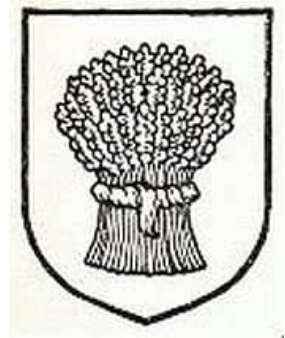


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Thinkpiece

Editor: Christopher Ecclestone
ceccestone@hallgartenco.com

Criticality & China: A Matter of Perspective

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Criticality & China

A Matter of Perspective

- + **The West is not the only player with problems of criticality in the supply of metals and minerals, when China faces similar issues and challenges**
- + **Various metals which are seen as China-dominated are, in fact, challenging for China also (e.g. Antimony, Heavy Rare Earths, Cesium)**
- + **The West has a grip on quite a number of metals that China cannot hope to break, such as Niobium or Beryllium**
- + **Long supply lines make Chinese access to certain minerals sourced in distant locations problematic (e.g. Chrome, Vanadium, Borates, Lithium) in a shooting-war**
- + **China is dependent upon Australia, Chile, Brazil, Indonesia and the Philippines for many basic metals required for a war effort (e.g. copper, iron ore, metcoal, nickel)**
- + **Some access to metals for the Chinese is only as good as the regime in power in some locations, a change of government can turn supply certainty into doubt (e.g. DRC, Zambia, Burma)**
- ✗ **The corruption of criticality lists/rankings by carpetbagging promoters, bending the ears of parochial governments, risks devaluing criticality as a concept**
- ✗ **The West, particularly the US, is so intent on navel-gazing in critical metals that it does not see Chinese encroachment on metals that have low sex appeal**
- ✗ **The US allowed its total dominance of Cesium to transfer to total China dominance at the stroke of a pen**
- ✗ **Russia potentially offers to China a source of almost every desired metal/mineral at relatively close proximity**

Through a Glass Darkly....

For nigh on a decade now the West has been navel-gazing on the issue of criticality and strategic supply of metals. The opening shot was fired by a British Geological Survey document that we suspect they thought would sink without a trace. However, it was launched at a point in time that coincided with the Zeitgeist and the rise of concerns over China dominance of certain metals.

The BGS survey with its quirky methodology had the field to itself for several years. The BGS survey was based on a scoring system that then was sorted from a high score to low score, with most critical supply situation at the top, down to the metals of least concern. This is a contrast to later critical metals surveys by other countries (and the EU) that were binary, with metals/minerals either being critical or not with no gradations or granularity in the listings. Interestingly the BGS list was never updated.

The first wave of other lists began in 2017, but few of these were more than a table from an Excel

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spreadsheet. Justification or rationale for the choices were the least of the “authors” priorities.

At this point the US, Japan and Australia entered the fray with listings. India followed, while in the US a few different agencies weighed in.

Then most recently the carpetbagger phase began, which consisted of Canadian provinces fabricating lists that were basically “Letters to Santa” with the not so hidden hands of promoters behind them.

This leaves us with a final thought that metals seem to be added to these lists, but never removed.

There is increasing risk that Criticality/Risk Lists are having their currency debased and soon shall have no more value than Monopoly money if methodology is not tightened up and some intellectual rigour applied.

As to China

In formulating our thoughts in recent weeks on this plethora of listings we wondered what the obverse of the Western lists would look like, i.e. what would the Chinese list look like.

Have no doubt such things exist but they are not for public, let alone, market consumption. The Chinese know what they want/need and are not about to telegraph it to the West.

Niobium is a clear example of a metal that should never have been on any Western list as almost all the production is in the West (ironically it should be on China’s list for that reason).

We are continuing to hear panic in the halls of power about Lithium and yet day by day the rising tide of projects entering production mean that someday, somehow, Lithium supply and demand will be in balance and at least for the moment most of the new production is outside the Sinosphere, even if Chinese interests own/control some of the prime assets.

Needs & Wants

In economic terms what one needs and wants are quite often different things. China needs a certain amount of Rare Earths for its own purposes and it has those Rare Earths. China wants to totally dominate the REE space and its pricing and to do that it needs to control an overwhelming proportion of the global mining and processing of Rare Earths. But that is a goal that is slipping away from China as overexploitation of a finite resource has left it as a net importer of Heavy Rare Earths. Thus, it is now dependent on “the kindness of strangers” whereas the US for the many metals commodities it lacks is dependent upon “friends”. As is now becoming increasingly clear, China has no friends, excepting maybe North Korea.

