

Meanwhile, Back in Tokyo

☒ The Japanese have been very busy for at least the last 15 years attempting to construct, expand, and maintain a total rare earth supply chain for the Japanese domestic manufacturing industry, so that it can break free of China and Chinese involvement. Recent moves by Japanese rare earth permanent magnet (REPM) makers, such as, for example, Hitachi, to move some production to China a step that Hitachi, among others, said just 4 years ago, that they wouldn't do – has been interpreted I think wrongly as a “surrender” to the inevitable dominance of China in the sourcing of raw materials for rare earth permanent magnets. In fact, I suspect that even though Hitachi most likely moved production of commodity (i.e., wide-spec or no spec) REPMs to China, it has, in true Japanese fashion, kept the production of specialized proprietary tight-spec REPMs as well as R&D for REPMs at home, or close to home but not in China.

Hitachi, as an example, is a Tier One supplier to the German OEM automotive transmission supplier, ZfF at its, ZfF's, manufacturing plant in China Grove, North Carolina. REPM alloy made, I suspect, in both China and Japan is shipped from those places to Malaysia where the blocks are machined to shape. Then the shaped magnet alloy is shipped to North Carolina where it is installed and magnetized in ZfF automatic transmissions for, among others, the Ford Motor Company. I doubt that Malaysian labor rates and utilities are much cheaper than their equivalents in mainland China but I think they are no more or not much more than Chinese rates for the same overheads. Malaysia, however, offers Hitachi an added value, a venue where its trade secrets can be less likely to be stolen. Additionally, and perhaps most important of all, the Malaysian machining facility can switch suppliers without political fallout. Magnet alloy made in Japan, Vietnam, or even one day Malaysia or the USA can be substituted for

Chinese made material at any time.

The recent fuss over the operating license for Lynas LAMP facility in Malaysia was due to a previous attempt by Japan's Mitsubishi to process local monazite bearing sands for rare earths in the late 1990s. The result of that venture was a fiasco where the Malaysian government had to pay a substantial sum along with Mitsubishi to clean up a thorium residue issue, and the project was terminated. This did not endear either rare earths or Mitsubishi to Malaysian regulators, and the residue of ill will was the main driver behind the ludicrously named Save Malaysia Stop Lynas movement that held up the license for the LAMP for at least two expensive years.

Nonetheless the Japanese REPM industry has for the last two years been looking at the viability of Malaysia for additional supply chain development due to the availability of didymium from the LAMP and of terbium and dysprosium from xenotime extracted from tin processing residues and from ionic adsorption clays in Sarawak (Malaysian Borneo).

Nearby to Malaysia in Vietnam there is already a variety of Japanese investment in a total rare earth supply chain. The REPM manufacturer, Shinetsu has a magnet alloy/magnet plant there using, among other feed stock, REPM scrap. The Japanese magnet alloy producer, Showa Denko, also has an operation in Vietnam. Toyota operates a plant in Vietnam recovering rare earths from Nickel Metal Hydride batteries as does, I believe, Honda. Toyota is also a principal investor in the development of the Dong Pao rare earth deposit in Vietnam and if and when production begins there it can be apportioned for separation to the two Chinese owned total rare earth separation facilities already operating in Vietnam as well as to the Shinetsu, Showa, and Toyota facilities with separation capabilities and/or alloy and or magnet making capacity. There are at least four solvent extraction plants in Vietnam for the separation of rare earths.

Toyota is also a principal investor in the large (8000 ton per annum capacity) monazite fed separation plant in Kerala, India that is either ready for operation or in operation today.

In Brazil Mitsubishi and/or Sumitomo is processing tin-processing tailings from Pitinga to extract some of the substantial xenotime resident in it. I believe that the separation processing of this xenotime is done in Vietnam, but it may be done in Japan or even China for the account of Mitsubishi's Japanese clients.

In North America we know that Toyota's trading company took a position in Matamec and has looked extensively at many other properties, but politics and environmental issues seem to have inhibited any further Japanese investment in North America.

The Japanese REPM industry has voted with its pocketbook and its engineers for involvement in the global rare earths trade. The purpose of all of this is to make Japanese REPM manufacturers independent of the Chinese total rare earth supply chain.

