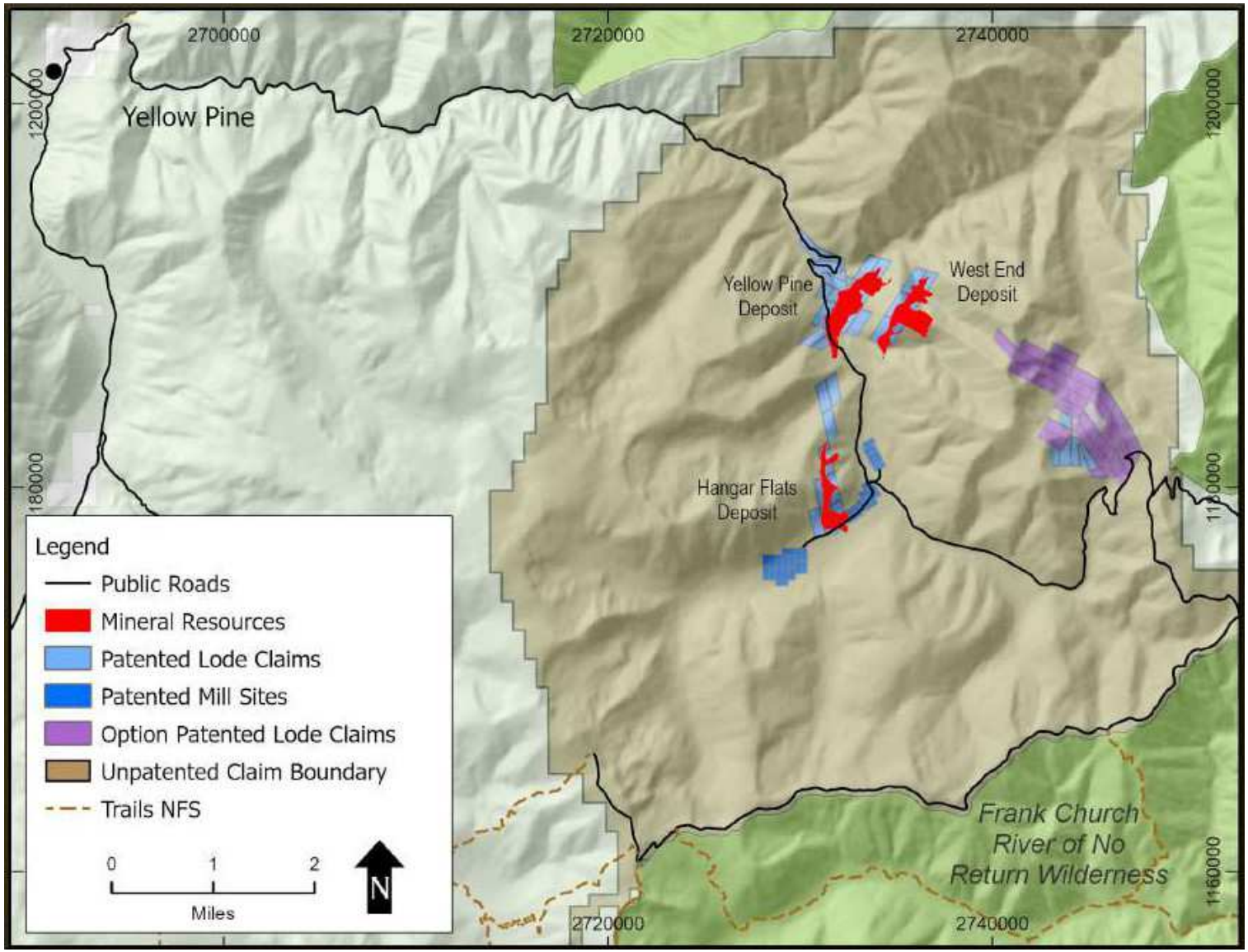
It is located in the rugged mountains of central Idaho with the district's elevation ranging from 6,000 to 8,000 feet at the summits of adjacent ridges. The central valleys of the district are drained by the East Fork of the South Fork of the Salmon River and its tributaries.

The land is heavily wooded with fir and pine trees and underbrush. Large forest fires burned much of the area in 2002, 2006 and 2007.

The Hangar Flats, West End, and Yellow Pine deposits, along with the historic tailings, lie within mineral concessions controlled by Perpetua, as are other exploration prospects.

Mineral rights controlled by Perpetua encompass approximately 27,104 acres or 42 square miles.

The claims are 100% owned, except for 27 patented lode claims that are held under an option to purchase. The project is subject to a 1.7% NSR Royalty (to Franco Nevada, TSX:FNV) on gold only. There is no royalty on Silver or Antimony output.


2700000
2720000
2740000
1200000
1180000
1160000
Yellow Pine
Yellow Pine Deposit
West End Deposit
Hangar Flats Deposit
Frank Church River of No Return Wilderness
Legend
Public Roads
Mineral Resources
Patented Lode Claims
Patented Mill Sites
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History

The project is located in a past-producing area near the historical town of Stibnite. Since the late 1920s, gold, silver, Antimony, Tungsten, and mercury mineralized materials have been mined in the area via both underground and, later, open-pit, creating numerous open pits, underground workings, large-scale waste rock dumps, heap leach pads, spent heap leach ore piles, tailings depositories, a mill site, three town sites, an airstrip, and other disturbances, some of which still exist today.

The current state of the site can be seen in this aerial view:

The burgeoning activity at Stibnite was associated with Tungsten and Antimony mining that supplied strategic minerals needed for the U.S. and Allied efforts during World War II. The war-induced demand for these strategic metals in turn drove development decisions.