One doesn’t, of course, in normal commercial relationships need “friends”, one just needs reliable commercial counterparties. You buy, we sell or vice versa. It is China that has made this game a much more predatory one and in many ways this practice is now turning around to bite it.

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Firstly, we should add a proviso that we saw on a corporate powerpoint a reference to “Chinese Criticality List” that the company in question had excerpted to show that Rare Earths, Phosphate and Fluorspar were on this purported list. However, after searching the internet and questioning the company (with no response) we have come to the conclusion that this is some fake *samizdat* document created in the fertile imaginations of the denizens of Vancouver and West Perth.

In imagining what a *real* Chinese criticality list circulating in the corridors of power in Peking might look like we have taken into consideration those things that China needs not just for its commercial purposes but also in a situation where “the bullets start flying”. Beyond that we have highlighted the metals/minerals that China currently dominates supply. With some of these we have also marked them with an X when there is the danger of China losing dominance.

A Case Study - Cesium

We will not rehearse here the sad story of how the US went from 90% plus domination of the Cesium space to China ending up with the domination in its hands at the stroke of a pen and the exchange of a cheque.

One of the main reasons (besides money) for Cabot Corp’s sale of its specialty fluids division to Sinomines was the Tanco Mine at (under) Bernic Lake in Manitoba was on the way to extinction.

This problem then passed to Sinomines which quickly found Essential Mines (formerly one of our Model Resources Portfolio constituents) that had discovered some pods of pollucite at its Pioneer mine in Western Australia. This was quickly exhausted and then the Chinese were forced to “do whatever” to get the flow of pollucite that came from the Bikita (lithium) mine in Zimbabwe.

The Chinese are now so desperate that they are talking of draining Bernic Lake and turning the old underground mine into an open pit so they can extract the pollucite left in the pillars of the old mine.

This creates a delectable opportunity for the West to extract revenge. Canada is blocking listed companies on its exchanges from even taking minority investments from the Chinese. This then raises the question as to why the Chinese should be allowed to extract what is (ostensibly) the last identified Cesium in North America?

All of this then opens up the possibility that holders of deposits of Rubidium (Cesium’s “ugly sister”) can muscle in on the formates market, basically eating Sinomines’ lunch.

When the Bullets Start Flying

The true test of whether a metal is critical, or not, is what happens when the bullets start flying. With Taiwan high on Xi’s agenda and sabre-rattling a daily occurrence in the South China Sea, the minds in Peking must inevitably turn to the metals & minerals that China would need if it decided to ramp the volume in its disputes.

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As the Germans found in WW2, it requires a lot of *materiel* to run a war and if you don't have it on your own patch, or that of those you invade, you have a problem if there is a sea blockade. China is dependent upon countries like South Africa for Chrome, Manganese and Vanadium. It is dependent upon Chile for copper, DRC for copper, cobalt & tin, Australia for iron ore and metcoal, Brazil for iron ore, Indonesia and the Philippines for nickel, Malaysia and Indonesia for Tin.

There is no love lost with Vietnam, so it will find a **Coalition of the Ornerly** right on its doorstep.

The only country that it can squeeze for resources, with which it shares a border, is Burma, playing somewhat of the role that Romania (with its oil supplies) played for Germany.

Even fence-sitting neutral countries can be blackmailers as the Germans found out when seeking Tungsten from Spain and Portugal and iron ore from Sweden.

The Whys & Wherefores

For our methodology, we have imagined that a copy of China's criticality list has accidentally been left in a forgotten briefcase in a cloakroom of a Manila go-go bar by a visiting Chinese diplomat.

The blue highlighting represents those metals that China currently dominates. The Xs mark the needs rather than the wants. We use the earlier criticality lists of the US, EU and Japan because they predate the arrival of lobbyists on the scene that created distorted lists after the pandemic.

