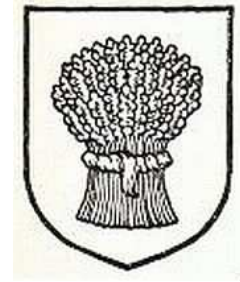


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HALLGARTEN + COMPANY

Sector Coverage

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Germanium/Gallium Opening Shots in the New Cold War

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Germanium/Gallium

Opening Shots in the New Cold War

- + The Chinese too blatantly showed their hand in a clumsy ban of Gallium & Germanium exports which has set off alarm bells in both governments and C-Suites
- + The wake-up call has precipitated a dash for alternative sourcing which is bearing fruit
- + China has given the West a peek preview of how it will move against Western interests, using metals supply as a blackmail tool, in the event of a shooting war over Taiwan
- + The export ban has sent prices of the metals in question back into commercially viable territory for putative producers
- ✗ Rebuilding a Gallium supply chain will take time, though all the mineral resources are at the West's disposal in tailing ponds and waste dumps
- ✗ The Western governments (not just that of the US) must bite the bullet on recreating Strategic Reserves of critical metals, and this has a cost to them (and taxpayers)
- ✗ Many commercial enterprises (e.g. chipmakers) are dependent on these metals and yet are still unreconstructed advocates of Just in Time practices and zero inventory "management"
- ✗ China will almost certainly try spoiling moves when they realise dominance is slipping away and this is almost always in the form of vicious price-cutting

Nihil Novum Sub Sole

Let us start with a truism..... there is no metal which China currently dominates that cannot have control taken back by the West.

Think about this briefly. Except for having the long-time (and rapidly diminishing) largest Antimony mine in the world (operating since the 1500s) China does not have a special advantage in any metal. Indeed, such was its weakness in the seemingly mundane Chromite that it had to spend decades cozying up to Albania's troglodytic Enver Hoxha to guarantee supplies.

China has no clinch hold on the technology either, with much of the brain work having been done in the West decades ago and then having been purloined or having gone off-patent.

Everything that China currently produces in specialty metals can, with a will, be produced by the West or its friends. Blackmail by withholding supplies cannot be a long-term strategy if the West can replicate and exceed China as a source. Already in the Tungsten space, the Chinese have been beaten back while in Rare Earths and Antimony, the country has become a net importer to try and prop up the appearance of dominance (and control).

Big Sticks and Small Carrots

When we were recently writing our review of the takeover battle between Teck and Glencore a colleague said, “don’t forget to mention the Germanium” and we nearly did. It proved to be an important reminder as Germanium (Gallium) became eminently newsworthy only a few weeks later when China decided to turn off the spigots of both metals from the 1st of August 2023. This move was part of the tit-for-tat over Chinese access to Western semi-conductor output. The Chinese ban spurred a surge in Wikipedia and Google traffic as pundits and journalists scurried to get up to speed on these metals. For us, it was propitious as we had been so recently hot off the press with our thoughts. As for Gallium, we happened to be one of the few that also knew where a primary Gallium deposit was hiding in full sight.... Though we were not telling.

While Western chipmakers say they have ample supplies of the two minerals in the short term we do not believe this claim and it represents little more than whistling past the cemetery. Just in Time is their corporate downfall... and may be written on their tombstones. Peking’s action has prompted a scramble to secure new sources, which in the case of Gallium in particular, are available potentially just not currently. China currently accounts for 98% of the Gallium and between 60%-70% of refined Germanium.

In our analysis of the Teck Resources (TSX:TECK, NYSE:TECK) takeover tussle in June, we had noted Glencore’s economy of details when it came to the metals the merged entity would produce. This became even more poignant when one delved deeper and looked at the critical metals/minerals that emanate from Teck’s facilities particularly in light of Glencore’s role as somewhat of a hunter-gatherer for China. When these metals are brought into the harsh light of day one can see reasons why the Pentagon might fire up the Bat Phone to the White House and then the White House would need to put through a hurried call to Ottawa advising “No way, Jose”.