Low-grade Tungsten product was shipped to the Metal's Reserve Corporation at Salt Lake City, Utah, the United States Vanadium Corporation near Bishop, California or to the purification plant of the Bradley Mining Company at Boise for further refinement.

Antimony-Tungsten-gold sulphide milling operations ceased in 1952 as a result of lower metal prices following the end of the Korean War, while Mercury operations on the Cinnabar claims continued until 1963.

During World War II and the Korean War, the district is estimated to have produced more than 90% of the US's Antimony and approximately 50% of the US's Tungsten. This is an impressive concentration of

strategic metals from one relatively small area.

Past Production

Mine	Production Years	Short Tons Mines	Recovered Au ozs	Recovered Ag ozs	Recovered Sb Short tons	Recovered Tungsten (MTUs)
Hangar Flats	1928-38	303,853	51,610	181,863	3,758	67
Yellow Pine	1938-92	6,493,838	479,517	1,756,928	40,257	856,189
West End	1978-97	8,156,942	454,475	149,760		
Total		14,954,633	985,602	2,088,551	44,015	856,256

Exploration recommenced in 1974, followed by open pit mining and seasonal heap leaching of oxide gold ores from 1982 to 1997.

Resource

The latest Mineral Resource estimate includes estimates for the three lode gold deposits; Yellow Pine, Hangar Flats and West End, and also reports the Mineral Resource Estimate for the historical tailings deposit, which is unchanged since the PFS in 2014.

Stibnite Project - Resource Estimate

Category		Tonnage (000s)	Gold g/t	Contained Au (000s ozs)	Silver g/t	Contained Ag (000s ozs)	Antimony %	Contained Sb (000s lbs)
Measured								
	Yellow Pine	4,902	2.42	382	3.75	590	0.24	25,831
Indicated	Yellow Pine	45,350	1.72	2,509	2.07	3020	0.09	85,774
	Hangar Flats	25,861	1.44	1,194	3.24	2697	0.15	84,463
	West End	53,469	1.08	1,849	1.31	2259	0.00	-
	Historical Tailings	2,687	1.16	100	2.86	247	0.17	9,817
Total M&I		132,269	1.42	6,034	2.07	8814	0.07	205,885
Inferred								
	Yellow Pine	3,214	0.96	99	0.60	62	0.0	50
	Hangar Flats	12,224	1.12	440	2.64	1037	0.11	28,560
	West End	20,540	1.06	700	1.11	733	0.00	-
	Historical Tailings	191	1.13	7	2.64	16	0.16	662
Total Inferred		36,168	1.07	1,246	1.59	1849	0.04	29,272

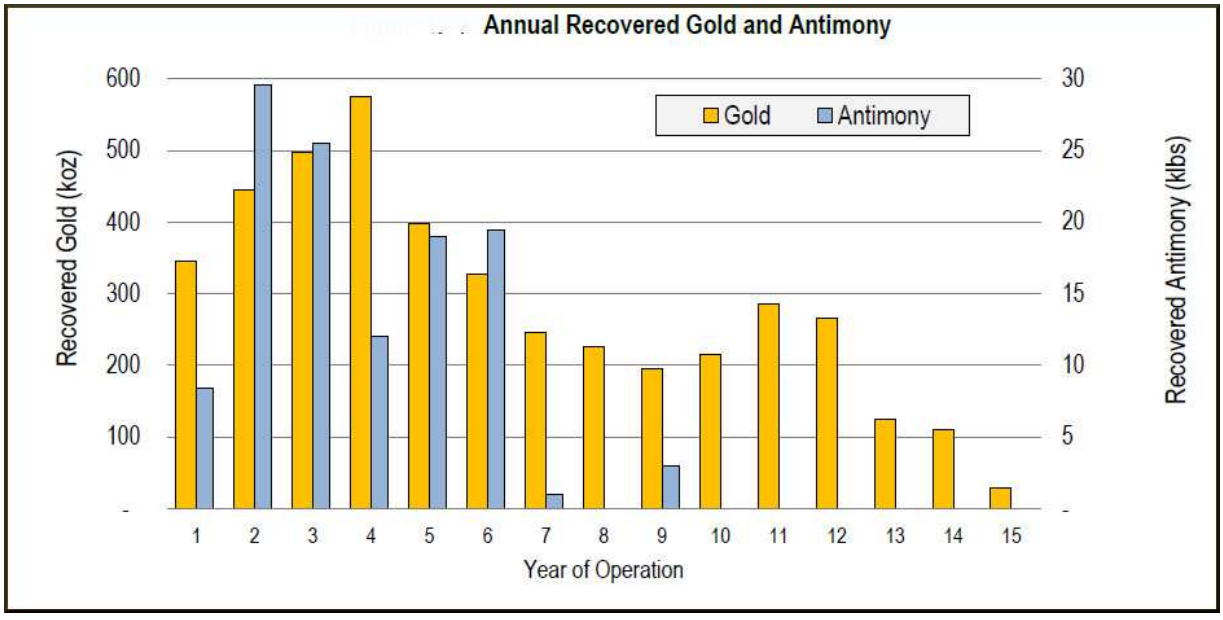
The Latest Feasibility Study (FS)

The FS published in January 2021 was compiled by M3 Engineering & Technology (M3) and superseded the PFS from 2014. The expected production by deposit is shown below:

Production by Deposit

	Gold ozs	Silver ozs	Antimony (tonnes)
Dore Bullion			
Yellow Pine	2,453,000	11,000	
Hangar Flats	364,000	1,000	
West End	1,333,000	839,000	
Historic Tailings	68,000	-	
Revovered Dore Bulllion	4,218,000	851,000	0
Antimony Concentrate			
Yellow Pine	17,000	573,000	41,772
Hangar Flats	4,000	255,000	9,447
Historic Tailings	1,000	31,000	1,113
Antimony Con recovered metals	22,000	859,000	52,333
Total recovered metals	4,240,000	1,710,000	52,333

The average production per annum in the first six years is 8,200 tonnes of Antimony. Below can be seen the recovered metals per annum:



The CapEx

If there is a negative in this project it is the substantial capex. For what is likely to be the largest US gold producer, not owned by one of the gold majors, the capex is understandable. The project does not lend itself towards scaling down throughput and at current gold prices that would be deemed undesirable anyway. The processing plant is by far the largest component of the envisioned costs.