The USA is very far behind the Japanese in this. Basically this can be ascribed to two reasons:

1. The demand for REPMs in the USA as component parts of goods to be assembled in the USA is less than 1000 tons per year, and
2. No one has re-established even a minimal total domestic American rare earth supply chain here since Magnequench departed.

What the USA needs right now is a 500-1000 ton capacity total rare earth supply chain that is profitable at current pricing. Such an operation would seed a larger capacity supply chain when it becomes necessary due to Chinese internal absorption of their entire output or a real cutoff of our supply, whichever comes first.

China still distorting the rare earth market

It has been a few years since China set its sights on clamping down on illegal mining and exporting of rare earths. And the result? It seems the problem has got worse, not better.

According to Dudley Kingsnorth, REE expert and now professor at Curtin University in Perth, Australia, some 30% of neodymium being sold in China is moving through the illegal channels. One in three magnets contains illegally obtained rare earths. In China, illegal magnets are selling at half the prices obtaining in the official market. The result is twofold: rare earth prices are being suppressed, and the whole REE market is being distorted, with obvious impacts on those trying to get projects up outside China.

And, in another conversation I had this week, Ian Chalmers  of Alkane Resources (ASX: ALK | OTCQX: ANLKY) expressed a few concerns about the impact of the China situation on the global REE industry. He considers that both Japan and South Korea have a false sense of security about REE supplies in the light of the World Trade Organization ruling. They think the REE supply problem has gone away. But, in his view, the new export licensing system and China's planned introduction next month of a new resource tax will see supply to the rest of the world reduced rather than eased.

In the short term, Japan is taking advantage of the availability of illegally mined and exported rare earth elements to get around Chinese restrictions, especially on the elements vital to magnet manufacture. Ian Chalmers agrees with the assessment that some one-third of rare earths mined in

China is being produced outside the official system. He is concerned that, if China does start moving against the illegal mining, ready availability of praseodymium, dysprosium, terbium and neodymium could dry up in as short a time as 12 months.

No one can say for sure whether China will move on the issue of illegal mining. But, given the measures Beijing has taken in recent years to conserve its reserves of strategic and technology metals, it seems strange that the illegal REE sector seems to have got so far out of hand. After all, in January we saw Chinese officials make arrests concerned with smuggling of magnesia out of the country and destined for a South Korean steel maker.

Moreover, with China intent to develop downstream products from its REE output, why allow Japan and others access to those elements and compete with China in the value-adding field?

As Kingsnorth points out, the Chinese rare earths magnet industry demand for praseodymium and neodymium exceeds the production quotas by 10,000 tonnes, effectively condoning illegal mining and processing. He adds: China is moving too slowly to eliminate illegal production. In a recent presentation, he quotes a senior official from the China Rare Earth Industry Association telling a conference in Chengdu that illegal mine output accounts for between 40,000 and 50,000 tonnes a year of rare earth oxides.

Last August China launched a program to stockpile rare earths. The stockpiling was expected to push up domestic prices – after all, the targets were 4,000 tonnes of praseodymium/neodymium oxide, 500 tonnes of Nd oxide, 1,200 tonnes of dysprosium oxide, 300 tonnes of erbium oxide, 500 tonnes of europium oxide, 500 tonnes of terbium oxide, 2,500 tonnes of yttrium oxide and 90 tonnes of lutetium oxide.

But Dudley Kingsnorth comments that prices have not appreciated to any degree in 2014 and 2015. To date the increases have been minimal.



Then there is the question of prices and profitability. Beijing has pressed on with the plan to merge all REE operations into six corporate entities. But just last week two of the more significant miners reported sharp falls in their 2014 profits. They blamed poor demand and weak prices – both of which factors reinforce the concern about the scale of illegal production. REHT saw a 57.4% plunge in its bottom line compared to the 2013 result; at least it stayed in the black, if only to the of equivalent of \$102 million. China Minmetals Rare Earth Co posted a loss, its revenues falling by 64.8%. As Xinhua reported, rare earth prices are at a multi-year low despite a slight rebound at the end of 2015. Xiamen Tungsten also reported losses for 2014 in its rare earth division.

These are three of the six merged entities, the others being Aluminium Corp of China, Guangdong Rare Earth, and China Southern Rare Earth Group.

So far as Alkane is concerned, Chalmers says he is not locked into supplying any customer once the Dubbo project is in production (he says now that will be 2017). He sees European customers still keen not to be beholden to China. In addition, Alkane will be able to compete with Chinese pricing structures (Alkane using the Chinese denominated spot price in its calculations).