Germanium & Teck

The chief critical metal at risk under potential Glencore control would have been Germanium. Teck controls the Western world’s supply of Germanium metal with nigh on 30% of production. Germanium metal is used as a semiconductor in transistors and other electronic devices, in optic fibre networks and in infrared thermal imaging systems for military use. In recent years, consumption of Germanium military grade infra-red lenses has surged and the metal also has applications in highly efficient solar panels used in space. With applications for Germanium metal in defence and Germanium tetrachloride in fibre optics cable the assault on Teck should be raising some eyebrows in defence circles, that is if they even notice.

The DoD of the US, on its own website cited Nancy Albertson, a chemist and program manager for DLA Strategic Materials as saying ““Mainland China pretty much has a chokehold on the market right now, so if it decided to either ramp up the cost or cut us off completely — and that's not unheard of — that would be a very big issue for us” as she announced an increased effort by the US to recycle Germanium.

The U.S. relies on imports for over 50% of its Germanium needs, and nationwide consumption was about 30,000 kilograms in 2020, according to the U.S. Geological Survey. The Defence Logistics Agency program is expected to yield 2,200 to 3,000 kilograms of high-purity Germanium ingot per annum, nearly 10% of the nation's annual need by recycling decommissioned military equipment. Windows of decommissioned tanks and other military vehicles are also said to be a reliable source of Germanium. This, in turn, will be used in thermal-sensing devices in platforms like Abrams main battle tanks, Bradley Fighting Vehicles, Apache helicopters and naval systems.

The criticality of Teck's output was further evidenced when *force majeure* was declared some five years ago when one of their furnaces blew up, sending Germanium prices sky rocketing.

While a somewhat old statistic, Reuters cited U.S. Geological Survey data showing that China produced more than 70% of the 155 tonnes of total refined Germanium production in 2016. We doubt this dominance would have changed at all in recent times. As is well-known when it comes to the morality of supplying China with critical metals, Glencore, in the view of many, has all the morals of an alley cat. Will the US allow Glencore to achieve a stranglehold on Teck's Germanium output?

Is this a repeat of the US's massive own-goal in allowing the sale of Cabot's specialty fluids division to Sinomine in January of 2019 which gave China dominance of the Cesium market?

Trafigura – Battle of the Titans

Never one to miss an opportunity, the massive trading house Trafigura (in its guise as owner of Nyrstar) entered the fray claiming that the solution to the "Chinese problem" and the US-sourcing of Germanium and Gallium actually lay right under everyone's nose in its tailings storage ponds (shown below) in central Tennessee.



As the owners of the Clarksville zinc processing facility, they claimed to be developing a plan to extract the two minerals from the ponds where for years the company has deposited the residue from its refining of zinc from five mines located in central and eastern Tennessee.

The irony of ironies is that we were covering Nyrstar as far back as 2009. At that time Nyrstar (then an independent Euronext-listed entity reconstituted from the ruins of Oz Minerals/Zinifex had just acquired the East-Tennessee Zinc Mine complex from Glencore Group for US\$126mn. The complex was comprised of three separate mines located within 20 miles of each other and within 250 miles of Nyrstar's Clarksville smelter and Gordonsville zinc mine complex.

Fast forward (well, slow) and now Nyrstar, part of Trafigura after its own pratfall, is on the hunt for government funds finance a Germanium processing circuit at Clarksville. Voice of America reported that industry experts (us, amongst them) were saying that the United States should be willing to pay the price to develop a guaranteed source of the minerals, which are deemed critical for the manufacture of the semiconductors that control electronic devices ranging from smart bombs to refrigerators.

Existing stocks from tailings would be augmented with residue from future zinc processing at a new \$150 million state-of-the-art facility.

Nyrstar's plans, first reported in Tennessee media, are talking of the production of up to 30 tons of Germanium and 40 tons of Gallium a year. That would make up for much of the 43.7 tons of Germanium that China exported in 2022 and its 94 tons of Gallium.