Stibnite Mine - CapEx

	Initial	Sustaining	Closure	Total
Directs				
Mine costs	84.02	118.97		202.99
Processing Plant	433.46	49.04		482.51
On-site infrastructure	190.91	83.89		274.80
Off-site infrastructure	115.94			115.94
Indirect Cost	232.68			232.68
Owner's Costs	38.35			38.35
Offsite Environmental Mitigation	14.40			14.40
Onsite mitigation & closure	3.47	23.48	98.05	125.01
Total CapEx	1,113.24	275.39	98.05	1,486.68
Contingency	149.71	20.35	1.24	171.31
Total CapEx with Contingency	1,262.95	295.74	99.30	1,657.99

The CapEx includes a substantial provision for mine closure and remediation of over $99mn.

Assumptions

The economic analysis completed for this FS assumed that gold and silver production in the form of *doré* with appropriate deductions for payabilities, refining and transport charges. The gold prices selected for the five economic cases vary from $1,350/oz to $2,350/oz.

Antimony prices were assumed to be constant at $3.50/lb ($7,700 per tonne). That latter price has now clearly been left behind by the Antimony price surge. While one might speculate that the price will come back down, there is no swing supply likely to appear to engineer such a fall.

As mentioned earlier the project is subject to a 1.7% NSR Royalty on gold only, with no royalty on silver or antimony.

Stibnite Mine

USD mns

	Year 1	Year2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Revenue - Au & Sb	600.60	804.44	910.00	1,059.24	728.00	593.32	440.44	396.76	360.36
Cost of Mining	51.48	68.95	78.00	90.79	89.20	72.70	53.97	48.61	44.15
Cost of Processing	69.63	93.26	105.50	122.80	142.80	116.38	86.39	77.83	70.69
Royalty	8.91	11.93	13.50	15.71	10.80	8.80	6.53	5.89	5.35
Refining & Transportation	2.31	3.09	3.50	4.07	2.26	1.84	1.36	1.23	1.12
Operating Income (Gold)	468.27	627.20	709.50	825.86	482.94	393.60	292.18	263.20	239.06
Selling/General/Admin. Expenses	18.81	25.19	28.50	33.17	38.07	31.03	23.03	20.75	18.85
Financing	29.78	27.86	27.38	25.46	29.06	29.66	29.78	30.26	30.50
Operating Income (Au & Sb)	419.68	574.15	653.62	767.23	415.82	332.91	239.37	212.20	189.72
Previous Est. Operating Income	396.58	543.21	618.62	726.49	387.82	310.09	222.43	196.94	175.86
Gold production (ozs)	330,000	442,000	500,000	582,000	400,000	326,000	242,000	218,000	198000
Antimony production (tonnes)	3,630	13,158	11,570	5,445	8,167	8,621	454	-	1,361
Gold price (Hallgarten est.)	$1,820	$1,820	$1,820	$1,820	$1,820	$1,820	$1,820	$1,820	$1,820
Antimony price (Hallgarten est.)	$13,000	$13,000	$13,000	$13,000	$13,000	$13,000	$13,000	$13,000	$13,000

Earnings Model

On the following page can be seen our model for the revenues and operating profits of the Stibnite Gold/Antimony Project). In calculating this we used the volumes of gold and Antimony mooted in the Feasibility Study over the first nine years (there is no Antimony revenue after that year).

We have rebased the pricing from our previous coverage and have employed the current Au and Sb prices. This creates an augmented Operating Income line (the previous estimate is highlighted on the blue-shaded line).

We used the cash costs as per the Feasibility Study but without the by-product credits (because we have built Antimony revenues into the top-line instead.

Stibnite Mine - Cash Costs

	Years 1-4		Life of Mine	
	$/st milled	$/oz Au	$/st milled	$/oz Au
Mining	9.71	156.00	8.22	205.00
Processing	13.13	211.00	12.76	318.00
G&A	3.54	57.00	3.43	85.00
Cash Costs Before By-Product Credits	26.38	424.00	24.41	608.00
By-Product Credits	(5.99)	(96.00)	(2.81)	(70.00)
Cash Costs After By-Product Credits	20.40	328.00	21.60	538.00
Royalties	1.69	27.00	1.09	27.00
Refining and Transportation	0.46	7.00	0.24	6.00
Total Cash Costs	22.54	362.00	22.94	571.00

Permitting

Amassing the permits for such a sizeable project is a massive undertaking. A key agreement signed in 2021 was that inked between Perpetua Resources, the EPA and the USDA agreeing an Administrative Settlement Agreement and Order on Consent (ASAOC), giving Perpetua permission to voluntarily clean up key areas of the historical Stibnite mining district that would not otherwise be remedied by the additional legacy restoration proposed in the Stibnite Gold Project.