Critical Minerals	China	US (2019)	EU (2017)	Japan
Antimony	X	X	X	X
Arsenic	X	X		
Barytes	X	X	X	
Bauxite	X	X		
Beryllium	X	X	X	
Bismuth	X	X	X	
Borate	X		X	
Cesium	X	X		
Chromium	X	X		X
Cobalt	X	X	X	X
Coking coal	X	X	X	
Fluorspar		X	X	
Gallium		X	X	X
Germanium		X	X	X
Synthetic Graphite	X	X	X	X
Natural graphite	X		X	
Hafnium	X	X	X	
Helium	X	X	X	
Indium	X	X	X	X
Lithium	X	X		X

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Antimony tops this list (for alphabetical reasons) yet is a metal that China has dominated for hundreds of years and yet now faces steeply declining mine output. Only a decade back it had around 90% of the global mined output and similar in the processed output. Now its mined share is closer to 60%. To maintain its market share of the processing end of the business (and thus of pricing – its eternal “big stick”) it has scoured the planet for artisanal sources. It has exploited the exploiters of those deposits and yet as they are infinitely finite (due to the undercapitalization of the operators) and the buying, pricing and shipment of the ore product (rarely even concentrates) is frequently hidden from the governments of these countries, there is a not a good scenario for continued Chinese dominance. However, Antimony is a metal vital for munitions and the US DoD has woken up to the Chinese threat and has, maybe, clandestinely been building a stockpile in the absence of Western production of any consequence.

Then in **Cesium**, as we showed in our case study, China dominates a space that is essentially shrinking from the supply point of view with few identifiable new sources out there.

Fluorspar is a fairly prolific mineral (with equally prolific applications) that has been produced all around the world for hundreds of years. It has ended up under the dominance of China because it brutally beat down the price. There is nothing stopping the West (except lack of willpower) from ramping up production and “taking back control” of this mineral.

Gallium & Germanium are in no shortage of supply. Once again there is a shortage of willpower and the Chinese have long used to predatory pricing to keep the price of these metals just below the levels at which the West would return to producing metals that in many cases it already has above ground in tailings ponds and smelter streams.

Special mention should be made of **synthetic graphite**, this is produced from needle coke, a by-product of petroleum refining and by some accounts, while Chinese is the largest producer of synthetic graphite, it is dependent upon the UK, of all places, for the supply of needle coke.

In **graphite**, which is almost as common as dirt, the Chinese advantage stemmed from not giving a damn about the use of CFCs in processing this mineral hence the reappearance/resurgence of the “hole in the ozone layer”. The West is ramping up production from its many and various graphite deposits and the end is nigh for Chinese dominance and the distance of some of the sources from Mother China.

Notable from our listings is that **Lithium** is not highlighted as being under Chinese control, because it is not, but neither is it critical to any sort of war effort. Frankly, in an outbreak of aggression, EV’s are going to be the least of anyone’s concerns.

Magnesium is totally dominated by China but doesn’t need to be and in fact recent weeks have seen a plan to reactivate production in Romania and there is a copious (potential) supply from *salares* in Latin America, particularly Bolivia.

Rare Earth Elements are China’s “feet of clay”. China is in fact a case study in How to Blow Dominance

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of a Metal. It is now a net importer of Heavy Rare Earths and is massively dependent upon one mine, Bayan Obo (really an iron ore mine) for its Light Rare Earth supplies. Japanese magnet makers are fleeing Chinese onshore processing like the residents of Pompeii fleeing Vesuvius. The cunning *Gweilo* are doing all sorts of devious things at MP Materials, Lynas et al. to undermine Chinese dominance and even worse have discovered monazite sands (right at the end of their nose) which potentially sets the West free from China-dependence in Light Rare Earths. More recently, frantic attempts at price manipulation to scare off the evil foreigners are not working as they did in 2011. Oops....

Critical Minerals	China	US (2019)	EU (2017)	Japan
Magnesium		X	X	X
Manganese	X	X		X
Natural rubber	X		X	
Niobium	X	X	X	X
Phosphate rock/Phosphorus	?		X	X
Platinum-group elements	X	X	X	X
Potash	X	X		
Rare Earth Elements	X	X	X	X
Rhenium	X	X		X
Rubidium	X	X		
Scandium	X	X	X	
Silicon metal			X	
Strontium		X		
Tantalum	X	X	X	X
Tellurium	X	X		
Tin	X	X		
Titanium	X	X		X
Tungsten	X	X	X	X
Uranium	X	X		
Vanadium	X	X	X	X
Zirconium	X	X		X

Strontium is currently dominated by China but this is only a recent conquest as Spain and Mexico have also shared dominance in the past.

Tellurium supplies are as vulnerable for China as its copper supplies are, because it is largely produced as a by-product of copper refining. The West could do much more on this front but, as usual, its costs and laziness on the part of the West that have let Chinese eat the other side's lunch.