Even though this investment amount is a mere bagatelle for Trafigura, the company says it is exploring funding opportunities from federal and state governments as well as private U.S. sources. Company officials are hopeful that funding will be in place in the next few months and that construction can begin soon afterward. The timeline for the construction's completion of two to two and a half years is realistic

Ultimately, we believe that end-users, over and beyond the government, should be willing to shoulder the added cost of establishing domestic sources for critical minerals such as Gallium and Germanium. This could be done not by "gifting money" to Trafigura but by committing to long term offtakes at commercially attractive/viable levels to create a win-win for producers and end-users. Of course, the loser in this scenario is China.... our heart bleeds for them.

Not the Only Game in Town

Moving on from Germanium to Gallium we were bemused to be asked whether Nyrstar/Trafigura would be using Chinese technology to which we responded that there is nothing new under the sun in Gallium processing and that in fact the Chinese probably lifted the technology from the West in the first place. Some elementary research (i.e. reading no so old USGS reports) rewards one with information that countries such as Hungary and Kazakhstan (and even Slovakia) have been Gallium producers in the last couple of decades.

The United States has not produced primary (low-purity, unrefined) Gallium since 1987 and has none in its Strategic Reserves.

Someone with a longer memory told us of a Gallium plant near Perth in WA and some sleuthing revealed that Rhone Poulenc had a 20-hectare site at Pinjarra being fed material from the aluminium smelter at Kwinana. This plant was put on care & maintenance in 1991 “due to low prices” and this was still around as a viable entity in, at least, 1996.

Then some probing of contacts in the Zinc space revealed the potential of KazZinc and Korea Zinc (re)entering the space for Ga (and Ge).

Pricing

The market for both metals is opaque and “by appointment”. At the best of times trades are sporadic but the sheer lack of transactions since August 1st has left pricing information in the land of folk rumour rather than hard facts. Reports do indicate that both metals are being quoted significantly higher than pre-ban but it seems that those that “have” are sitting on what they’ve got, while those that “don’t” are agonizing in private on what to do.

Chess or Chinese Roulette?

We made an initial comment to reporters that it was a strategic game of chess which prompted the more learned Chess-fans to ask what the end game might be? But upon further reflection it seems more like a game of Russian Roulette in which the Chinese keep taking a bullet. Strategically, if the big game is seizing Taiwan then China has made a major blunder. By signalling to the West which metals that the West is vulnerable to a squeeze on supply, it thus prompts the West to take preventative action. This by

its very nature means that a surprise swoop on China (accompanied by a shutdown of strategic metals supplies) is defanged as a Blitzkrieg Day plus 1 issue in the West because the West will already have girded its loins against such an eventuality. By a cumulative process of these type of predatory actions (e.g. the Rare Earth export ban to China over the Senkaku Islands dispute in 2011 and now this latest) the West has had its wake-up call and lethargically, but eventually, gotten itself out of bed.

Conclusion

Over and beyond losing the surprise “Gotcha” effect in the event of a Taiwan shooting war, China is facing the loss of markets for its output of these metals on a long-term basis. As is becoming increasingly clear, the metals are not unique to China, with common fly-ash from many coal-fired power plants containing Germanium and similarly waste flows from zinc and bauxite smelters being also sources for Gallium. China has no special advantage here.

The reason why the Chinese ended up with dominance in these metals is because they've been prepared to produce and sell these metals at knock-down prices, sometimes at a loss, to make sure that nobody else produces them.

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It used to have cheap production costs (and environmental devil-may-care rules) but China has reached the end of “cheap”, something we predicted in an op-ed in the [The Banker](#) journal as long ago as 2005. China’s share of both metals’ global market should go spiralling down from here. They can try predatory pricing to try and regain a foothold, but that threat can also be nullified if Western end-users are more inclined to go for secure supplies, over cheap supplies. That change of mindset is the main fallout from these tit-for-tat bans and correspondingly China’s main *faux pas* in all this.

In these two metals, in particular, they will see that the global challengers to their dominance are not tin-pot Rare Earth promotorial types as in 2011, but rather Teck Resources, RTZ and Trafigura/Nyrstar (amongst other potential entrants). China should have heeded the variation on the old Pottery Barn rule... you break it, you (don’t) own it.

Important disclosures

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