In recent weeks the company announced that it had been awarded the Clean Air Act Permit to Construct for the Stibnite project from the Idaho Department of Environmental Quality on the 17th of June 2022. The Air Permit mandates compliance with state and federal air standards and regulates emissions from construction and operation of the Project.

During the Air Permit review process, IDEQ assessed the proposed air emissions and prescribed enforceable requirements to reduce air quality impacts from the Project. The final Air Permit is designed to ensure protection of public health and the environment. The emissions allowed by the Air Permit are

consistent with the mine plan currently under review in the federal permitting process. Perpetua submitted the Air Permit application to IDEQ in 2019. During the review process, IDEQ invited the public to comment on drafts of the Air Permit in September 2020, February 2021, and January 2022.

The Air Permit is one of many permits Perpetua is seeking in parallel with the National Environmental Policy Act (NEPA) process.

In response to public comments received on the Draft Environmental Impact Statement (DEIS), the company submitted a refined proposed action to the USFS in December 2020. To ensure a full analysis of the improved project, the USFS will issue a Supplemental Draft Environmental Impact Statement (SDEIS) followed by an opportunity for public comment. The preliminary SDEIS was circulated for cooperating agency review in April 2022. The publication of the SDEIS for public review and comment is expected in the third quarter of 2022.

Financing

Management expects the project to carry 60-70% of debt, and that any equity component of project financing will be manageable.

In late February of 2021, the company announced the appointment of Endeavour Financial as its financial advisor to assist in the evaluation of funding options to support the development of the Stibnite Gold Project.

The last major raise was in August of 2021 when the company launched a marketed public offering of common shares underwritten by B. Riley Securities, Inc. and Cantor Fitzgerald Canada Corporation. The issue was a success with the issuance of 9,523,810 common shares at a price to the public of US$5.25 per share for gross proceeds of US$50mn.

The underwriters also exercised in full the over-allotment option to purchase an additional 1,428,572 common shares also at a price of US$5.25 per common share. The sale of these additional common shares added aggregate gross proceeds to Perpetua of approximately US$7.5mn, bringing the aggregate gross proceeds of the offering to approximately US$57.5mn.

Paulson & Co. Inc. purchased 3,835,810 common shares as part of the offering to maintain its pro rata interest of 40.276% of outstanding common shares.

Antimony – Critical or Strategic or Both?

Is the metal strategic? Thus far it does not have the type of applications that other high-tech metals possess but it is still a key component in the things it is used for and its long term application as an alloy with Lead in ammunition has not gone away. Antimony is a strategic metal used to harden lead in ordnance and lead-acid storage batteries. Antimony Trioxide is a fine, white powder that is used primarily in conjunction with a halogen to form a synergistic flame retardant system for plastics, rubber,

fiberglass, textile goods, paints, coatings and paper. Antimony oxide is also used as a color fastener in paint, as a catalyst for production of polyester resins for fibres and film, as a catalyst for production of polyethylene phthalate in plastic bottles, as a phosphorescent agent in fluorescent light bulbs, and as an opacifier for porcelains. Sodium Antimonate is primarily used as a fining agent (degasser) for glass in cathode ray tubes and as a flame retardant.

Is its supply critical? According to the critical metals lists published by the US, UK, EU, Japan, Australia and Canada it is. Indeed it is one of the very few metals that manages to score on every ranking. The reason for this has been the unyielding (until now) grip that China has had upon the supply and processing of Antimony.

Pass the Ammo

The US has lamentably sunk into a state of almost total dependence upon Chinese supplies of Antimony for its many uses, even to the extent that the product used in defense applications is sourced from China. As is well known this dependence upon China has now triggered alarm bells. However even with amicable relations the Chinese sources of Antimony are declining and, as a result, are unreliable for the medium- to long-term.

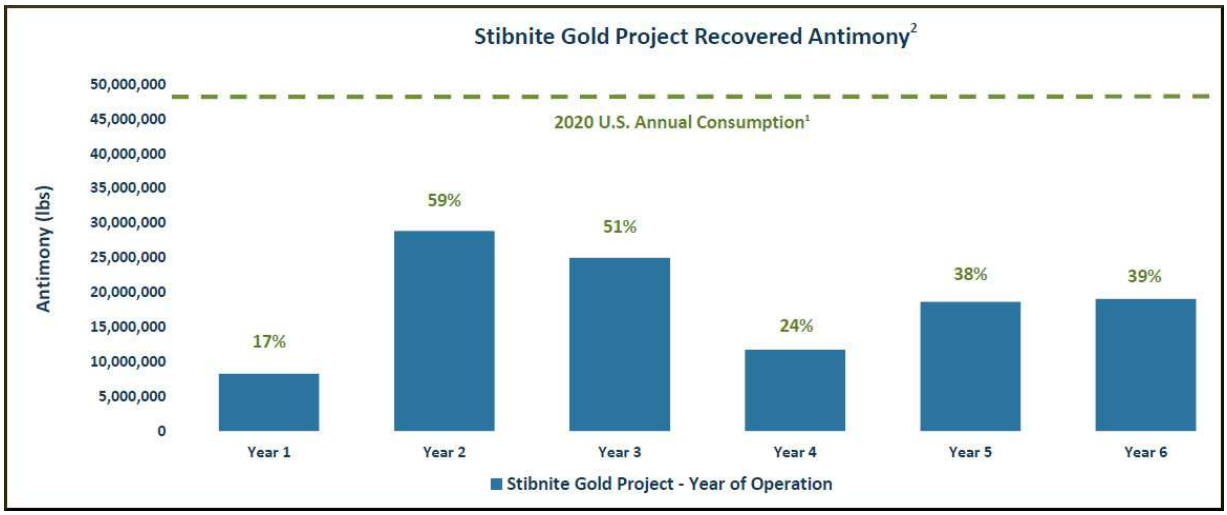
The United States has relied almost entirely on China, and to a lesser extent Russia, in recent years to procure this critical mineral that is vital to producing ammunition. Ergo, antimony is critical to the defense-industrial supply chain and is needed to produce everything from armor-piercing bullets and explosives, as well as sundry other military equipment, such as night-vision goggles. Antimony Trisulphide is a major component in primers for all centre-fired ordnance.