NexGen launches new drill campaign amid improving prospects for uranium prices

✘ NexGen Energy ('NexGen', TSXV: NXE) has started a new drill campaign (deploying three diamond rigs) campaign at the Arrow zone in its Rook I property – located within the boundaries of Saskatchewan's Athabasca Basin – as part of its winter 2015 program. NexGen intends to better gauge and identify the geometry of the high-grade uranium mineralization setting exploration targets in basement rocks, starting at about 100 meters below surface level. The Rook I property is open for potential expansion in all directions while the Rook I spans along the Athabasca Basin boundary, featuring several, and previously untested, mineralization targets. NexGen will use a third drill by mid-January to explore a 7km long strike area along the Patterson Conductor Corridor, located north-east and south-west from Arrow.

The British Columbia based NexGen has been most active developing uranium in the Athabasca Basin, where it has 100% holdings and controlling interests in various projects, one of which, the Radio Project, is immediately adjacent to Rio Tinto's Roughrider Deposit. Last fall, NexGen raised about CAD\$ 10 million in a private placement with Cormark Securities Inc. in order to fund additional exploration. NexGen is not just the latest uranium company scouring the Athabasca Basin, hoping to find an amazing deposit that 'ticks all the boxes'. NexGen's technical and management people are professionals, who have looked for the best possible uranium opportunities in most or all of the world's most prolific areas, having determined that the Athabasca Basin holds the best grades. After all, many of the big names in uranium mining are well represented in the region from Cameco/Areva's MacArthur River to Denison/KEPCO's Waterberry Lake.

Now, NexGen has managed to accumulate the largest land holding in the Basin's western side. In other words, NexGen's property has tremendous 'closeology' potential given that Fission Uranium JV has purchased the Patterson Lake South property and Alpha Minerals and itself. Fission could find itself wanting to diversify its risk profile by acquiring additional assets, especially NexGen's Arrow, which is located near PLS. Likewise, that same motivation could prompt the other big players in the Basin to start feeling an attraction for NexGen, including Cameco, Denison, KEPCO and Rio Tinto; NexGen simply has an exciting play and the new drill campaign will help generate additional interest. AS for the subject of interest, uranium prices have not yet recovered from the crash prompted by the Fukushima meltdown in 2011 following a devastating earthquake in Japan. However, in 2015, there are the conditions for uranium to reach or even exceed the USD\$ 50/lb. mark as suggested by Chris Ecclestone. Chris was right in predicting that uranium would pass the USD\$ 40/lb. ceiling in 2014 and the conditions that prompted the increased price and demand are still there.

The Japanese recovery, the Chinese nuclear program (and other ongoing programs, including India, South Africa, Slovakia and even the Republic of Ireland) could push up the price of uranium by 20% in 2015. Even if the Canadian mining industry in general could face more difficulties thanks to the slowdown in the Chinese economy, which will continue to weigh on the price of several metals from iron ore to copper and lead. Yet, the situation for uranium has a high probability of improving because of the firm mandate won by Prime Minister Shinzo Abe last December. Mr. Abe is keen to gradually restart almost all of Japan's nuclear reactors, which would support uranium prices in the medium or even the short term. Just before the Christmas break, Japan announced that two reactors would be approved for operation, adding to the two that were rekindled in 2012. The expectations are for several additional reactors to be gradually rekindled between 2015 and 2018. Moreover,

uranium's November rally was interrupted more by 'circumstance' than by fundamentals.

The market was hit by the confusion generated by the sanctions against Russia. Meanwhile, apart from the political mandate to restore the prominent role of nuclear power generation in Japan, a possible labor dispute at Cameco, the world's largest uranium supplier, could result in a loss of volume of uranium in the international market, prompting a rise in U308 prices. In the mid-term, China plans to build from six to eight reactors a year between 2016 and 2020, which could already start to have an effect on uranium spot prices. Nuclear power produces about 15% of electricity in the world. The increase in energy demand expected in the coming years is a challenge for companies worldwide which need to produce the energy required for economic growth and social development without degrading the environment. Nuclear power is ready to resume its place on center stage as a number of countries are reassessing their energy policies. Many opponents of nuclear energy slowly beginning to admit that it is essential as a transition energy ahead of a wider shift to other renewable sources from wind to solar.