Tin may technically have China as the largest miner/processor but again this is a product of the West's massive own goal in letting the Tin Cartel blow itself up in the 1980s and leave most Western players in tatters. Finally, the worm is turning with a number of non-Chinese players appearing. Tin smelting is not rocket science and so ousting China from this sandbox will not be much of a challenge, if there is the will to do so. The biggest new sources are in Central Africa and therefore again this defence metal is very

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deniable to the Chinese military machine.

Tungsten dominance has been wrestled from the West since the 1980s in an attempt to run the German/Swedes out of town in the machine-tool industry. These woke up just in time and back the likes of Almonty and others in the “fightback” and Chinese dreams here (in a metal also crucial for munitions) have become smouldering ashes.

Finally, we might mention the trio of **Titanium/Hafnium/Zirconium** where the Chinese get a three-for-one deal, with the West (particularly Australia or Australian companies) vending Titanium from ilmenite into China with the Hf and Zr almost as a freebie. Once again, deniability exists here in a situation of rising tensions.

Corporate Case Study: Energy Fuels (NYSE: UUUU)

Having excoriated the West for intellectual and financial lassitude in the past, we would however note the changing *Zeitgeist* which presents a greater challenge to the ongoing perception of Chinese dominance.

An example of the changed mood is Energy Fuels, which was already been upsetting the established order of things by processing mineral sands sourced from Chemours (NYSE: CC), removing the radioactive elements then dispatching them to Neo Performance Materials (TSX: NEO) separation facility at Silmet in Estonia for the production of Rare Earth Oxides. We would note that in the first Rare Earth “boom” of 2009-2011, monazite sands were regarded as a no-go area due to their radioactive components.

Energy Fuels has in recent weeks (on April 12) commissioned a 5,000 tpa SX plant dedicated to REE separation in Utah. It is notable that Energy Fuels is the US’s only licensed refiner of uranium ores into yellowcake, which makes it the only location in the USA to which monazite concentrates (containing from 4% - 7% radioactive Thorium) can be shipped, since Energy Fuels is licensed to store Thorium.

To further complicate matters for the Chinese, Energy Fuels upped its game even further in recent days by acquiring, for AUD\$375mn, one of the world’s largest heavy mineral sands producer/developers, Base Resources (ASX: BSE) with operations in Kenya & Madagascar. From these operations it will obtain monazite sands to be processed in the US into individual REEs, along with Titanium (from rutile and ilmenite) and Zirconium and Hafnium (from zircon).

In the regulatory-driven (by the environmentalists) atmosphere of the USA, Energy Fuels stands out as probably the only US company that will ever be licensed to produce yellowcake, Vanadium, and Rare Earths.

Conclusion

The West now obsesses over what China has and it (collectively) does not when relatively speaking, it, collectively has most things and China (where it matters does not).

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And of the things that China dominates, its domination is largely just a product of laziness of the West, failure to invest and China, for a long while, having super low wage costs and almost zero environmental controls. China has been for 40-50 years essentially like Western Europe and the US were in the Victorian Age.

When the Gallium/Germanium “scare” broke out in July/August of 2023, the chickens in the henhouse reacted to the fox with much squawking and flapping of truncated wings but more than half a year on Apocalypse Now has become Apocalypse Delayed and the Chinese measure has not proven to be the end of the world as we know it. Indeed, to the contrary, managers of Chinese enterprisers stuck between the rock and a hard place of having productions quotas to reach and yet having their markets chopped off at the knees have resorted to clandestine shipments over the Vietnamese border to help make the twain meet. The West meanwhile discovered that (pre-internet) there used to be Gallium production in the West, and that Germanium production was as easy as working over tailings ponds at Zinc smelters. Much ado about nothing.

The same can be said for Tungsten, now resurging in the West while Antimony and Rare Earth production out of Chinese mines is plunging due to long term over-exploitation and high-grading. Who would have thought it?

So here we find ourselves in 2024, on the cusp of a precipice of our own making, with China at our side with a similar, or way worse, dilemma with regard to metal/mineral supplies.

Looking at a hypothetical list of China’s wants and needs in the metals/minerals space and overlaying on that distance to the sources thereof and then taking into account that China has very few “friends” indeed, it is not a pretty picture. Even those friends it has (the Belt & Road Crowd) are bought and paid for but can just as easily disappear like gorillas into the mist when there is a call to take sides.

A key issue that should be focused on is “deniability”, i.e. which metals are so far away from China or in potentially hostile hands that China can be denied those metals. Thus, instead of obsessing on what China has got, maybe more time should be spent on what it has not, and how (if the bullets start flying) one can deny it access to those things that might expedite its success in any aggressive moves.

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