The website, Defense News, reported that “Antimony is now on the front lines of recent congressional efforts to shore up the strategic reserve ……., known as the national defense stockpile. The stockpile includes a multitude of other minerals critical to the defense-industrial supply chain”.

With the US recognizing Antimony as one of the key critical metals in which it has vulnerability the fire is lit under the potential for the future production planned at Stibnite to be deemed to be of national importance.

As noted, the Stibnite mine came to the rescue in WW2 and serviced the voracious appetite of the US war effort for both Antimony and Tungsten. The potential exists for a substantial amount of self-sourcing of Sb yet again with the onset of production at the Stibnite mine.

The table below shows just how important this could be with a meaningful proportion of US needs being satisfied over the next decade by the Stibnite mine:



It should be noted that the mooted US consumption figure (based on USGS data) is a flatline and thus does not calculate in any growth form current applications and includes nothing for the potential demand from molten salt battery applications.

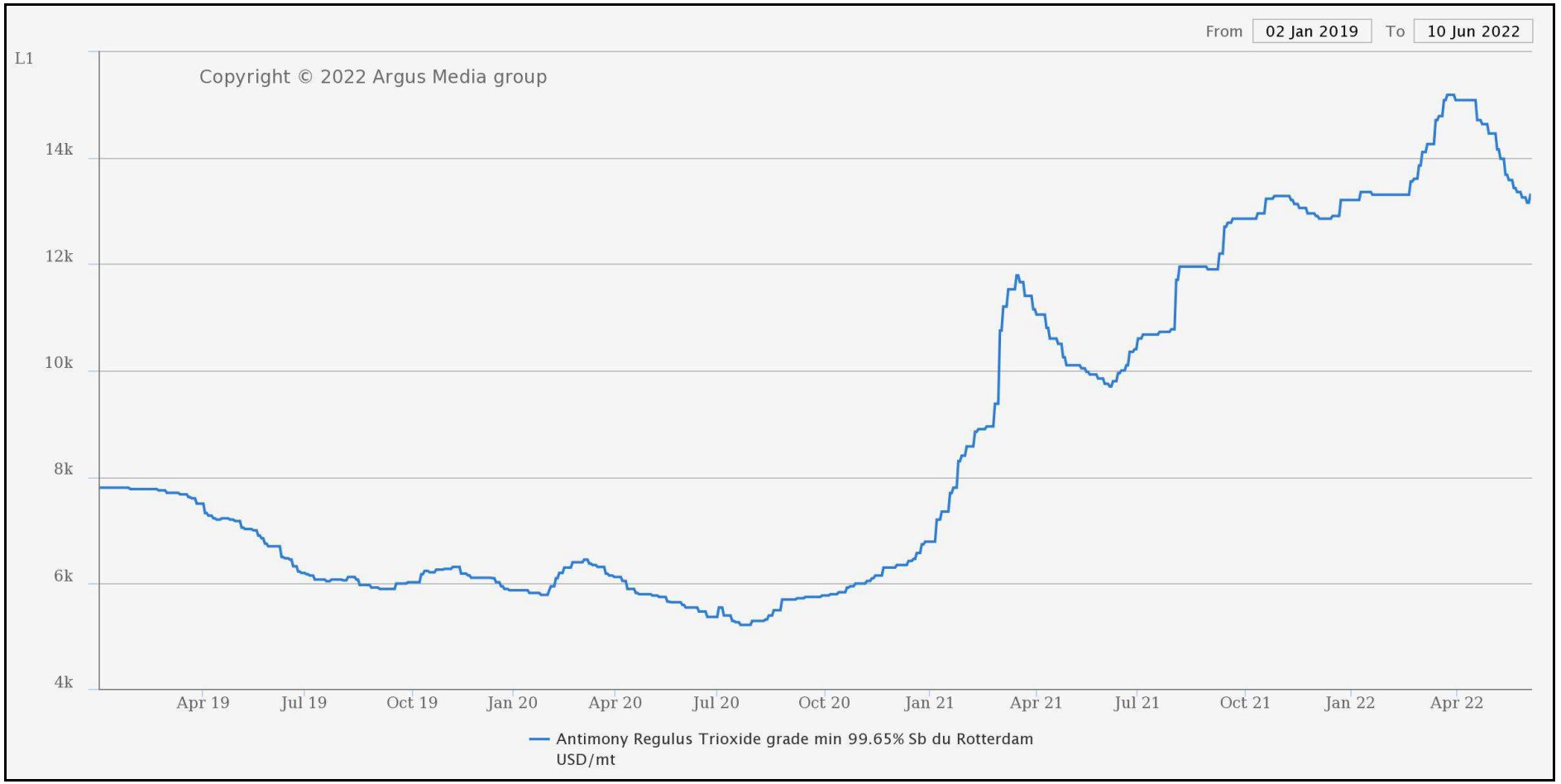
Over a Chinese Barrel

China has long had a very strong position in Antimony. Indeed this is the metal it has been dominant in for the longest. However, like so many other resources this advantage has been squandered through overproduction, predatory pricing and high-grading. China now finds its domestic share of global mine production plunging and to prop up its dominance it has become a leading importer of artisanal and "conflict" ore from all around the world. It then processes this imported ore/concentrate and manages to hold a still dominant position in processed end-product Antimony Trioxide and other products.

Lighting a Fire Under the Price

After a swoon that lasted several years, and sank the prospects of several Antimony wannabes, the price of Antimony started to uptick in 2016. It got to around $8,500 per tonne and then plunged again to around $5,800 on stories that the metal was about to be put in the penalty box by the EU and some American states. This was linked to supposed toxic properties when used in fire retardants, particularly with children's pajamas. This was further complicated by the ever-looming liquidation of the FANYA stockpile, which amounted to around 19,000 tonnes, which was finally sanctioned by Chinese courts over the summer. The latest talk in the trade is that now the FANYA stocks have been bought by one of China's largest Sb producers.

The pandemic compounded matters and the metal reached a decade low near $5,000 per tonne in August of 2020.



Source: Argus Metals

The price (as shown in the chart above) took off from that point onwards on a combination of global shortages caused by the Pandemic and the coup in Burma, long-term underinvestment, chaos in the global shipping industry, declining Chinese production and the arrival of Molten Salt batteries in the commercial marketplace.

The effect was stunning, with Antimony breaking out of a multi-year malaise and becoming the hottest metal in the last eighteen months (though tussling with Tin for that title) doubling in price from around $5,500 to nearly $15,000.

While all metals have retreated on the inflation/interest rate scare and its implications for demand, Antimony has retreated the least of any metal we look at.

Global Production – the Conundrum

As already noted, China has dominated global production of Sb for longer than any other metal. Its monster Twinkling Star mine was found in the 1500s and have been mined commercially since the 1850s. At some points in time it has amounted to 30-40% of global production but while not mined out by any means the mine faces are now kilometres from the mine entrances, very deep and declining grades. The truism that "Antimony mines are forever" holds but not if they become simply unmineable due to reaching their economic and logistical extremities. By all accounts the sometime other world-leading mine, Consolidated Murchison in South Africa still has potential but it has reached extreme depths where heat, water entry and distance again compromise the economics. It was shuttered in 2015.

As a result the largest non-Chinese production is Mandalay Resources with around 3,000 tonnes of Sb per annum and the unknown amount emanating from the Polyus facilities in Russia. Both are associated with gold production. But we might venture that once again (as in 2013) the Sb value of the Costerfield mine's production for Mandalay exceeds the value of the gold. Not that they would trumpet this statistic.

China Crisis?

The drop in production from Twinkling Star and other numerous domestic mines that have long been overexploited through high-grading, has left the Chinese claim to dominance in the metal looking like a threadbare fig-leaf. Hsikwangshan (Twinkling Star), which has 40,000 tpa of capacity for Antimony products, produced 24,000 tonnes in 2021, down from 26,000 tonnes in 2020 and 28,000 tonnes in 2019.

From around 90% of global production at the turn of the century we would now posit that the proportion is 50-60%. However, domination in processing remains well above 80%. This has been achieved through rapacious exploitation of artisanal resources from around the world. This includes the largest chunk from "conflict" sourced material from Burma but also artisanal output from Laos, Honduras, Bolivia etc. This sourcing has kept the figleaf in place but not stopped its deterioration.

The problems of Burma are well known and have directly impacted the global pricing as Chinese has found operating there, with their neo-colonial approach, to not be appreciated. Artisanal mining everywhere is hampered by the water table. In Honduras and Laos, mom-&-pop mines can go down only so far and then expensive drainage and pumping is required. In these two countries in particular the long-term future of artisanal supplies is extremely dubious.

While taking Chinese statistics on Antimony with more than a pinch of salt, Chinese customs data indicated that the country imported 6,557 tonnes of Antimony concentrate during January-March, down by 18% from a year ago. Shipments reached 2,493 tonnes in March, down from 3,671 tonnes a year earlier.

In late April 2022, market observers were shocked to hear that the major Chinese antimony producer, Hsikwangshan (Twinkling Star), had closed its blast furnace because of a lack of concentrate feedstock availability. The suspension was expected to last for at least one month.

All seven private-sector metal producers in Lengshuijiang city, China's largest Antimony production hub, also halted their blast furnaces around the same time because of concentrate supply shortages. The seven private-sector metal producers in Lengshuijiang have a combined capacity of 35,000-40,000 tpa.

Some reports suggested that they might not reopen their furnaces this year because all feedstock supplies will be shipped to large producers such as Hsikwangshan and Chenzhou Mining.

Hsikwangshan, long the world's foremost Antimony mine/processing complex, is so diminished that it can support only 200-300 tpm metal equivalent of Antimony production, so it has to purchase concentrate and metal from other producers to maintain its Trioxide production.

Wire services commented that most producers and traders are upbeat about the market outlook, despite low demand from downstream consumers as global interest rates have started to rise. They find it meaningless to cut offer prices to attract sales because consumers will not make purchases even if prices move lower, after Covid-19 lockdowns forced them to also halt production.

We would concur with the view that prices are likely to move up in the coming months in light of continued tight supply and expected restocking activity from domestic and overseas consumers.

Mass Energy Storage Devices

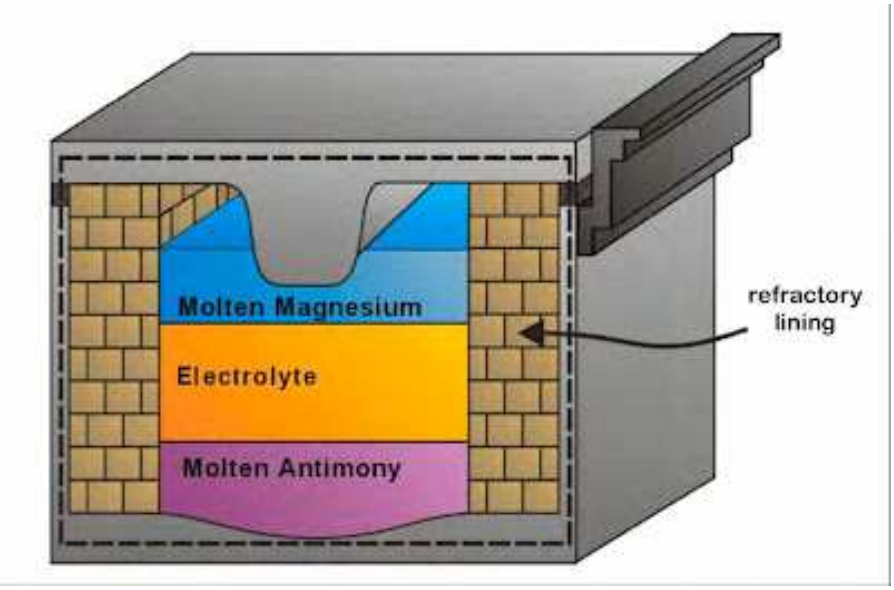
After a long period with no significant new applications for Antimony the appearance on the scene of Molten Salt batteries as mass energy storage devices has upset the delicate supply/demand balance in Antimony.

One of the prime attractions of mass storage devices is that they do not need to be connected to the grid and thus can be in the middle of nowhere bridging the infrastructure gap (and cost) that weighs on emerging economies (and isolated minesites). They can be supplied with the energy they store from

solar or wind sources.

The most commonly touted medium for this type of storage is Vanadium Redox Flow batteries (VRBs) but now liquid metal batteries using molten salts are being added to the mix. The concept however is not new with the idea of using these salts for storing energy going back to the Second World War.

Molten salt is a solid at standard temperature/pressure but enters the liquid phase under elevated temperatures.



Liquid metal batteries can be stored indefinitely (over 50 years) yet provide full power in an instant when required. Once activated, they provide a burst of high power for a short period (a few tens of seconds to 60 minutes or more), with output ranging from watts to kilowatts. The high power is due to the high ionic conductivity of the molten salt, which is three orders of magnitude (or more) greater than that of the sulphuric acid in a Lead–acid car battery

A team of researchers at MIT led by Professor Donald Sadoway worked on a liquid battery system that could enable renewable energy sources to compete with conventional power plants.

Heavy-Hitter Backers

The research was put into a commercial venture, called Ambri, which was initially funded to the tune of $15mn by Bill Gates, energy giant Total, the US Department of Energy's Advanced Research Projects Agency and Khosla Ventures (run by Sun Microsystems co-founder Vinod Khosla). Then in August of 2021 it was reported that Reliance New Energy Solar Ltd (RNESL), a wholly owned subsidiary of Reliance Industries Ltd led a US$144mn fundraising as part of the Indian group's plans to manufacture batteries in its home market. RNESL invest US$50mn to acquire 42.3 million shares of preferred stock in Ambri.

Other major participants included Perpetua's largest shareholder fund, Paulson & Company, and as well as Ambri's extant largest shareholder Bill Gates. Other new investors were Fortistar, Goehring & Rozencwajg Associates and the Japan Energy Fund.

What this means for Sb Demand

Each GWh of Ambri batteries requires less than 1% of current annual production of these (calcium and Antimony) anode and cathode materials. This is the closest we have to divining how much Antimony that the Ambri product line might consume if it gains traction. Current Sb production is around 170,000 tonnes per annum, implying that a Gigawatt of Ambri cell utilizes around 1,700 tonnes of Antimony.

Higher prices are rather a "chicken-and-egg" issue for the likes of Ambri. To be sure of adequate supplies of metal higher prices are needed (probably over $8,000 at least) and yet if they go too high then viability of the economic equation is cast into doubt.

If Liquid Metal Batteries become the "killer application" in grid-linked storage (or non-grid linked) then it potentially lights a fire under Antimony demand and pricing. The announcement that US Antimony (NYSE:UAMY) had secured an offtake deal with Ambri for its output lit a fire under the price of that stock in late 2020.

In early June, Ambri announced the expansion of its manufacturing capacity at a new facility in Milford, Massachusetts. The new facility, Ambri's Innovation Hub, enables the company to significantly broaden its manufacturing operations as it brings its battery systems to commercial markets (having just signed a deal for supplying to a user in South Africa). The Milford facility, which will also be home to an expanded R&D lab and host an on-site Ambri pilot system, more than triples the size of its current manufacturing footprint and allows for a production capacity of 200,000 battery cells per year that will be installed into systems for customers starting in 2023.

To mix some metaphors, molten salt batteries have flown under the radar thus far but definitely have a place in the evolving battery universe and hopefully will take the Antimony market along for the ride.

The Perpetua Shareholder Base

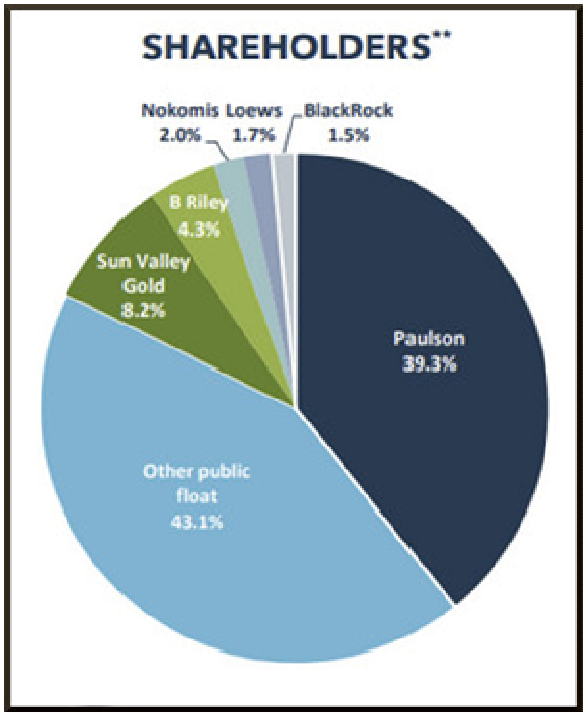
For a mid-tier developer Perpetua has a quite exceptional level of institutional shareholdings. It has long had Gabelli, Franklin and Van Eck on board. The holding of the NY investment manager, Paulson & Company is of more recent vintage, with a position having been initiated in 2016.

The sizeable stake held by Barrick Gold (which was 8.5% in September 2021) was recently disposed of in June 2022 and is believed to have passed into the hands of an institutional investor which is regarded as friendly.

The stake of Sun Valley LLC originally consisted of an equity holding of 1,255,726 Common Shares and unsecured convertible notes (representing just over four million common shares) held by accounts over

which Sun Valley has discretionary trading authority. The 5,295,766 shares represented (at the time of our last writing) approximately 10.26% of the issued and outstanding common shares on an as-converted basis.

The current state of the shareholder distribution, is shown in the pie chart at the right.



In early June the company revealed that Kopernik Global Investors LLC had become a shareholder following a recent market purchase. Kopernik is a global, value-oriented investor with a track record of successful investments, including in the metals and mining space.

Risks

The principal risks from an investment in Perpetua would appear to be:

- A return to a downtrend in gold prices
- A return to low Antimony prices
- Environmental issues with the mine build
- Financing problems

In 2020 gold hit $2,000 per ounce on monetary degradation fears and yet….. ended up confounding its fans yet again when the price retreated $300 from its highs before stabilising. The best way to look at the risk of gold to any operation is to look at the cash cost per ounce and assess the cushion between the production cost (LOM cash cost is US$538 per oz) and the actual selling price of gold. The bigger the margin the less the risk. It is clear that Perpetua does NOT need $2,000 gold to be viable. At today's market cap of ~$230mn Perpetua trades at only ~30% of the project's NPV, using a $1,350/oz gold price.

Until late 2020, Antimony was in one of its regular swoons. The FANYA threat was behind us only to be replaced by the regulator threat (the EU and State of Massachusetts) agitating against fire retardants. This has gone back to being a sleeper issue (but could come back to life). After the nadir in the first weeks of the pandemic the price has not looked back. If production form China continues to lag and artisanals continue to be able to fill the void while demand continues to rise (even before considering the potential from battery demand) then prices would seem to have a floor under them above $12,000 per tonne.

It is seldom that a mining projects leads with the remediation but the aforementioned efforts to clean up old problems around the site and its vicinity show that Perpetua are starting as they mean to carry on. Environmental issues have not reared their head thus far as a hindrance to the development of the

mine plan. With $99mn set aside for mitigation and reclamation upon closure the developers are spending more on this activity than many miners spend on building the whole mine. Over and beyond this the company will be restoring the area pre-construction (ASAOC), during construction (fish tunnel) and during operations (reprocessing tailings, etc).

The CapEx is sizeable on the project and the revival in mining, across the board, has heightened the competition for funds. However, the surge in metal prices has made investors more amenable to loosening their purse strings. If anything the crew at Paulson & Company are skilled at financing and while one would not expect them to fund this exclusively themselves, they have access to sources and entrée at the largest investment banks and streamers/royalty companies that mere miners can only dream of. If prices hold up then financing should not be an issue.

Conclusion

The task was made that much harder during the long financing drought in gold after 2012 (that lasted until 2019). The Antimony potential of the project could not be fully factored in with that metal also suffering from a depressed price after 2014.

The company's fortunes though have "turned on a dime" with Paulson & Company taking the financial reins in recent years and the coincidental resurgence, firstly, of gold and then Antimony more recently.

In this Third Wave of battery metals, Antimony (the prime component in Molten Salt batteries) has joined the ranks of battery metals and the hunt is on for that scarce commodity, the non-Chinese Antimony miner.

While the Antimony price was in somewhat of a regulator-induced swoon in the last two years, the main application in fire retardants has not gone away. In the wake of the pandemic and with the marketplace dry of product, the price has had a fire lit under it by Molten Salt batteries capturing the *Zeitgeist*. This combination was a perfect storm that drove the price from around $5,500 in late 2020 to over $14,000 per tonne.

The main game at the Stibnite mine remains the gold potential and while the yellow metal has retreated from its brief flirtation with the $2,000 threshold, the reality of governments' degradation of their monetary base, all across the Western world, as a response to the pandemic leaves the inflation threat reinvigorated and waiting to rear its ugly head.

Despite the stock having been brutalized in recent months, caught in gold's downdraft, we reiterate our **LONG** rating and our twelve-month target price of $16.10 and we are adding the company to the Model Resources Portfolio.


CA:PPTA Daily
7/08/22
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
Volume
©BigCharts.com
150
100
50
0
Thousands
Aug
Sep
Oct
Nov
Dec
22
Feb
Mar
Apr
May
Jun
Jul

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